Health & Safety Program

Dan-Ex Contracting Ltd.

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Ambulance:	911
Police:	911
Fire / Rescue:	911
Poison Control	

Alternate Emergency Numbers	
Ambulance:	
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Hospitals		
Hospital	**Address**	**Phone Number**

WorkSafe BC / Workers Compensation Board of BC	(604) 276-3100
	1-888-621-7233
Disaster Services	
Dangerous Goods Incidents	
Environmental Complaint	
Severe Weather Reporting	
Disaster Services Agency	
CCOHS	
Dangerous Goods:	
Industrial Accidents:	

Utilities	
British Columbia One Call	1-800-474-6886
Electric	
Gas	
Water /Sewer	

Other Contacts	

Chapter 1

Company Health & Safety Policy

Policy Statement

The management of ***Dan-Ex Contracting Ltd.*** is committed to providing a safe, healthy, drug free work environment at all of our operating locations. We are dedicated to identifying, correcting and preventing health, safety and environmental hazards that could adversely affect our employees, customers or the general public. Management is committed to ensuring that all applicable regulatory health, safety and environmental protection requirements are complied with and that adequate resources are provided to ensure the health and safety of our employees as well as the preservation of the environment to this end.
It is our policy to provide a healthy and safe work environment for employees at every level through awareness and prevention of occupational injuries and illness.

The objective of our company Health and Safety Program is to reduce work-related accidents (thereby injuries) and illness and to promote health and safety in every task undertaken by employees on behalf of the company.

To this end our Health and Safety Program will include:

1. Implementation of a program for conducting routine health and safety inspections to identify and eliminate unsafe working conditions or practices and control health hazards.
2. A comprehensive health and safety training program for all new and existing personnel.
3. Provisions for the use of personal protective equipment by all employees.
4. Provisions for mechanical and physical safeguards to the maximum extent possible.
5. Company-wide health and safety policies requiring every employee of the company to comply with these policies as a condition of employment.
6. Provisions for a thorough and prompt investigation of every accident to determine its cause; correct the problem and reduce the likelihood of it reoccurring.
7. A safety incentive program for promoting health and safety, encouraging the active participation of all employees, and acknowledging, through rewards, individuals whose safety record exemplifies the standards set forth in this program.

Policy Commitment

Copies of this policy will be posted, distributed and explained to all workers. Compliance with this policy will be reviewed regularly at all employee levels.

Violations will be recorded. Repeated disregard or willful violations of this policy by any subcontractor or employee at any level may be considered cause for discipline in accordance with the Workers Compensation Act and existing laws.

_____
Owner

_____
Date

Environmental Policy

Dan-Ex Contracting Ltd. recognizes that sound environmental policy makes business sense. Our Company is committed to delivering safe, reliable services in an environmentally responsible manner to the clients that we serve. We are committed to pollution prevention; the conservation of resources; and the continual improvement of our environmental management systems and performance.

Policy Commitment

Dan-Ex Contracting Ltd. is committed to:

1. compliance with all levels of environmental legislation, regulations, and accepted standards of environmental protection;
2. providing information on key environmental issues related to Company operations to our clients
3. supporting community-oriented environmental initiatives and programs;
4. providing employees with the information necessary to make informed decisions, and ensuring all employees recognize and understand their responsibility to follow the ***Dan-Ex Contracting Ltd.***'s environmental policies and procedures;
5. updating our Environmental Responsibility Policy on a regular basis; and setting environmental targets, objectives, and programs accordingly.

Copies of this policy will be posted, distributed and explained to all workers. Compliance with this policy will be reviewed regularly at all employee levels.

Violations will be recorded. Repeated disregard or willful violations of this policy by any subcontractor or employee at any level may be considered cause for discipline in accordance with the Workers Compensation Act and existing laws.

_____
Owner

_____
Date

The Workers Compensation Act clearly defines the requirement to provide safe and healthful working conditions for all employees. Therefore, the Health and Safety of our employees is the first consideration in operating this business.

Program Goals

The primary goal of ***Dan-Ex Contracting Ltd.*** is to continue operating a profitable business while protecting employees from injuries or illness. This can be achieved by delegating responsibility and accountability to all involved in this company's operation.

- Responsibility: Having to answer for activities and results.
- Accountability: The actions taken by management to insure the performance of responsibilities.

In other words, to reach our goal of a safe workplace everyone needs to take responsibility and be held accountable.

Benefits of achieving our goals are:

- Minimizing of injuries and accidents
- Minimizing the loss of property and equipment
- Elimination of potential fatalities
- Elimination of potential permanent disabilities
- Elimination of potential OHS fines
- Reductions in Workers' Compensation costs
- Reductions in operating costs
- Having the best "Health and Safety" conditions possible in the workplace

Management Commitment

The management of ***Dan-Ex Contracting Ltd.*** is committed to the company's safety policy, and to provide direction and motivation by:

- Appointing Safety Coordinator(s) and/or Safety Committee Co-chairpersons.
- Establishing company safety goals and objectives.
- Developing and implementing this written Health and Safety program.
- Ensuring total commitment to the Health and Safety program.
- Facilitating employees' safety training.
- Establishing responsibilities for management and employees to follow.
- Ensuring that management and employees are held accountable for performance of their safety responsibilities.
- Establishing and enforcing disciplinary procedures for employees.
- Reviewing the Health and Safety program annually, and revising or updating as needed.

Labour & Management Accountability

All employees, both labour and management, need to understand their responsibilities under WCA rules and be held accountable for complying with the rules as well as the company's related policies.

Health and Safety Program

Purpose

The purpose of the Health and Safety Program is to establish a proactive approach to the elimination of workplace hazards through the policies and procedures contained in this manual, worker participation and training, and through the promotion of constant vigilance by all employees.

Responsibility

It shall be the responsibility of management to implement and monitor this program.

Procedure

The Health and Safety Program shall be based on the following:

A. **Employee training** is the most important and most fundamental requirement of this program. As related to the tasks involved and potential for exposure, employees shall be trained in accordance with the ***Dan-Ex Contracting Ltd.*** core training curriculum. The training may be conducted by competent personnel or others. Employees shall not be assigned job responsibilities until the training associated with job hazards has been completed, and documentation shall be maintained verifying employee participation and comprehension. Frequency of training shall be in accordance with OHS requirements.

B. **Hazard Identification and Control**: ***Glenn Willesen*** shall be responsible for administration of this program. The program shall include identification, analysis, and control of the following elements:

1. Physical hazards are those that can be attributed to the workplace itself and include the worksite or building, machinery, materials, processes, electrical hazards, housekeeping, noise, heat, etc.

   Safety inspections shall be conducted by designated personnel. Any discrepancies found by the inspection shall be corrected and the discrepancy and subsequent corrective actions shall be reviewed by local management.

   Because of the wide variety of work accomplished by ***Dan-Ex Contracting Ltd.***, our field employees are subjected to ever changing physical hazards. It shall be the responsibility of the crew supervisor to survey the worksite prior to the start of operations and weekly thereafter. Should the foreman encounter a situation or hazard that is not familiar or seems irregular, he/she shall contact management and his safety coordinator for advice before proceeding.

2. Chemical hazards are those hazards posed by chemicals inherent or resident in the work place and those chemicals introduced into the workplace by ***Dan-Ex Contracting Ltd.*** or others. It shall be the responsibility of management to implement and monitor the effectiveness of the program as set forth in the Workplace Hazardous Materials Information System (WHMIS) program.

3. Work practices are those tasks, movements, and operations required to accomplish a job. Each segment of the operation may offer real or potential hazards and as such should be scrutinized by personnel trained in hazard recognition. Areas to be addressed include but are not limited to:

   a. The materials involved

   b. The flow of materials and how they are moved and handled

   c. Equipment and machinery involved

   d. Machine guarding/lockout and tagging

e. Process produced hazards (dust, vapours, light, heat, etc.)

f. Personal protective equipment

g. Worker ergonomics

h. Lighting, ventilation, and noise considerations

i. Employee training and experience

Findings generated by hazard assessments shall be reviewed by management and methods shall be developed to minimize or eliminate the hazard.

4. Regardless of the severity, all job-related accidents, injuries, and all occupational illnesses shall be reported and investigated. It shall be the responsibility of management to provide the resources necessary to satisfy this requirement.

   All supervisors and foremen shall receive training in accordance with this procedure and in accordance with *Accident, Injury and Illness Reporting* and *Record Keeping*, and any procedures subsequent to that policy.

   All accident, injury, and illness reports and all investigations of those incidents shall be reviewed, and prevention measures outlined, by management to the respective area where the incident occurred.

C. **Hazard notification** will include all employee communication of real and potential workplace hazards. Specifically, training shall be administered to all employees in accordance with procedures. Additionally, chemical-specific training shall be administered whenever a task requires an employee to come into direct contact with a hazardous chemical or has the potential to be exposed to a hazardous chemical. Hazard notification shall also include all training sessions, notifications, employee suggestions, safety meetings, tailgate meetings, etc., where real or potential workplace hazards are discussed. It shall be the responsibility of ***Glenn Willesen***, foremen and supervisors to ensure that hazards assessments are conducted and that the results of those assessment and subsequent corrective actions are communicated to all affected employees.

D. It shall be the responsibility of ***Glenn Willesen*** to ensure that all records required by this procedure are developed and maintained for a period of not less than _____ years. These records include but are not limited to:

   1. Hazard Assessments

   2. Safety Inspections

   3. Training Documentation (curriculum, materials, tests, rosters, etc.)

   4. Safety meeting records (roster of attendees, subjects discussed, etc.)

   5. Accident/Illness reports and investigations.

   Moreover, management shall implement and employee's safety suggestion program. The program shall allow free expression of ideas and concerns, and shall include a method for anonymous input. All suggestions shall be reviewed by the joint health and safety committee at regularly scheduled meetings.

All records of joint health and safety committee meetings and records detailing actions taken are subject to the requirements of this procedure.

Responsibilities

Company Owner

- Prepare and review at least annually a written company H&S policy.
- Assign and review the development of a program to implement the H&S policy.
- Provide the necessary resources to implement, support, and enforce the company H&S policy and program in accordance with the Workers Compensation Act and the regulations made under the Act.
- Promote the exchange of H&S information with outside groups such as regional labour management H&S committees and trade associations.
- Meet all legal requirements for investigating and reporting critical injuries, accidents, incidents, occurrences, and other events.
- Conduct an annual H&S review with project manager and superintendent.
- Cause a joint health and safety committee (JHSC) to be established and represent management on the committee.
- Attend at least one joint health and safety committee (JHSC) meeting at a project each year.
- Review site training plans for H&S and ensure that adequate resources are available.

Supervisor

Supervisors are responsible for actively supporting health and safety performance in their areas.

Purpose

Employee on-the-job safety is the primary responsibility of every supervisor. Employee safety cannot succeed without the sincere ongoing effort of every supervisor.

- Implement, support, and enforce the H&S program at the project level.
- Communicate with the owner on requirements such as notice of project and notices of accidents and injuries.
- Review the site H&S program with supervisors and subcontractors before they start work, identifying responsibilities and promoting cooperation.
- Oversee site planning and approve a site plan that covers access, traffic control, materials handling, storage, and sanitation.
- Prepare fire protection and emergency response plans.
- Review safe work procedures for the site.
- Direct accident investigations on site. Review and forward reports to head office.
- Ensure that site security and public way protection are provided.
- Identify special site hazards and outline appropriate safe work procedures and training.
- Establish an on-site system for maintaining and processing injury reports, health and safety orders, WHMIS, inspection reports, and other administrative requirements.
- Coordinate H&S functions (for example, safe work procedures and accident investigations) involving owner/client, subcontractors, and direct-hire personnel.
- Perform site inspections at least weekly.

Foreman

Foremen are responsible for actively supporting health and safety performance in their areas.

Purpose

Employee on-the-job safety is the primary responsibility of every foreman. Employee safety cannot succeed without the sincere ongoing effort of every foreman.

- new and young crew members.
- Implement, support, and enforce the H&S program at crew level.
- Conduct weekly H&S talks available from various sources
- Inspect H&S equipment weekly.
- Review H&S aspects of each task with crew.
- Assist in accident investigations.
- Report H&S problems to superintendent and correct hazards immediately where possible.
- Inspect tools and equipment at least weekly and ensure proper maintenance. Ensure that housekeeping is done at least daily.
- Review MSDSs with crew before using hazardous materials.
- Review minutes of JHSC meetings, health and safety orders, and H&S directives with crew.
- Go over job hazard assessment each morning with crew for changes that may have occurred over a 24 hour period. This will be per job-site basis.
- Perform thorough monthly job hazard assessments.

Employees

Employees must recognize their role in safety. That role should involve a responsible attitude for personal safety and the welfare of coworkers and contractors. It is critical to the success of our health and safety program that employees have as their goal the concept that injuries can be prevented.

Employees should:

- Work in accordance with the company H&S policy and program, the project H&S program, the Workers Compensation Act, and the regulations made under the Act.
- Report hazards or unsafe conditions to their supervisor.
- Report all accidents, injuries, and near misses to their supervisor.
- Follow emergency response plans when necessary.
- Clean up their work area at least daily.
- Inspect personal protective equipment (PPE) before use and report any defects or damage to their supervisor.

Contractors/Subcontractors

Contractors/Subcontractors shall take necessary precautions for the safety of personnel on the worksite. Contractors/Subcontractors shall comply with all ***Dan-Ex Contracting Ltd.*** health and safety rules and standards, and applicable federal, provincial, and municipal health and safety laws, rules and regulations necessary to prevent injury to persons or damage to property.

Contractors/Subcontractors should:

- Before starting work, ensure compliance with the project H&S policy and program. Make it clear to employees that failure to comply can result in termination of contract.
- Provide training in the requirements of the project H&S program.
- Coordinate all activities through the site superintendent.
- Provide, inspect, and maintain personal protective equipment (PPE) as required for direct-hire employees.
- Monitor site conditions daily.
- Record—and report where required as an employer—all injuries, accidents, and near misses.
- Clean up work areas at least daily.
- Conduct regular safety talks for employees.
- Provide site-specific training as required.
- Provide compensation and time necessary to employees who participate on the JHSC.
- Provide adequate facilities (toilets/wash-up, tool storage, first aid) for employees.
- Notify site superintendent of any lost-time injuries, medical aid cases, and reportable occurrences on the project.
- Cooperate in accident investigation and reporting.

Health and Safety Representative

- Inspect work areas weekly to identify any hazards.
- Report hazards and make written recommendations to supervisor or superintendent.
- Attend and participate in H&S meetings on site.
- Help in reviewing and implementing the H&S program for the project.
- Assist in accident investigation.

Joint Health and Safety Committee (if applicable)

- Will meet a minimum of ***52*** times per year, or as otherwise agreed.
- Make written recommendations on H&S matters to the superintendent or project manager.
- Assist in reviewing the site H&S program.
- Help to implement and maintain the site H&S program.
- Review inspection and accident reports.
- Review reports from the worker trades committee.
- May assist in arbitrating enforcement issues. Periodically review JHSC membership to ensure that it fairly represents the workforce on site.
- Conduct ***daily*** inspections of the workplace.

Hazard Identification and Control

Regular inspections and procedures for correction provide methods of identifying existing or potential hazards in the workplace, and eliminating or controlling them.

Dan-Ex Contracting Ltd. will examine safe work practices and ensure that they are being followed, and that unsafe conditions or procedures are identified and corrected properly and promptly.

Employees are encouraged to report possible hazardous situations, knowing their reports will be given prompt and serious attention.

Workplace equipment and personal protective equipment will be maintained in good, safe working condition.

Hazards, where possible, will be corrected as soon as they are identified. For those that cannot be immediately corrected, a target date for correction will be set. ***Dan-Ex Contracting Ltd.*** will provide interim protection for workers while hazards are being corrected. A written tracking system will be established to help monitor the progress of the hazard correction process.

Accident/Incident Investigation

- Accidents/incidents will be investigated by trained individuals.
- The primary focus shall be to understand why the accident or incident occurred, and what actions can be taken to preclude recurrence.
- The focus will be on solutions and never on blame.
- Investigations will be documented, and adequately identify the causes of the accident or near-miss occurrence.

Young and New Worker Orientation and Training

Young and New Workers will be provided with:

- The name and contact information for the young or new worker's supervisor
- The employer's and young or new worker's rights and responsibilities under the Workers Compensation Act and OHS Regulation including the reporting of unsafe conditions and the right to refuse to perform unsafe work
- Workplace health and safety rules
- Hazards to which the young or new worker may be exposed, including risks from robbery, assault or confrontation
- Rules for working alone or in isolation
- Information on violence in the workplace
- Personal protective equipment, training and proper use
- The location of first aid facilities and means of summoning first aid and reporting illnesses and injuries
- Training in Emergency Procedures
- Instruction and demonstration of the young or new worker's work task or work process
- The employer's health and safety program, if required
- WHMIS information requirements as applicable to the young or new worker's workplace

- Contact information for the joint health and safety committee or the worker health and safety representative, as applicable to the workplace

Additional Orientation and Training

Young or New workers will receive additional orientation and training if:

- A workplace observation reveals that the young or new worker is not able to perform work tasks or work processes safely, or
- It is requested by the young or new worker

Periodic Program Evaluation

A periodic review is scheduled to look at each critical component in our Health and Safety plan to determine what is working well and what changes, if any, are needed.

All employees are encouraged to participate by keeping the employer informed of their concerns regarding the elements of this Health and Safety plan.

Chapter 2

General Safety Rules/Safe Practices

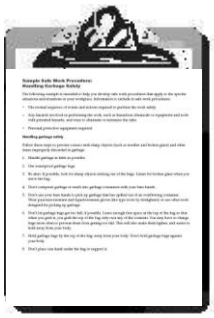
Glenn Willesen is responsible for the implementation and enforcement of the following safety rules. Disciplinary procedures will be enforced.

Employee Safety Training & Disciplinary Procedures

The WCA requires that employees be trained in the safe methods of performing their job. ***Dan-Ex Contracting Ltd.*** is committed to instructing all employees in safe and healthful work practices. Awareness of potential hazards, as well as knowledge of how to control them, is critical to maintaining a safe and healthful work environment and preventing injuries. To achieve this goal, we will provide training to each employee on general safety issues and safety procedures specific to that employee's work assignment.

Every new employee will be given instruction by their supervisor/foreman in the general safety requirements of their job. A copy of our Code of Safe Practices shall also be provided to each employee. Tailgate or toolbox safety meetings will be conducted periodically. All training will be documented on the forms provided.

Managers, superintendents and foremen will be trained at least twice per year on various accident prevention topics.



Training provides the following benefits:

- Makes employees aware of job hazards
- Teaches employees to perform jobs safely
- Promotes two way communication
- Encourages safety suggestions
- Creates interest in the safety program
- Fulfills WCA requirements

Employee training will be provided at the following times:

- All new employees will receive a safety orientation their first day on the job.
- All new employees will be given a copy of the Code of Safe Practices and required to read and sign for it.
- All field employees will receive training at tailgate or toolbox safety meetings held at the job site.
- All employees given a new job assignment for which training has not been previously provided will be trained before beginning the new assignment.
- Whenever new substances, processes, procedures or equipment that represent a new hazard are introduced into the workplace.
- Whenever The COMPANY is made aware of a new or previously unrecognized workplace hazard.
- Whenever management believes that additional training is necessary.
- After all serious accidents.
- When employees are not following safe work rules or procedures.

Training topics will include, but not be limited to:

- ☐ Employee's safety responsibilities
- ☐ General safety rules
- ☐ Code of Safe Practices
- ☐ Safe job procedures
- ☐ Use of hazardous materials
- ☐ Use of equipment
- ☐ Emergency procedures
- ☐ Safe lifting and material handling practices
- ☐ Use of boom and scissor lifts
- ☐ Use of fall-protection
- ☐ Contents of safety program
- ☐ Emergency procedures

Documentation of Training

All employee safety training will be documented on one of the following three forms:

1. New Employee Safety Orientation
2. Specialized, formal employee training plans (confined spaces, fall protection, lockout/tagging, first aid, etc.)
3. Tailgate/Toolbox Safety Meeting Report

The following informal training methods will be used. Actual demonstrations of the proper way to perform a task will be used in most cases, for example:

- Tell them how to do the job safely
- Show them how to do the job safely
- Have them tell you how to do the job safely
- Have them show you how to do the job safely
- Follow up to ensure they are still performing the job safely

Safety Communication

Employee safety communication procedures are designed to develop and maintain employee involvement and interest in the Health and Safety Program. These activities will also ensure effective communication between management and employees on safety related issues that is of prime importance to The COMPANY.

The following are some of the safety communication methods that may be used:

- Tailgate/Toolbox safety training with employees that encourage participation and open, two-way communication.
- New employee safety orientation and provision of the Code of Safe Practices.
- Provision and maintenance of employee bulletin boards discussing safety issues, accidents, and general safety suggestions.
- Written communications from management or the Safety Coordinator, including memos, postings, payroll stuffers, and newsletters.
- Anonymous safety suggestion program.

Employees will be kept advised of highlights and changes relating to the safety program. The Foremen shall relay changes and improvements regarding the safety program to employees, as appropriate. Employees will be involved in future developments and safety activities, by requesting their opinions and comments, as necessary.

All employee-initiated safety related suggestions shall be properly answered, either verbally or in writing, by the appropriate level of management. Unresolved issues shall be relayed to The Safety Coordinator.

All employees are encouraged to bring any safety concerns they may have to the attention of management. ***Dan-Ex Contracting Ltd.*** will not discriminate against any employee for raising safety issues or concerns.

This company also has a system of anonymous notification whereby employees who wish to inform the company of workplace hazards without identifying themselves may do so by phoning or sending written notification to the following address:

Enforcement of Safety Policies

The compliance of all employees with The Company's Health and Safety Program is mandatory and shall be considered a condition of employment.

The following programs will be utilized to ensure employee compliance with the safety program and all safety rules:

- Training programs
- Retraining
- Optional safety incentive programs
- Disciplinary action

Training Programs

The importance of safe work practices and the consequences of failing to abide by safety rules will be covered in the New Employee Safety Orientation and at Tailgate/Toolbox Safety meetings. This will help ensure that all employees understand and abide by The Company's safety policies.

Retraining

Employees that are observed performing unsafe acts or not following proper procedures or rules will be retrained by their foreman or supervisor. A Safety Contact Report may be completed by the supervisor to document the training. If multiple employees are involved, additional safety meetings will be held.

Safety Incentive Programs

Although strict adherence to safety policies and procedures is required of all employees, the company may choose to periodically provide recognition of safety-conscious employees and jobsites without accidents through a safety incentive program.

Disciplinary Action

The failure of an employee to adhere to safety policies and procedures established by The COMPANY can have a serious impact on everyone concerned. An unsafe act can threaten not only the health and well being of the employee committing the unsafe act but can also affect the safety of his/her coworkers and/or customers. Accordingly, any employee who violates any of the company's safety policies will be subject to disciplinary action.

Note: Failure to promptly report any on-the-job accident or injury, on the same day as occurrence, is considered a serious violation of The Company’s Code of Safe Practices. Any employee who fails to immediately report a work-related accident or injury, no matter how minor shall be subject to disciplinary action.

Employees will be disciplined for infractions of safety rules and unsafe work practices that are observed, not just those that result in an injury. Often, when an injury occurs, the accident investigation will reveal that the injury was caused because the employee violated an established safety rule and/or safe work practice(s).

In any disciplinary action, the foreman should be cautious that discipline is given to the employee for safety violations, and not simply because the employee was injured on the job or filed a Workers' Compensation claim.

Violations of safety rules and the Code of Safe Practices are to be considered equal to violations of other company policy. Discipline for safety violations will be administered in a manner that is consistent with The Company's system of progressive discipline. If, after training, violations occur, disciplinary action will be taken as follows:

1. Oral warning. Document it, including date and facts on the "Safety Warning Report" form. Add any pertinent witness statements. Restate the policy and correct practice(s).
2. Written warning. Retrain as to correct procedure/practice.
3. Written warning with suspension.
4. Termination

As in all disciplinary actions, each situation is to be carefully evaluated and investigated. The particular step taken in the disciplinary process will depend on the severity of the violation, employee history, and regard to safety. Foremen and superintendents should consult with the office if there is any question about whether or not disciplinary action is justified. Employees may be terminated immediately for willful or extremely serious violations. Union employees are entitled to the grievance process specified by their contract.

Note: Consistency in the enforcement of safety rules shall be exercised at all times.

Code of Safe Practices

Dan-Ex Contracting Ltd. will maintain a "Health and Safety Program" conforming to the best practices of organizations of this type. To be successful, such a program must embody the proper attitudes toward injury and illness prevention on the part of supervisors and employees. It also requires cooperation in all Health and Safety matters, not only between supervisor and employee, but also between each employee and his or her co-workers. Only through such a cooperative effort can a safety program in the best interest of all be established and preserved. Health and Safety in our business must be a part of every operation.

The Company's Health and Safety Program includes:

- Providing mechanical and physical safeguards to the maximum extent possible.
- Conducting a program of Health and Safety inspections to find and eliminate unsafe working conditions or practices, to control health hazards, and to comply fully with the Health and Safety standards for every job.
- Training all employees in good Health and Safety practices.
- Providing necessary personal protective equipment and instructions for its use and care.
- Developing and enforcing Health and Safety rules and requiring that employees cooperate with these rules as a condition of employment.
- Investigating, promptly and thoroughly, every accident to find out what caused it and to correct the problem so that it will not happen again.
- Setting up a system of recognition and awards for outstanding safety service or performance.

We recognize that the responsibilities for Health and Safety are shared:

- The Company accepts the responsibility for leadership of the health and safety program, for its effectiveness and improvement, and for providing the safeguards required to ensure safe conditions.
- Supervisors are responsible for developing the proper attitudes toward Health and Safety in themselves and in those they supervise, and for ensuring that all operations are performed with the utmost regard for the Health and Safety of all personnel involved, including themselves.
- Employees are responsible for wholehearted, genuine operation with all aspects of the Health and Safety Program including compliance with all rules and regulations—and for continuously practicing safety while performing their duties.

General Safety Rules

Dan-Ex Contracting Ltd. employees shall follow these safe practice rules, render every possible aid to safe operations, and report all unsafe conditions or practices to their supervisor. Failure to abide by the Code of Safe Practices may result in disciplinary action up to and including termination.

- Supervisors shall insist that employees observe and obey every rule, regulation, and order necessary to the safe conduct of the work, and shall take such action necessary to obtain compliance.
- If you are unsure of the safe method to do your job, STOP and ask your supervisor. Ignorance is no excuse for a safety violation.
- All employees shall be given frequent accident prevention instructions. Instructions, practice drills and articles concerning workplace Health and Safety shall be given periodically.

- No one shall knowingly be permitted to work while the employee's ability or alertness is impaired by fatigue, illness, and prescription or over the counter drugs. Employees who are suspected of being under the influence of illegal or intoxicating substances, impaired by fatigue or an illness, shall be prohibited from working.
- Anyone known to be under the influence of alcohol and/or drugs shall not be allowed on the job while in that condition. Persons with symptoms of alcohol and/or drug abuse are encouraged to discuss personal or work-related problems with the supervisor/employer.
- Employees should be alert to see that all guards and other protective devices are in proper places and adjusted, and shall report deficiencies. Approved protective equipment shall be worn as applicable.
- Horseplay, scuffling, fighting and other acts that tend to have an adverse influence on the safety or well being of the employees are prohibited. Do not run on the job site or in the shop or office area.
- Work shall be well-planned and supervised to prevent injuries when working with equipment and handling heavy materials. When lifting heavy objects, employees should bend their knees and use the large muscles of the leg instead of the smaller muscles of the back. Back injuries are the most frequent and often the most persistent and painful type of workplace injury.
- Workers shall not handle or tamper with any electrical equipment, machinery or air or water lines in a manner not within the scope of their duties, unless they have received instructions from their supervisor. Do not operate equipment that you are not familiar with. Do not attempt to use such equipment until you are fully trained and authorized.
- Keep your work area clean, free of debris, electrical cords and other hazards. Immediately clean up spilled liquids.
- Always notify all other individuals in your area who might be endangered by the work you are doing.
- A red tag system identifies equipment that is NOT to be operated, energized or used. All lock-out/tag-out notices and procedures must be observed and obeyed.
- Do not block exits, fire extinguishers, first aid kits, emergency equipment, electrical panels, or traffic lanes.
- Do not leave tools, materials, or other objects on the ground that might cause others to trip and fall.
- Do not distract others while working. If conversation is necessary, make sure eye contact is made prior to communicating.
- Employees shall not enter manholes, underground vaults, chambers, tanks, silos, or other similar places that receive little ventilation, unless it has been determined that it is safe to enter.
- Materials, tools, or other objects shall not be thrown from buildings or structures until proper precautions are taken to protect others from the falling objects.
- Employees shall cleanse thoroughly after handling hazardous substances, and follow special instructions from authorized sources.
- Gasoline or other flammable liquids shall not be used for cleaning purposes.
- No burning, welding, or other source of ignition shall be applied to any enclosed tank or vessel, even if there are some openings, until it has first been determined that no possibility of explosion exists, and authority for the work is obtained from the foreman or superintendent.
- Any damage to scaffolds, falsework, or other supporting structures shall be immediately reported to the foreman and repaired before use.
- Possession of firearms, weapons, illegal drugs or alcoholic beverages on company or customer property or the job site is strictly prohibited.
- All injuries shall be reported promptly to your supervisor so that arrangements can be made for medical and/or first-aid treatment.

Dan-Ex Contracting Ltd.

Code of Safe Practices Receipt

This is to certify that I have received a copy of The Company Code of Safe Practices.

I have read these instructions, understand them, and will comply with them while working for the company.

I understand that failure to abide by these rules may result in disciplinary action and possible termination of my employment with this COMPANY.

I also understand that I am to report any injury to my foreman or superintendent immediately and report all safety hazards.

I further understand that I have the following "Safety" rights:

- I have the right to refuse work in any area I feel is not safe.
- I am entitled to information on any hazardous material or chemical I am exposed to, as well as any other hazards while working.
- I am entitled to see a copy of the Health and Safety regulations relevant to the workplace.
- I have the right to participate in the ongoing health and safety of this company (i.e. I may suggest health and safety concerns, offer ideas to improve health and safety, etc.).
- I will not be discriminated against for reporting safety concerns.

Employee Name	Signature	Date

Supervisor Name	Signature	Date

Notes:

Chapter 3

Hazard Assessment, Recognition, & Control

Dan-Ex Contracting Ltd. is committed to providing a safe and hazard free workplace. It our policy to use the "recognize, assess and control" method for dealing with hazards.

Definitions

Hazard: is any practice, behaviour, condition, or combination that can cause injury or illness in people or damage to property.

Hazard Recognition: means noting a "suspected" hazard, because of its potential to harm or damage, or having it brought to your attention. The alert may come as a personal opinion or concern.

Hazard Identification: is a skill used by a trained individual who has the knowledge to make this determination.

Hazard Assessment: means evaluating the degree of risk and exposure to the suspected or identified hazard.

Health hazards include:

- chemical agents (solids, liquids or gases)
- physical agents (forms of energy or force such as sound, heat or electricity)
- biological agents (microorganisms from plant, animal or human tissue)
- ergonomic hazards (consequence of poor equipment, workstation design or work activity design).

Safety hazards

These have the potential to cause traumatic injury or death. They include:

- machinery and equipment related hazards
- energy hazards (falls, struck by incidents, kinetic, released energy)
- confined space hazards and
- material handling hazards

Mike Mertz will inspect all job-sites and facilities for hazards. Inspections of the job-site and or facility shall be performed at least ***daily***. During the course of inspection if a hazard is identified it is immediately corrected. If the hazard is not immediately correctable, all appropriate personnel shall be notified and the hazard shall be clearly identified by signs, barricades, or other warnings.

Assessments shall include if necessary:

- detailed inspections and/or testing of hazards
- physical observation of work practices
- investigations of near misses
- conducting interviews of workers or reviewing records such as first-aid records or minutes of joint health and safety meetings.

Self-Inspection for OHS/WCA Compliance

The scope of self-inspections should include the following:

- Processing, Receiving, Shipping and Storage — equipment, job planning, layout, heights, floor loads, projection of materials, materials-handling and storage methods, and training for material handling equipment.
- Building and Grounds Conditions — floors, walls, ceilings, exits, stairs, walkways, ramps, platforms, driveways, and aisles.
- Housekeeping Program — waste disposal, tools, objects, materials, leakage and spillage, cleaning methods, schedules, work areas, remote areas, and storage areas.
- Electricity — equipment, switches, breakers, fuses, switch-boxes, junctions, special fixtures, circuits, insulation, extensions, tools, motors, grounding, and Canadian Electrical Code compliance.
- Lighting — type, intensity, controls, conditions, diffusion, location, and glare and shadow control.
- Heating and Ventilation — type, effectiveness, temperature, humidity, controls, and natural and artificial ventilation and exhaust.
- Machinery — points of operation, flywheels, gears, shafts, pulleys, key ways, belts, couplings, sprockets, chains, frames, controls, lighting for tools and equipment, brakes, exhausting, feeding, oiling, adjusting, maintenance, lockout/tagging, grounding, work space, location, and purchasing standards.
- Personnel — experience training, including hazard identification training; methods of checking machines before use; type of clothing; personal protective equipment; use of guards; tool storage; work practices; and methods of cleaning, oiling, or adjusting machinery.
- Hand and Power Tools — purchasing standards, inspection, storage, repair, types, maintenance, grounding, use, and handling.
- Chemicals — storage, handling, transportation, spills, disposals, amounts used, labelling, toxicity or other harmful effects, warning signs, supervision, training, protective clothing and equipment, and hazard communication requirements.
- Fire Prevention — extinguishers, alarms, sprinklers, smoking rules, exits, personnel assigned, separation of flammable materials and dangerous operations, explosive-proof fixtures in hazardous locations, and waste disposal.
- Maintenance, including tracking and abatement of preventive & regular maintenance — regularity, effectiveness, training of personnel, materials and equipment used, records maintained, method of locking out machinery, and general methods.
- Personal Protective Equipment — type, size, maintenance, repair, storage, assignment of responsibility, purchasing methods, standards observed, training in care and use, rules of use, and method of assignment.
- Transportation — motor vehicle safety, seat belts, vehicle maintenance, and safe driver programs.
- Review — evacuation routes, equipment, and personal protective equipment.

Company: _____ Location: _____

Inspector(s): _____ Date: _____

EMPLOYER POSTINGS

Y N

- ☐ ☐ Are all the required workplace posters displayed in a prominent location where all employees are likely to see them?
- ☐ ☐ Are emergency telephone numbers posted where they can be readily found in case of emergency?
- ☐ ☐ Where employees may be exposed to any toxic substances or harmful physical agents, has appropriate information concerning employee access to medical and exposure records and "Material Safety Data Sheets" been posted or otherwise made readily available to affected employees?
- ☐ ☐ Are signs concerning "Exiting from buildings," room capacities, floor loading, biohazards, exposures to x-ray, microwave, or other harmful radiation or substances posted where appropriate?
- ☐ ☐ Is the Summary of Occupational Illnesses and Injuries posted?

RECORDKEEPING

Y N

- ☐ ☐ Are all occupational injury or illnesses, except minor injuries requiring only first aid, being recorded as required?
- ☐ ☐ Are employee medical records and records of employee exposure to hazardous substances or harmful physical agents up-to-date and in compliance with current OHS regulations?
- ☐ ☐ Are employee training records kept and accessible for review by employees, when required by OHS regulations?
- ☐ ☐ Have arrangements been made to maintain required records for the legal period of time for each specific type record? (Some records must be maintained for many years.)
- ☐ ☐ Are operating permits and records up-to-date for such items as elevators, air pressure tanks, and liquefied petroleum gas tanks?

HEALTH AND SAFETY PROGRAM

Y N

- ☐ ☐ Do you have an active health and safety program in operation that deals with general health and safety program elements as well as the management of hazards specific to your worksite?
- ☐ ☐ Is one person clearly responsible for the overall activities of the health and safety program?
- ☐ ☐ Do you have a safety committee or group made up of management and labour representatives that meets regularly and report in writing on its activities?
- ☐ ☐ Do you have a working procedure for handling in-house employee complaints regarding health and safety?
- ☐ ☐ Are you keeping your employees advised of the successful effort and accomplishments you and/or your safety committee have made in assuring they will have a workplace that is safe and healthful?
- ☐ ☐ Have you considered incentives for employees or workgroups who have excelled in reducing workplace injury/illnesses?

MEDICAL SERVICES AND FIRST AID

Y N

- ☐ ☐ Is there a hospital, clinic, or infirmary for medical care in proximity of your workplace?
- ☐ ☐ If medical and first-aid facilities are not in proximity of your workplace, is at least one employee on each shift currently qualified to render first aid?
- ☐ ☐ Have all employees who are expected to respond to medical emergencies as part of their work (1) received first-aid training; (2) had hepatitis B vaccination made

available to them; (3) had appropriate training on procedures to protect them from blood-borne pathogens, including universal precautions; and (4) have available and understand how to use appropriate personal protective equipment to protect against exposure to blood-borne diseases?

- ☐ ☐ Where employees have had an exposure incident involving blood-borne pathogens, did you provide an immediate post-exposure medical evaluation and follow-up?
- ☐ ☐ Are medical personnel readily available for advice and consultation on matters of employees' health?
- ☐ ☐ Are emergency phone numbers posted?
- ☐ ☐ Are first-aid kits easily accessible to each work area, with necessary supplies available, periodically inspected and replenished as needed?
- ☐ ☐ Have first-aid kit supplies been approved by a physician, indicating that they are adequate for a particular area or operation?
- ☐ ☐ Are means provided for quick drenching or flushing of the eyes and body in areas where corrosive liquids or materials are handled?

FIRE PROTECTION

Y N

- ☐ ☐ Is your local fire department well acquainted with your facilities, its location and specific hazards?
- ☐ ☐ If you have a fire alarm system, is it certified as required?
- ☐ ☐ If you have a fire alarm system, is it tested at least annually?
- ☐ ☐ If you have interior stand pipes and valves, are they inspected regularly?
- ☐ ☐ If you have outside private fire hydrants, are they flushed at least once a year and on a routine preventive maintenance schedule?
- ☐ ☐ Are fire doors and shutters in good operating condition?
- ☐ ☐ Are fire doors and shutters unobstructed and protected against obstructions, including their counterweights?
- ☐ ☐ Are fire door and shutter fusible links in place?
- ☐ ☐ Are automatic sprinkler system water control valves, air and water pressure checked weekly/ periodically as required?
- ☐ ☐ Is the maintenance of automatic sprinkler systems assigned to responsible persons or to a sprinkler contractor?
- ☐ ☐ Are sprinkler heads protected by metal guards, when exposed to physical damage?
- ☐ ☐ Is proper clearance maintained below sprinkler heads?
- ☐ ☐ Are portable fire extinguishers provided in adequate number and type?
- ☐ ☐ Are fire extinguishers mounted in readily accessible locations?
- ☐ ☐ Are fire extinguishers recharged regularly and noted on the inspection tag?
- ☐ ☐ Are employees periodically instructed in the use of extinguishers and fire protection procedures?

PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING (PPE)

Y N

- ☐ ☐ Are employers assessing the workplace to determine if hazards that require the use of personal protective equipment (e.g. head, eye, face, hand, or foot protection) are present or are likely to be present?
- ☐ ☐ If hazards or the likelihood of hazards are found, are employers selecting and having affected employees use properly fitted personal protective equipment suitable for protection from these hazards?
- ☐ ☐ Has the employer been trained on PPE procedures, i.e. what PPE is necessary for a job tasks, when they need it, and how to properly adjust it?
- ☐ ☐ Are protective goggles or face shields provided and worn where there is any danger of flying particles or corrosive materials?
- ☐ ☐ Are approved safety glasses required to be worn at all times in areas where there is a risk of eye injuries such as punctures, abrasions, contusions or burns?

- ☐ ☐ Are employees who need corrective lenses (glasses or contacts) in working environments having harmful exposures, required to wear only approved safety glasses, protective goggles, or use other medically approved precautionary procedures?
- ☐ ☐ Are protective gloves, aprons, shields, or other means provided and required where employees could be cut or where there is reasonably anticipated exposure to corrosive liquids, chemicals, blood, or other potentially infectious materials?
- ☐ ☐ Are hard hats provided and worn where danger of falling objects exists?
- ☐ ☐ Are hard hats inspected periodically for damage to the shell and suspension system?
- ☐ ☐ Is appropriate foot protection required where there is the risk of foot injuries from hot, corrosive, poisonous substances, falling objects, crushing or penetrating actions?
- ☐ ☐ Are approved respirators provided for regular or emergency use where needed?
- ☐ ☐ Is all protective equipment maintained in a sanitary condition and ready for use?
- ☐ ☐ Do you have eye wash facilities and a quick "Drench Shower" within the work area where employees are exposed to injurious corrosive materials?
- ☐ ☐ Where special equipment is needed for electrical workers, is it available?
- ☐ ☐ Where food or beverages are consumed on the premises, are they consumed in areas where there is no exposure to toxic material, blood, or other potentially infectious materials?
- ☐ ☐ Is protection against the effects of occupational noise exposure provided when sound levels exceed those of the OHS noise standard?
- ☐ ☐ Are adequate work procedures, protective clothing and equipment provided and used when cleaning up spilled toxic or otherwise hazardous materials or liquids?
- ☐ ☐ Are there appropriate procedures in place for disposing of or decontaminating personal protective equipment contaminated with, or reasonably anticipated to be contaminated with, blood or other potentially infectious materials?

GENERAL WORK ENVIRONMENT

Y N

- ☐ ☐ Are all worksites clean, sanitary, and orderly?
- ☐ ☐ Are work surfaces kept dry or appropriate means taken to assure the surfaces are slip-resistant?
- ☐ ☐ Are all spilled hazardous materials or liquids, including blood and other potentially infectious materials, cleaned up immediately and according to proper procedures?
- ☐ ☐ Is combustible scrap, debris and waste stored safely and removed from the worksite promptly?
- ☐ ☐ Is all regulated waste, discarded according to federal, provincial, and municipal regulations?
- ☐ ☐ Are accumulations of combustible dust routinely removed from elevated surfaces including the overhead structure of buildings, etc.?
- ☐ ☐ Is combustible dust cleaned up with a vacuum system to prevent the dust going into suspension?
- ☐ ☐ Is metallic or conductive dust prevented from entering or accumulating on or around electrical enclosures or equipment?
- ☐ ☐ Are covered metal waste cans used for oily and paint-soaked waste?
- ☐ ☐ Are all oil and gas fired devices equipped with flame failure controls that will prevent flow of fuel if pilots or main burners are not working?
- ☐ ☐ Are paint spray booths, dip tanks, etc., cleaned regularly?
- ☐ ☐ Are the minimum number of toilets and washing facilities provided?
- ☐ ☐ Are all toilets and washing facilities clean and sanitary?
- ☐ ☐ Are all work areas adequately illuminated?
- ☐ ☐ Are pits and floor openings covered or otherwise guarded?
- ☐ ☐ Have all confined spaces been evaluated for compliance with OHS?

WALKWAYS

Y N
- ☐ ☐ Are aisles and passageways kept clear?
- ☐ ☐ Are aisles and walkways marked as appropriate?
- ☐ ☐ Are wet surfaces covered with non-slip materials?
- ☐ ☐ Are holes in the floor, sidewalk or other walking surface repaired properly, covered or otherwise made safe?
- ☐ ☐ Is there safe clearance for walking in aisles where motorized or mechanical handling equipment is operating?
- ☐ ☐ Are materials or equipment stored in such a way that sharp projectives will not interfere with the walkway?
- ☐ ☐ Are spilled materials cleaned up immediately?
- ☐ ☐ Are changes of direction or elevations readily identifiable?
- ☐ ☐ Are aisles or walkways that pass near moving or operating machinery, welding operations or similar operations arranged so employees will not be subjected to potential hazards?
- ☐ ☐ Is adequate headroom provided for the entire length of any aisle or walkway?
- ☐ ☐ Are standard guardrails provided wherever aisle or walkway surfaces are elevated more than 2.4 metres above any adjacent floor or the ground?
- ☐ ☐ Are bridges provided over conveyors and similar hazards?

FLOOR AND WALL OPENINGS

Y N
- ☐ ☐ Are floor openings guarded by a cover, a guardrail, or equivalent on all sides (except at entrance to stairways or ladders)?
- ☐ ☐ Are toe-boards installed around the edges of permanent floor opening (where persons may pass below the opening)?
- ☐ ☐ Are skylight screens of such construction and mounting that they will withstand a load of at least 90 kilograms (200 pounds)?
- ☐ ☐ Is the glass in the windows, doors, glass walls, etc., which are subject to human impact, of sufficient thickness and type for the condition of use?
- ☐ ☐ Are grates or similar type covers over floor openings such as floor drains of such design that foot traffic or rolling equipment will not be affected by the grate spacing?
- ☐ ☐ Are unused portions of service pits and pits not actually in use either covered or protected by guardrails or equivalent?
- ☐ ☐ Are floor or wall openings in fire resistive construction provided with doors or covers compatible with the fire rating of the structure and provided with a self-closing feature when appropriate?

STAIRS AND STAIRWAYS

Y N
- ☐ ☐ Are standard stair rails or handrails on all stairways having four or more risers?
- ☐ ☐ Are all stairways at least 500 millimetres wide?
- ☐ ☐ Do stairs have landing platforms are less than 4.5 metres apart vertically?
- ☐ ☐ Do stringers have a slope of no more than 50 degrees from the horizontal?
- ☐ ☐ Are stairs of hollow-pan type treads and landings filled to the top edge of the pan with solid material?
- ☐ ☐ Are step risers on stairs uniform from top to bottom?
- ☐ ☐ Are steps on stairs and stairways designed or provided with a surface that renders them slip resistant?
- ☐ ☐ Are stairway handrails securely fastened and supported on open sides of each flight?
- ☐ ☐ Where doors or gates open directly on a stairway, is there a platform provided so the swing of the door does not reduce the width of the platform to less than 500 millimetres?

- ☐ ☐ Are stairway handrails capable of withstanding a load of 90 kilograms (200 pounds), applied within 50 millimetres (2 inches) of the top edge, in any downward or outward direction?
- ☐ ☐ Where stairs or stairways exit directly into any area where vehicles may be operated, are adequate barriers and warnings provided to prevent employees stepping into the path of traffic?
- ☐ ☐ Do stairway landings have a dimension measured in the direction of travel, at least equal to the width of the stairway?

ELEVATED SURFACES

Y N

- ☐ ☐ Are signs posted, when appropriate, showing the elevated surface load capacity?
- ☐ ☐ Are surfaces elevated more than 2.4 metres above the floor or ground provided with standard guardrails?
- ☐ ☐ Are all elevated surfaces (beneath which people or machinery could be exposed to falling objects) provided with standard 100 millimetre (4-inch) toe-boards?
- ☐ ☐ Is a permanent means of access and egress provided to elevated storage and work surfaces?
- ☐ ☐ Is required headroom provided where necessary?
- ☐ ☐ Is material on elevated surfaces piled, stacked or racked in a manner to prevent it from tipping, falling, collapsing, rolling or spreading?
- ☐ ☐ Are dock boards or bridge plates used when transferring materials between docks and trucks or rail cars?

EXITING OR EGRESS

Y N

- ☐ ☐ Are all exits marked with an exit sign and illuminated by a reliable light source?
- ☐ ☐ Are the directions to exits, when not immediately apparent, marked with visible signs?
- ☐ ☐ Are doors, passageways or stairways, that are neither exits nor access to exits, and which could be mistaken for exits, appropriately marked "NOT AN EXIT," "TO BASEMENT," "STOREROOM," etc.?
- ☐ ☐ Are exit signs provided with the word "EXIT" in lettering at least 125 millimetres (5 inches) high and the stroke of the lettering at least 13 millimetres (½-inch) wide?
- ☐ ☐ Are exit doors side-hinged?
- ☐ ☐ Are all exits kept free of obstructions?
- ☐ ☐ Are at least two means of egress provided from elevated platforms, pits or rooms where the absence of a second exit would increase the risk of injury from hot, poisonous, corrosive, suffocating, flammable, or explosive substances?
- ☐ ☐ Are there sufficient exits to permit prompt escape in case of emergency?
- ☐ ☐ Are special precautions taken to protect employees during construction and repair operations?
- ☐ ☐ Is the number of exits from each floor of a building and the number of exits from the building itself, appropriate for the building occupancy load?
- ☐ ☐ Are exit stairways that are required to be separated from other parts of a building enclosed by at least 2-hour fire-resistive construction in buildings more than four stories in height, and not less than 1-hour fire-resistive constructive elsewhere?
- ☐ ☐ Where ramps are used as part of required exiting from a building, is the ramp slope limited to 300 millimetres (1 foot) vertical and 3.7 metres (12 feet) horizontal?
- ☐ ☐ Where exiting will be through frameless glass doors, glass exit doors, or storm doors are the doors fully tempered and meet the safety requirements for human impact?

EXIT DOORS

Y	N	
☐	☐	Are doors that are required to serve as exits designed and constructed so that the way of exit travel is obvious and direct?
☐	☐	Are windows that could be mistaken for exit doors, made inaccessible by means of barriers or railings?
☐	☐	Are exit doors openable from the direction of exit travel without the use of a key or any special knowledge or effort when the building is occupied?
☐	☐	Is a revolving, sliding or overhead door prohibited from serving as a required exit door?
☐	☐	Are doors on cold storage rooms provided with an inside release mechanism which will release the latch and open the door even if it's padlocked or otherwise locked on the outside?
☐	☐	Where exit doors open directly onto any street, alley or other area where vehicles may be operated, are adequate barriers and warnings provided to prevent employees from stepping into the path of traffic?
☐	☐	Are doors that swing in both directions and are located between rooms where there is frequent traffic, provided with viewing panels in each door?

PORTABLE LADDERS

Y	N	
☐	☐	Are all ladders maintained in good condition, joints between steps and side rails tight, all hardware and fittings securely attached and moveable parts operating freely without binding or undue play?
☐	☐	Are non-slip safety feet provided on each ladder?
☐	☐	Are non-slip safety feet provided on each metal or rung ladder?
☐	☐	Are ladder rungs and steps free of grease and oil?
☐	☐	Is it prohibited to place a ladder in front of doors opening toward the ladder except when the door is blocked open, locked or guarded?
☐	☐	Is it prohibited to place ladders on boxes, barrels, or other unstable bases to obtain additional height?
☐	☐	Are employees instructed to face the ladder when ascending or descending?
☐	☐	Are employees prohibited from using ladders that are broken, missing steps, rungs, or cleats, broken side rails or other faulty equipment?
☐	☐	Are employees instructed not to use the top step of ordinary stepladders as a step?
☐	☐	When portable rung ladders are used to gain access to elevated platforms, roofs, etc., does the ladder always extend at least 1 metre (3 feet) above the elevated surface?
☐	☐	Is it required that when portable rung or cleat type ladders are used, the base is so placed that slipping will not occur, or it is lashed or otherwise held in place?
☐	☐	Are portable metal ladders legibly marked with signs reading "CAUTION" - Do Not Use Around Electrical Equipment" or equivalent wording?
☐	☐	Are employees prohibited from using ladders as guys, braces, skids, gin poles, or for other than their intended purposes?
☐	☐	Are employees instructed to only adjust extension ladders while standing at a base (not while standing on the ladder or from a position above the ladder)?
☐	☐	Are metal ladders inspected for damage?
☐	☐	Are the rungs of ladders uniformly spaced at 300 millimetres, (12 inches) centre to centre?

HAND TOOLS AND EQUIPMENT

Y	N	
☐	☐	Are all tools and equipment (both company and employee owned) used by employees at their workplace in good condition?
☐	☐	Are hand tools such as chisels and punches, which develop mushroomed heads during use, reconditioned or replaced as necessary?

- ☐ ☐ Are broken or fractured handles on hammers, axes and similar equipment replaced promptly?
- ☐ ☐ Are worn or bent wrenches replaced regularly?
- ☐ ☐ Are appropriate handles used on files and similar tools?
- ☐ ☐ Are employees made aware of the hazards caused by faulty or improperly used hand tools?
- ☐ ☐ Are appropriate safety glasses, face shields, etc. used while using hand tools or equipment which might produce flying materials or be subject to breakage?
- ☐ ☐ Are jacks checked periodically to ensure they are in good operating condition?
- ☐ ☐ Are tool handles wedged tightly in the head of all tools?
- ☐ ☐ Are tool cutting edges kept sharp so the tool will move smoothly without binding or skipping?
- ☐ ☐ Are tools stored in dry, secure location where they won't be tampered with?
- ☐ ☐ Is eye and face protection used when driving hardened or tempered spuds or nails?

PORTABLE (POWER OPERATED) TOOLS AND EQUIPMENT

Y N

- ☐ ☐ Are grinders, saws and similar equipment provided with appropriate safety guards?
- ☐ ☐ Are power tools used with the correct shield, guard, or attachment, recommended by the manufacturer?
- ☐ ☐ Are portable circular saws equipped with guards above and below the base shoe?
- ☐ ☐ Are circular saw guards checked to assure they are not wedged up, thus leaving the lower portion of the blade unguarded?
- ☐ ☐ Are rotating or moving parts of equipment guarded to prevent physical contact?
- ☐ ☐ Are all cord-connected, electrically operated tools and equipment effectively grounded or of the approved double insulated type?
- ☐ ☐ Are effective guards in place over belts, pulleys, chains, sprockets, on equipment such as air compressors?
- ☐ ☐ Are portable fans provided with full guards or screens having openings 13 millimetres (½ inch) or less?
- ☐ ☐ Is hoisting equipment available and used for lifting heavy objects, and are hoist ratings and characteristics appropriate for the task?
- ☐ ☐ Are ground-fault circuit interrupters provided on all temporary electrical 15 and 20 ampere circuits, used during periods of construction?
- ☐ ☐ Are pneumatic and hydraulic hoses on power-operated tools checked regularly for deterioration or damage?

WOODWORKING TOOLS

Y N

- ☐ ☐ Do all woodworking tools and machinery meet applicable requirements of CSA Standards or American National Standards Institute, 01.1-1961, Safety Code for Woodworking Machinery?
- ☐ ☐ Before a worker is permitted to operate any woodworking machine, has he/she received instructions in the hazards of the machine and the safe method of its operation? Are workers operating any woodworking machinery instructed to do the following:
- ☐ ☐ Learn the machine's applications and limitations, as well as the specific potential hazards peculiar to this machine and follow available operating instructions and safety rules carefully?
- ☐ ☐ Keep working areas clean and to use adequate lighting?
- ☐ ☐ Do not wear loose clothing, gloves, bracelets, necklaces, or ornaments?
- ☐ ☐ Wear face, eye, ear, respiratory, and body protection devices, as indicated for the operation or environment?
- ☐ ☐ Not to use cutting tools larger or heavier than the machine is designed to accommodate and to never operate a cutting tool at greater speed than recommended?

- ☐ ☐ Keep hands well away from saw blades and other cutting tools and to use a push stock or push block to hold or guide the work when working close to a cutting tool?
- ☐ ☐ Whenever possible, use properly locked clamps, jig, or vise to hold the work?
- ☐ ☐ When an applicable guard cannot be used, combs (feather boards) shall be used?
- ☐ ☐ Never stand directly in line with a horizontally rotating cutting tool? (This is particularly true when first starting a new tool, or a new tool is initially installed on the arbour.)
- ☐ ☐ Be sure the power is disconnected from the machine before tools are serviced?
- ☐ ☐ Never leave the machine with the power on?
- ☐ ☐ Be positive that hold-downs and anti-kickback devices are positioned properly, and that the work-piece is being fed through the cutting tool in the right direction?
- ☐ ☐ Do not use a dull, gummy, bent, or cracked cutting tool?
- ☐ ☐ Be sure that keys and adjusting wrenches have been removed before turning power on?
- ☐ ☐ Use only accessories designed for the machine.
- ☐ ☐ Adjust the machine for minimum exposure of cutting tool necessary to perform the operation?
- ☐ ☐ Is there a cover or guard installed on machines that throw stock, material, or objects, such as rip saws?
- ☐ ☐ Is there a machine stop or machine feed stop switch that operators can reach without leaving their normal operating position?
- ☐ ☐ On fixed machines, are stop buttons red or orange?
- ☐ ☐ Are one or more stop buttons provided depending on the working position of the operator or operators?
- ☐ ☐ Are all belts, pulleys, gears, shafts, and moving parts guarded?
- ☐ ☐ Is all equipment electrically grounded?
- ☐ ☐ Are feather-boards or suitable jigs used when a standard guard will not work, such as when dadoing, grooving, jointing, molding, and rabbeting?
- ☐ ☐ Are the "OFF" switches located so operators do not have to leave to shut off the machines?
- ☐ ☐ Are all power and operating controls within reach of the operator?
- ☐ ☐ Are foot-operated controls protected from unexpected or accidental activation?
- ☐ ☐ Are feed rolls of feeder attachments guarded to protect the operator from contacting hazardous parts?
- ☐ ☐ Are both sides of band-saw wheels covered?
- ☐ ☐ Are all unused portions of a band-saw blade covered?
- ☐ ☐ Does the radial arm saw have a hood that completely encloses the upper portion of the blade, including the end of the saw arbour?
- ☐ ☐ Is the blade of the radial arm saw prevented from extending beyond the front edge of the table or roll case?
- ☐ ☐ Is there a lower blade guard that encloses the radial arm saw blade and automatically adjusts to the thickness of the material?
- ☐ ☐ Are machine control switches located or guarded to prevent unexpected or accidental movement?
- ☐ ☐ Are electrical-switch start buttons recessed?
- ☐ ☐ Are machines designed for a fixed location securely anchored to prevent walking or moving?
- ☐ ☐ When ripping, does the radial arm saw have a spreader in line with the blade and anti-kickback fingers on each side of the blade?
- ☐ ☐ Does the radial arm saw blade automatically return gently and stay at the back of the table?
- ☐ ☐ Does the table saw have a hood that covers the blade at least to the depth of the teeth?

- ☐ ☐ Does the table saw hood automatically adjust itself to the thickness of the material being cut?
- ☐ ☐ Does the table saw hood protect the operator from flying splinters and broken saw teeth?
- ☐ ☐ When ripping, does the table saw have a spreader in line with the blade and anti-kickback fingers on each side of the blade?
- ☐ ☐ Are push sticks used to guide short stock and ends through table saws?

ABRASIVE WHEEL EQUIPMENT (GRINDERS)

Y N

- ☐ ☐ Is the work rest used and kept adjusted to within 3.125 millimetres (1/8 inch) of the wheel?
- ☐ ☐ Is the adjustable tongue on the top side of the grinder used and kept adjusted to within 6.3 millimetres (1/4 inch) of the wheel?
- ☐ ☐ Do side guards cover the spindle, nut, and flange and 75 percent of the wheel diameter?
- ☐ ☐ Are bench and pedestal grinders permanently mounted?
- ☐ ☐ Are goggles or face shields always worn when grinding?
- ☐ ☐ Is the maximum RPM rating of each abrasive wheel compatible with the RPM rating of the grinder motor?
- ☐ ☐ Are fixed or permanently mounted grinders connected to their electrical supply system with metallic conduit or other permanent wiring method?
- ☐ ☐ Does each grinder have an individual on and off control switch?
- ☐ ☐ Is each electrically operated grinder effectively grounded?
- ☐ ☐ Before new abrasive wheels are mounted, are they visually inspected and ring tested?
- ☐ ☐ Are dust collectors and powered exhausts provided on grinders used in operations that produce large amounts of dust?
- ☐ ☐ Are splash guards mounted on grinders that use coolant to prevent the coolant reaching employees?
- ☐ ☐ Is cleanliness maintained around grinders?

POWDER-ACTUATED TOOLS

Y N

- ☐ ☐ Are employees who operate powder-actuated tools trained in their use and carry a valid operator's card?
- ☐ ☐ Is each powder-actuated tool stored in its own locked container when not being used?
- ☐ ☐ Are proper signs with bold face type reading "POWDER-ACTUATED TOOL IN USE" conspicuously posted when the tool is being used?
- ☐ ☐ Are powder-actuated tools left unloaded until they are actually ready to be used?
- ☐ ☐ Are powder-actuated tools inspected for obstructions or defects each day before use?
- ☐ ☐ Do powder-actuated tool operators have and use appropriate personal protective equipment such as hard hats, safety goggles, safety shoes and ear protectors?

MACHINE GUARDING

Y N

- ☐ ☐ Is there a training program to instruct employees on safe methods of machine operation?
- ☐ ☐ Is there adequate supervision to ensure that employees are following safe machine operating procedures?
- ☐ ☐ Is there a regular program of safety inspection of machinery and equipment?
- ☐ ☐ Is all machinery and equipment kept clean and properly maintained?
- ☐ ☐ Is sufficient clearance provided around and between machines to allow for safe operations, set up and servicing, material handling and waste removal?
- ☐ ☐ Is equipment and machinery securely placed and anchored, when necessary to prevent tipping or other movement that could result in personal injury?
- ☐ ☐ Is there a power shut-off switch within reach of the operator's position at each machine?
- ☐ ☐ Can electric power to each machine be locked out for maintenance, repair, or security?
- ☐ ☐ Are the non-current-carrying metal parts of electrically operated machines bonded and grounded?
- ☐ ☐ Are foot-operated switches guarded or arranged to prevent accidental actuation by personnel or falling objects?
- ☐ ☐ Are manually operated valves and switches controlling the operation of equipment and machines clearly identified and readily accessible?
- ☐ ☐ Are all emergency stop buttons coloured red
- ☐ ☐ Are all pulleys and belts properly guarded?
- ☐ ☐ Are all moving chains and gears properly guarded?
- ☐ ☐ Are splash guards mounted on machines that use coolant to prevent the coolant from reaching employees?
- ☐ ☐ Are methods provided to protect the operator and other employees in the machine area from hazards created at the point of operation, ingoing nip points, rotating parts, flying chips, and sparks?
- ☐ ☐ Are machinery guards secure and so arranged that they do not offer a hazard in their use?
- ☐ ☐ If special hand tools are used for placing and removing material, do they protect the operator's hands?
- ☐ ☐ Are revolving drums, barrels, and containers required to be guarded by an enclosure that is interlocked with the drive mechanism, so that revolution cannot occur unless the guard enclosures is in place, so guarded?
- ☐ ☐ Do arbours and mandrels have firm and secure bearings and are they free from play?
- ☐ ☐ Are provisions made to prevent machines from automatically starting when power is restored after a power failure or shutdown?
- ☐ ☐ Are machines constructed so as to be free from excessive vibration when the largest size tool is mounted and run at full speed?
- ☐ ☐ If machinery is cleaned with compressed air, is air pressure controlled and personal protective equipment or other safeguards utilized to protect operators and other workers from eye and body injury?
- ☐ ☐ Are fan blades protected with a guard having openings no larger than 13 millimetres (½ inch), when operating within 2.1 metres (7 feet) of the floor?
- ☐ ☐ Are saws used for ripping, equipped with anti-kickback devices and spreaders?
- ☐ ☐ Are radial arm saws so arranged that the cutting head will gently return to the back of the table when released?

LOCKOUT/TAGGING PROCEDURES

Y N

- ☐ ☐ Is all machinery or equipment capable of movement, required to be de-energized or disengaged and locked-out during cleaning, servicing, adjusting or setting up operations, whenever required?
- ☐ ☐ Where the power disconnecting means for equipment does not also disconnect the electrical control circuit:
- ☐ ☐ Are the appropriate electrical enclosures identified?
- ☐ ☐ Is means provided to assure the control circuit can also be disconnected and locked-out?
- ☐ ☐ Is the locking-out of control circuits in lieu of locking-out main power disconnects prohibited?
- ☐ ☐ Are all equipment control valve handles provided with a means for locking-out?
- ☐ ☐ Does the lock-out procedure require that stored energy (mechanical, hydraulic, air, etc.) be released or blocked before equipment is locked-out for repairs?
- ☐ ☐ Are appropriate employees provided with individually keyed personal safety locks?
- ☐ ☐ Are employees required to keep personal control of their key(s) while they have safety locks in use?
- ☐ ☐ Is it required that only the employee exposed to the hazard, place or remove the safety lock?
- ☐ ☐ Is it required that employees check the safety of the lock-out by attempting a startup after making sure no one is exposed?
- ☐ ☐ Are employees instructed to always push the control circuit stop button immediately after checking the safety of the lock-out?
- ☐ ☐ Is there a means provided to identify any or all employees who are working on locked-out equipment by their locks or accompanying tags?
- ☐ ☐ Are a sufficient number of accident preventive signs or tags and safety padlocks provided for any reasonably foreseeable repair emergency?
- ☐ ☐ When machine operations, configuration or size requires the operator to leave his or her control station to install tools or perform other operations, and that part of the machine could move if accidentally activated, is such element required to be separately locked or blocked out?
- ☐ ☐ In the event that equipment or lines cannot be shut down, locked-out and tagged, is a safe job procedure established and rigidly followed?

WELDING, CUTTING AND BRAZING

Y N

- ☐ ☐ Are only authorized and trained personnel permitted to use welding, cutting or brazing equipment?
- ☐ ☐ Does each operator have a copy of the appropriate operating instructions and are they directed to follow them?
- ☐ ☐ Are compressed gas cylinders regularly examined for obvious signs of defects, deep rusting, or leakage?
- ☐ ☐ Is care used in handling and storing cylinders, safety valves, and relief valves to prevent damage?
- ☐ ☐ Are precautions taken to prevent the mixture of air or oxygen with flammable gases, except at a burner or in a standard torch?
- ☐ ☐ Are only approved apparatus (torches, regulators, pressure reducing valves, acetylene generators, manifolds) used?
- ☐ ☐ Are cylinders kept away from sources of heat?
- ☐ ☐ Are the cylinders kept away from elevators, stairs, or gangways?
- ☐ ☐ Is it prohibited to use cylinders as rollers or supports?
- ☐ ☐ Are empty cylinders appropriately marked and their valves closed?
- ☐ ☐ Are signs reading: DANGER—NO SMOKING, MATCHES, OR OPENLIGHTS, or the equivalent, posted?

- ☐ ☐ Are cylinders, cylinder valves, couplings, regulators, hoses, and apparatus kept free of oily or greasy substances?
- ☐ ☐ Is care taken not to drop or strike cylinders?
- ☐ ☐ Unless secured on special trucks, are regulators removed and valve-protection caps put in place before moving cylinders?
- ☐ ☐ Do cylinders without fixed hand wheels have keys, handles, or non-adjustable wrenches on stem valves when in service?
- ☐ ☐ Are liquefied gases stored and shipped valve-end up with valve covers in place?
- ☐ ☐ Are provisions made to never crack a fuel gas cylinder valve near sources of ignition?
- ☐ ☐ Before a regulator is removed, is the valve closed and gas released from the regulator?
- ☐ ☐ Is red used to identify the acetylene (and other fuel-gas) hose, green for oxygen hose, and black for inert gas and air hose?
- ☐ ☐ Are pressure-reducing regulators used only for the gas and pressures for which they are intended?
- ☐ ☐ Is open circuit (No Load) voltage of arc welding and cutting machines as low as possible and not in excess of the recommended limits?
- ☐ ☐ Under wet conditions, are automatic controls for reducing no load voltage used?
- ☐ ☐ Is grounding of the machine frame and safety ground connections of portable machines checked periodically?
- ☐ ☐ Are electrodes removed from the holders when not in use?
- ☐ ☐ Is it required that electric power to the welder be shut off when no one is in attendance?
- ☐ ☐ Is suitable fire extinguishing equipment available for immediate use?
- ☐ ☐ Is the welder forbidden to coil or loop welding electrode cable around his body?
- ☐ ☐ Are wet machines thoroughly dried and tested before being used?
- ☐ ☐ Are work and electrode lead cables frequently inspected for wear and damage, and replaced when needed?
- ☐ ☐ Do means for connecting cable lengths have adequate insulation?
- ☐ ☐ When the object to be welded cannot be moved and fire hazards cannot be removed, are shields used to confine heat, sparks, and slag?
- ☐ ☐ Are fire watchers assigned when welding or cutting is performed in locations where a serious fire might develop?
- ☐ ☐ Are combustible floors kept wet, covered by damp sand, or protected by fire-resistant shields?
- ☐ ☐ When floors are wet down, are personnel protected from possible electrical shock?
- ☐ ☐ When welding is done on metal walls, are precautions taken to protect combustibles on the other side?
- ☐ ☐ Before hot work is begun, are used drums, barrels, tanks, and other containers so thoroughly cleaned that no substances remain that could explode, ignite, or produce toxic vapours?
- ☐ ☐ Is it required that eye protection helmets, hand shields and goggles meet appropriate standards?
- ☐ ☐ Are employees exposed to the hazards created by welding, cutting, or brazing operations protected with personal protective equipment and clothing?
- ☐ ☐ Is a check made for adequate ventilation in and where welding or cutting is performed?
- ☐ ☐ When working in confined places, are environmental monitoring tests taken and means provided for quick removal of welders in case of an emergency?

COMPRESSORS AND COMPRESSED AIR

Y N

- ☐ ☐ Are compressors equipped with pressure relief valves, and pressure gauges?
- ☐ ☐ Are compressor air intakes installed and equipped so as to ensure that only clean uncontaminated air enters the compressor?
- ☐ ☐ Are air filters installed on the compressor intake?
- ☐ ☐ Are compressors operated and lubricated in accordance with the manufacturer's recommendations?
- ☐ ☐ Are safety devices on compressed air systems checked frequently?
- ☐ ☐ Before any repair work is done on the pressure system of a compressor, is the pressure bled off and the system locked-out?
- ☐ ☐ Are signs posted to warn of the automatic starting feature of the compressors?
- ☐ ☐ Is the belt drive system totally enclosed to provide protection for the front, back, top, and sides?
- ☐ ☐ Is it strictly prohibited to direct compressed air towards a person?
- ☐ ☐ Are employees prohibited from using highly compressed air for cleaning purposes?
- ☐ ☐ If compressed air is used for cleaning off clothing, is the pressure reduced to less than 69 kPa (10 psi)?
- ☐ ☐ When using compressed air for cleaning, do employees wear protective chip guarding and personal protective equipment?
- ☐ ☐ Are safety chains or other suitable locking devices used at couplings of high pressure hose lines where a connection failure would create a hazard?
- ☐ ☐ Before compressed air is used to empty containers of liquid, is the safe working pressure of the container checked?
- ☐ ☐ When compressed air is used with abrasive blast cleaning equipment, is the operating valve a type that must be held open manually?
- ☐ ☐ When compressed air is used to inflate auto ties, is a clip-on chuck and an inline regulator preset to 276 kPa (40 psi) required?
- ☐ ☐ Is it prohibited to use compressed air to clean up or move combustible dust if such action could cause the dust to be suspended in the air and cause a fire or explosion hazard?

COMPRESSORS & AIR RECEIVERS

Y N

- ☐ ☐ Is every receiver equipped with a pressure gauge and with one or more automatic, spring-loaded safety valves?
- ☐ ☐ Is the total relieving capacity of the safety valve capable of preventing pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than 10 percent?
- ☐ ☐ Is every air receiver provided with a drain pipe and valve at the lowest point for the removal of accumulated oil and water?
- ☐ ☐ Are compressed air receivers periodically drained of moisture and oil?
- ☐ ☐ Are all safety valves tested frequently and at regular intervals to determine whether they are in good operating condition?
- ☐ ☐ Is there a current operating permit used by the Division of Occupational Health and Safety?
- ☐ ☐ Is the inlet of air receivers and piping systems kept free of accumulated oil and carbonaceous materials?

COMPRESSED GAS CYLINDERS

Y N

- ☐ ☐ Are cylinders with a water weight capacity over 13.5 kilograms (30 pounds), equipped with means for connecting a valve protector device, or with a collar or recess to protect the valve?
- ☐ ☐ Are cylinders legibly marked to clearly identify the gas contained?

- ☐ ☐ Are compressed gas cylinders stored in areas which are protected from external heat sources such as flame impingement, intense radiant heat, electric arcs, or high temperature lines?
- ☐ ☐ Are cylinders located or stored in areas where they will not be damaged by passing or falling objects or subject to tampering by unauthorized persons?
- ☐ ☐ Are cylinders stored or transported in a manner to prevent them from creating a hazard by tipping, falling or rolling?
- ☐ ☐ Are cylinders containing liquefied fuel gas, stored or transported in a position so that the safety relief device is always in direct contact with the vapour space in the cylinder?
- ☐ ☐ Are valve protectors always placed on cylinders when the cylinders are not in use or connected for use?
- ☐ ☐ Are all valves closed off before a cylinder is moved, when the cylinder is empty, and at the completion of each job?
- ☐ ☐ Are low pressure fuel-gas cylinders checked periodically for corrosion, general distortion, cracks, or any other defect that might indicate a weakness or render it unfit for service?
- ☐ ☐ Does the periodic check of low pressure fuel-gas cylinders include a close inspection of the cylinders' bottom?

HOIST AND AUXILIARY EQUIPMENT

Y N

- ☐ ☐ Is each overhead electric hoist equipped with a limit device to stop the hook travel at its highest and lowest point of safe travel?
- ☐ ☐ Will each hoist automatically stop and hold any load up to 125 percent of its rated load if its actuating force is removed?
- ☐ ☐ Is the rated load of each hoist legibly marked and visible to the operator?
- ☐ ☐ Are stops provided at the safe limits of travel for trolley hoist?
- ☐ ☐ Are the controls of hoist plainly marked to indicate the direction of travel or motion?
- ☐ ☐ Is each cage-controlled hoist equipped with an effective warning device?
- ☐ ☐ Are close-fitting guards or other suitable devices installed on hoist to assure hoist ropes will be maintained in the sheave groves?
- ☐ ☐ Are all hoist chains or ropes of sufficient length to handle the full range of movement of the application while still maintaining two full wraps on the drum at all times?
- ☐ ☐ Are nip points or contact points between hoist ropes and sheaves which are permanently located within 2.1 metres (7 feet) of the floor, ground or working platform, guarded?
- ☐ ☐ Is it prohibited to use chains or rope slings that are kinked or twisted?
- ☐ ☐ Is it prohibited to use the hoist rope or chain wrapped around the load as a substitute, for a sling?
- ☐ ☐ Is the operator instructed to avoid carrying loads over people?

INDUSTRIAL TRUCKS – LIFT TRUCKS

Y N

- ☐ ☐ Are only employees who have been trained in the proper use of hoists allowed to operate them?
- ☐ ☐ Are only trained personnel allowed to operate industrial trucks?
- ☐ ☐ Is substantial overhead protective equipment provided on high lift rider equipment?
- ☐ ☐ Are the required lift truck operating rules posted and enforced?
- ☐ ☐ Is directional lighting provided on each industrial truck that operates in an area with less than 2 foot-candles per square m of general lighting?
- ☐ ☐ Does each industrial truck have a warning horn, whistle, gong, or other device which can be clearly heard above the normal noise in the areas where operated?
- ☐ ☐ Are the brakes on each industrial truck capable of bringing the vehicle to a complete and safe stop when fully loaded?

- ☐ ☐ Will the industrial trucks' parking brake effectively prevent the vehicle from moving when unattended?
- ☐ ☐ Are industrial trucks operating in areas where flammable gases or vapours, or combustible dust or ignitable fibres may be present in the atmosphere, approved for such locations?
- ☐ ☐ Are motorized hand and hand/rider trucks so designed that the brakes are applied, and power to the drive motor shuts off when the operator releases his or her grip on the device that controls the travel?
- ☐ ☐ Are industrial trucks with internal combustion engine, operated in buildings or enclosed areas, carefully checked to ensure such operations do not cause harmful concentration of dangerous gases or fumes?
- ☐ ☐ Are powered industrial trucks being safely operated?

SPRAYING OPERATIONS

Y N

- ☐ ☐ Is adequate ventilation assured before spray operations are started?
- ☐ ☐ Is mechanical ventilation provided when spraying operations are done in enclosed areas?
- ☐ ☐ When mechanical ventilation is provided during spraying operations, is it so arranged that it will not circulate the contaminated air?
- ☐ ☐ Is the spray area free of hot surfaces?
- ☐ ☐ Is the spray area at least 6 metres (20 feet) from flames, sparks, operating electrical motors and other ignition sources?
- ☐ ☐ Are portable lamps used to illuminate spray areas suitable for use in a hazardous location?
- ☐ ☐ Is approved respiratory equipment provided and used when appropriate during spraying operations?
- ☐ ☐ Do solvents used for cleaning have a flash point to 38° Celsius (100° F) or more?
- ☐ ☐ Are fire control sprinkler heads kept clean?
- ☐ ☐ Are "NO SMOKING" signs posted in spray areas, paint rooms, paint booths, and paint storage areas?
- ☐ ☐ Is the spray area kept clean of combustible residue?
- ☐ ☐ Are spray booths constructed of metal, masonry, or other substantial noncombustible material?
- ☐ ☐ Are spray booth floors and baffles noncombustible and easily cleaned?
- ☐ ☐ Is infrared drying apparatus kept out of the spray area during spraying operations?
- ☐ ☐ Is the spray booth completely ventilated before using the drying apparatus?
- ☐ ☐ Is the electric drying apparatus properly grounded?
- ☐ ☐ Are lighting fixtures for spray booths located outside of the booth and the interior lighted through sealed clear panels?
- ☐ ☐ Are the electric motors for exhaust fans placed outside booths or ducts?
- ☐ ☐ Are belts and pulleys inside the booth fully enclosed?
- ☐ ☐ Do ducts have access doors to allow cleaning?
- ☐ ☐ Do all drying spaces have adequate ventilation?

ENTERING CONFINED SPACES

Y N

- ☐ ☐ Are confined spaces thoroughly emptied of any corrosive or hazardous substances, such as acids or caustics, before entry?
- ☐ ☐ Are all lines to a confined space, containing inert, toxic, flammable, or corrosive materials valved off and blanked or disconnected and separated before entry?
- ☐ ☐ Are all impellers, agitators, or other moving parts and equipment inside confined spaces locked-out if they present a hazard?
- ☐ ☐ Is either natural or mechanical ventilation provided prior to confined space entry?
- ☐ ☐ Are appropriate atmospheric tests performed to check for oxygen deficiency, toxic substances and explosive concentrations in the confined space before entry?

- ☐ ☐ Is adequate illumination provided for the work to be performed in the confined space?
- ☐ ☐ Is the atmosphere inside the confined space frequently tested or continuously monitored during conduct of work?
- ☐ ☐ Is there an assigned safety standby employee outside of the confined space, when required, whose sole responsibility is to watch the work in progress, sound an alarm if necessary, and render assistance?
- ☐ ☐ Is the standby employee appropriately trained and equipped to handle an emergency?
- ☐ ☐ Is the standby employee or other employees prohibited from entering the confined space without lifelines and respiratory equipment if there is any question as to the cause of an emergency?
- ☐ ☐ Is approved respiratory equipment required if the atmosphere inside the confined space cannot be made acceptable?
- ☐ ☐ Is all portable electrical equipment used inside confined spaces either grounded and insulated, or equipped with ground fault protection?
- ☐ ☐ Before gas welding or burning is started in a confined space, are hoses checked for leaks, compressed gas bottles forbidden inside of the confined space, torches lightly only outside of the confined area and the confined area tested for an explosive atmosphere each time before a lighted torch is to be taken into the confined space?
- ☐ ☐ If employees will be using oxygen-consuming equipment—such as salamanders, torches, and furnaces, in a confined space—is sufficient air provided to assure combustion without reducing the oxygen concentration of the atmosphere below 19 percent by volume?
- ☐ ☐ Whenever combustion-type equipment is used in a confined space, are provisions made to ensure the exhaust gases are vented outside of the enclosure?
- ☐ ☐ Is each confined space checked for decaying vegetation or animal matter which may produce methane?
- ☐ ☐ Is the confined space checked for possible industrial waste which could contain toxic properties?
- ☐ ☐ If the confined space is below the ground and near areas where motor vehicles will be operating, is it possible for vehicle exhaust or carbon monoxide to enter the space?

ENVIRONMENTAL CONTROLS

Y N

- ☐ ☐ Are all work areas properly illuminated?
- ☐ ☐ Are employees instructed in proper first-aid and other emergency procedures?
- ☐ ☐ Are hazardous substances, blood, and other potentially infectious materials identified, which may cause harm by inhalation, ingestion, or skin absorption or contact?
- ☐ ☐ Are employees aware of the hazards involved with the various chemicals they may be exposed to in their work environment, such as ammonia, chlorine, epoxies, caustics, etc.?
- ☐ ☐ Is employee exposure to chemicals in the workplace kept within acceptable levels?
- ☐ ☐ Can a less harmful method or process be used?
- ☐ ☐ Is the work area's ventilation system appropriate for the work being performed?
- ☐ ☐ Are spray painting operations done in spray rooms or booths equipped with an appropriate exhaust system?
- ☐ ☐ Is employee exposure to welding fumes controlled by ventilation, use of respirators, exposure time, or other means?
- ☐ ☐ Are welders and other workers nearby provided with flash shields during welding operations?
- ☐ ☐ If lift trucks and other vehicles are used in buildings or other enclosed areas, are the carbon monoxide levels kept below maximum acceptable concentration?

- ☐ ☐ Has there been a determination that noise levels in the facilities are within acceptable levels?
- ☐ ☐ Are steps being taken to use engineering controls to reduce excessive noise levels?
- ☐ ☐ Are proper precautions being taken when handling asbestos and other fibrous materials?
- ☐ ☐ Are caution labels and signs used to warn of hazardous substances (e.g., asbestos) and biohazards (e.g., bloodborne pathogens)?
- ☐ ☐ Are wet methods used, when practicable, to prevent the emission of airborne asbestos fibres, silica dust and similar hazardous materials?
- ☐ ☐ Are engineering controls examined and maintained or replaced on a scheduled basis?
- ☐ ☐ Is vacuuming with appropriate equipment used whenever possible rather than blowing or sweeping dust?
- ☐ ☐ Are grinders, saws, and other machines that produce respirable dusts vented to an industrial collector or central exhaust system?
- ☐ ☐ Are all local exhaust ventilation systems designed and operating properly such as air flow and volume necessary for the application, ducts not plugged or belts slipping?
- ☐ ☐ Is personal protective equipment provided, used and maintained wherever required?
- ☐ ☐ Are there written standard operating procedures for the selection and use of respirators where needed?
- ☐ ☐ Are restrooms and washrooms kept clean and sanitary?
- ☐ ☐ Is all water provided for drinking, washing, and cooking potable?
- ☐ ☐ Are all outlets for water not suitable for drinking clearly identified?
- ☐ ☐ Are employees' physical capacities assessed before being assigned to jobs requiring heavy work?
- ☐ ☐ Are employees instructed in the proper manner of lifting heavy objects?
- ☐ ☐ Where heat is a problem, have all fixed work areas been provided with spot cooling or air conditioning?
- ☐ ☐ Are employees screened before assignment to areas of high heat to determine if their health condition might make them more susceptible to having an adverse reaction?
- ☐ ☐ Are employees working on streets and roadways where they are exposed to the hazards of traffic, required to wear bright coloured (traffic orange) warning vests?
- ☐ ☐ Are exhaust stacks and air intakes so located that contaminated air will not be recirculated within a building or other enclosed area?
- ☐ ☐ Is equipment producing ultraviolet radiation properly shielded?
- ☐ ☐ Are universal precautions observed where occupational exposure to blood or other potentially infectious materials can occur and in all instances where differentiation of types of body fluids or potentially infectious materials is difficult or impossible?

FLAMMABLE AND COMBUSTIBLE MATERIALS

Y N

- ☐ ☐ Are combustible scrap, debris, and waste materials (oily rags, etc.) stored in covered metal receptacles and removed from the worksite promptly?
- ☐ ☐ Is proper storage practiced to minimize the risk of fire including spontaneous combustion?
- ☐ ☐ Are approved containers and tanks used for the storage and handling of flammable and combustible liquids?
- ☐ ☐ Are all connections on drums and combustible liquid piping, vapour and liquid tight?
- ☐ ☐ Are all flammable liquids kept in closed containers when not in use (e.g., parts cleaning tanks, pans, etc.)?
- ☐ ☐ Are bulk drums of flammable liquids grounded and bonded to containers during dispensing?

- ☐ ☐ Do storage rooms for flammable and combustible liquids have explosion-proof lights?
- ☐ ☐ Do storage rooms for flammable and combustible liquids have mechanical or gravity ventilation?
- ☐ ☐ Is liquefied petroleum gas stored, handled, and used in accordance with safe practices and standards?
- ☐ ☐ Are "NO SMOKING" signs posted on liquefied petroleum gas tanks?
- ☐ ☐ Are liquefied petroleum storage tanks guarded to prevent damage from vehicles?
- ☐ ☐ Are all solvent wastes, and flammable liquids kept in fire-resistant, covered containers until they are removed from the worksite?
- ☐ ☐ Is vacuuming used whenever possible rather than blowing or sweeping combustible dust?
- ☐ ☐ Are firm separators placed between containers of combustibles or flammables, when stacked one upon another, to assure their support and stability?
- ☐ ☐ Are fuel gas cylinders and oxygen cylinders separated by distance, and fire-resistant barriers, while in storage?
- ☐ ☐ Are fire extinguishers selected and provided for the types of materials in areas where they are to be used? Class A-Ordinary combustible material fires. Class B-Flammable liquid, gas or grease fires. Class C-Energized-electrical equipment fires.
- ☐ ☐ Are appropriate fire extinguishers mounted within 22.86 metres (75 feet) of outside areas containing flammable liquids, and within 3 metres (10 feet) of any inside storage area for such materials?
- ☐ ☐ Are extinguishers free from obstructions or blockage?
- ☐ ☐ Are all extinguishers serviced, maintained and tagged at intervals not to exceed 1 year?
- ☐ ☐ Are all extinguishers fully charged and in their designated places?
- ☐ ☐ Where sprinkler systems are permanently installed, are the nozzle heads so directed or arranged that water will not be sprayed into operating electrical switch boards and equipment?
- ☐ ☐ Are "NO SMOKING" signs posted where appropriate in areas where flammable or combustible materials are used or stored?
- ☐ ☐ Are safety cans used for dispensing flammable or combustible liquids at a point of use?
- ☐ ☐ Are all spills of flammable or combustible liquids cleaned up promptly?
- ☐ ☐ Are storage tanks adequately vented to prevent the development of excessive vacuum or pressure as a result of filling, emptying, or atmosphere temperature changes?
- ☐ ☐ Are storage tanks equipped with emergency venting that will relieve excessive internal pressure caused by fire exposure?
- ☐ ☐ Are "NO SMOKING" rules enforced in areas involving storage and use of hazardous materials?

HAZARDOUS CHEMICAL EXPOSURE

Y N

- ☐ ☐ Are employees trained in the safe handling practices of hazardous chemicals such as acids, caustics, etc.?
- ☐ ☐ Are employees aware of the potential hazards involving various chemicals stored or used in the workplace such as acids, bases, caustics, epoxies, and phenols?
- ☐ ☐ Is employee exposure to chemicals kept within acceptable levels?
- ☐ ☐ Are eye wash fountains and safety showers provided in areas where corrosive chemicals are handled?
- ☐ ☐ Are all containers, such as vats, and storage tanks labelled as to their contents, e.g., "CAUSTICS"?
- ☐ ☐ Are all employees required to use personal protective clothing and equipment when handling chemicals (gloves, eye protection, and respirators)?

- ☐ ☐ Are flammable or toxic chemicals kept in closed containers when not in use?
- ☐ ☐ Are chemical piping systems clearly marked as to their content?
- ☐ ☐ Where corrosive liquids are frequently handled in open containers or drawn from storage vessels or pipe lines, are adequate means readily available for neutralizing or disposing of spills or overflows and performed properly and safely?
- ☐ ☐ Have standard operating procedures been established, and are they being followed when cleaning up chemical spills?
- ☐ ☐ Where needed for emergency use, are respirators stored in a convenient, clean, and sanitary location?
- ☐ ☐ Are respirators intended for emergency use adequate for the various uses for which they may be needed?
- ☐ ☐ Are employees prohibited from eating in areas where hazardous chemicals are present?
- ☐ ☐ Is personal protective equipment provided, used and maintained whenever necessary?
- ☐ ☐ Are there written standard operating procedures for the selection and use of respirators where needed?
- ☐ ☐ If you have a respirator protection program, are your employees instructed on the correct usage and limitations of the respirators? Are the respirators NIOSH–approved for this particular application? Are they regularly inspected and cleaned, sanitized and maintained?
- ☐ ☐ If hazardous substances are used in your processes, do you have a medical or biological monitoring system in operation?
- ☐ ☐ Are you familiar with the Threshold Limit Values or Occupational Exposure Limits of airborne contaminants and physical agents used in your workplace?
- ☐ ☐ Have control procedures been instituted for hazardous materials, where appropriate, such as respirators, ventilation systems, and handling practices?
- ☐ ☐ Whenever possible, are hazardous substances handled in properly designed and exhausted booths or similar locations?
- ☐ ☐ Do you use general dilution or local exhaust ventilation systems to control dusts, vapours, gases, fumes, smoke, solvents or mists which may be generated in your workplace?
- ☐ ☐ Is ventilation equipment provided for removal of contaminants from such operations as production grinding, buffing, spray painting, and/or vapour degreasing, and is it operating properly?
- ☐ ☐ Do employees complain about dizziness, headaches, nausea, irritation, or other factors of discomfort when they use solvents or other chemicals?
- ☐ ☐ Is there a dermatitis problem? Do employees complain about dryness, irritation, or sensitization of the skin?
- ☐ ☐ Have you considered the use of an industrial hygienist or environmental health specialist to evaluate your operation?
- ☐ ☐ If internal combustion engines are used, is carbon monoxide kept within acceptable levels?
- ☐ ☐ Is vacuuming used, rather than blowing or sweeping dusts whenever possible for clean-up?
- ☐ ☐ Are materials which give off toxic asphyxiant, suffocating or anaesthetic fumes, stored in remote or isolated locations when not in use?

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

Y N

- ☐ ☐ Is there a list of hazardous substances used in your workplace?
- ☐ ☐ Is there a current written exposure control plan for occupational exposure to bloodborne pathogens and other potentially infectious materials, where applicable?
- ☐ ☐ Is there a written WHMIS program dealing with Material Safety Data Sheets (MSDS), labelling, and employee training?
- ☐ ☐ Is each container for a hazardous substance (i.e., vats, bottles, storage tanks, etc.) labelled with product identity and a hazard warning (communication of the specific health hazards and physical hazards)?
- ☐ ☐ Is there a Material Safety Data Sheet readily available for each hazardous substance used?
- ☐ ☐ Is there an employee training program for hazardous substances? Does this program include:
- ☐ ☐ An explanation of what an MSDS is and how to use and obtain one?
- ☐ ☐ MSDS contents for each hazardous substance or class of substances?
- ☐ ☐ Explanation of "Right to Know?"
- ☐ ☐ Identification of where an employee can see the employers written WHMIS program and where hazardous substances are present in their work areas?
- ☐ ☐ The physical and health hazards of substances in the work area, and specific protective measures to be used?
- ☐ ☐ Details of the WHMIS program, including how to use the labelling system and MSDS's?
- ☐ ☐ Are employees trained in the following:
- ☐ ☐ How to recognize tasks that might result in occupational exposure?
- ☐ ☐ How to use work practice and engineering controls and personal protective equipment and to know their limitations?
- ☐ ☐ How to obtain information on the types, selection, proper use, location, removal, handling, decontamination, and disposal of personal protective equipment?
- ☐ ☐ Who to contact and what to do in an emergency?

ELECTRICAL

Y N

- ☐ ☐ Do you specify compliance with OHS for all contract electrical work?
- ☐ ☐ Are all employees required to report as soon as practicable any obvious hazard to life or property observed in connection with electrical equipment or lines?
- ☐ ☐ Are employees instructed to make preliminary inspections and/or appropriate tests to determine what conditions exist before starting work on electrical equipment or lines?
- ☐ ☐ When electrical equipment or lines are to be serviced, maintained or adjusted, are necessary switches opened, locked-out and tagged whenever possible?
- ☐ ☐ Are portable electrical tools and equipment grounded or of the double insulated type?
- ☐ ☐ Are electrical appliances such as vacuum cleaners, polishers, and vending machines grounded?
- ☐ ☐ Do extension cords being used have a grounding conductor?
- ☐ ☐ Are multiple plug adaptors prohibited?
- ☐ ☐ Are ground-fault circuit interrupters installed on each temporary 15 or 20 ampere, 120 volt AC circuit at locations where construction, demolition, modifications, alterations or excavations are being performed?
- ☐ ☐ Are all temporary circuits protected by suitable disconnecting switches or plug connectors at the junction with permanent wiring?
- ☐ ☐ Do you have electrical installations in hazardous dust or vapour areas? If so, do they meet the Canadian Electrical Code (CEC) for hazardous locations?
- ☐ ☐ Is exposed wiring and cords with frayed or deteriorated insulation repaired or replaced promptly?

- ☐ ☐ Are flexible cords and cables free of splices or taps?
- ☐ ☐ Are clamps or other securing means provided on flexible cords or cables at plugs, receptacles, tools, equipment, etc., and is the cord jacket securely held in place?
- ☐ ☐ Are all cord, cable and raceway connections intact and secure?
- ☐ ☐ In wet or damp locations, are electrical tools and equipment appropriate for the use or location or otherwise protected?
- ☐ ☐ Is the location of electrical power lines and cables (overhead, underground, underfloor, other side of walls) determined before digging, drilling or similar work is begun?
- ☐ ☐ Are metal measuring tapes, ropes, handlines or similar devices with metallic thread woven into the fabric prohibited where they could come in contact with energized parts of equipment or circuit conductors?
- ☐ ☐ Is the use of metal ladders prohibited in areas where the ladder or the person using the ladder could come in contact with energized parts of equipment, fixtures or circuit conductors?
- ☐ ☐ Are all disconnecting switches and circuit breakers labelled to indicate their use or equipment served?
- ☐ ☐ Are disconnecting means always opened before fuses are replaced?
- ☐ ☐ Do all interior wiring systems include provisions for grounding metal parts of electrical raceways, equipment and enclosures?
- ☐ ☐ Are all electrical raceways and enclosures securely fastened in place?
- ☐ ☐ Are all energized parts of electrical circuits and equipment guarded against accidental contact by approved cabinets or enclosures?
- ☐ ☐ Is sufficient access and working space provided and maintained about all electrical equipment to permit ready and safe operations and maintenance?
- ☐ ☐ Are all unused openings (including conduit knockouts) in electrical enclosures and fittings closed with appropriate covers, plugs or plates?
- ☐ ☐ Are electrical enclosures such as switches, receptacles, and junction boxes, provided with tight-fitting covers or plates?
- ☐ ☐ Are disconnecting switches for electrical motors in excess of two horsepower, capable of opening the circuit when the motor is in a stalled condition, without exploding? (Switches must be horsepower rated equal to or in excess of the motor hp rating.)
- ☐ ☐ Is low voltage protection provided in the control device of motors driving machines or equipment which could cause probable injury from inadvertent starting?
- ☐ ☐ Is each motor disconnecting switch or circuit breaker located within sight of the motor control device?
- ☐ ☐ Is each motor located within sight of its controller or the controller disconnecting means capable of being locked in the open position or is a separate disconnecting means installed in the circuit within sight of the motor?
- ☐ ☐ Is the controller for each motor in excess of two horsepower, rated in horsepower equal to or in excess of the rating of the motor it serves?
- ☐ ☐ Are employees who regularly work on or around energized electrical equipment or lines instructed in the cardiopulmonary resuscitation (CPR) methods?
- ☐ ☐ Are employees prohibited from working alone on energized lines or equipment over 600 volts?

NOISE

Y N

- ☐ ☐ Are there areas in the workplace where continuous noise levels exceed 85dBA?
- ☐ ☐ Is there an ongoing preventive health program to educate employees in: safe levels of noise, exposures; effects of noise on their health; and the use of personal protection?
- ☐ ☐ Have work areas where noise levels make voice communication between employees difficult been identified and posted?

- ☐ ☐ Are noise levels being measured using a sound level meter or an octave band analyzer and are records being kept?
- ☐ ☐ Have engineering controls been used to reduce excessive noise levels? Where engineering controls are determined not feasible, are administrative controls (i.e., worker rotation) being used to minimize individual employee exposure to noise?
- ☐ ☐ Is approved hearing protective equipment (noise attenuating devices) available to every employee working in noisy areas?
- ☐ ☐ Have you tried isolating noisy machinery from the rest of your operation?
- ☐ ☐ If you use ear protectors, are employees properly fitted and instructed in their use?
- ☐ ☐ Are employees in high noise areas given periodic audiometric testing to ensure that you have an effective hearing protection system?

FUELLING

Y N

- ☐ ☐ Is it prohibited to fuel an internal combustion engine with a flammable liquid while the engine is running?
- ☐ ☐ Are fuelling operations done in such a manner that likelihood of spillage will be minimal?
- ☐ ☐ When spillage occurs during fuelling operations, is the spilled fuel washed away completely, evaporated, or other measures taken to control vapours before restarting the engine?
- ☐ ☐ Are fuel tank caps replaced and secured before starting the engine?
- ☐ ☐ In fuelling operations, is there always metal contact between the container and the fuel tank?
- ☐ ☐ Are fuelling hoses of a type designed to handle the specific type of fuel?
- ☐ ☐ Is it prohibited to handle or transfer gasoline in open containers?
- ☐ ☐ Are open lights, open flames, sparking, or arcing equipment prohibited near fuelling or transfer of fuel operations?
- ☐ ☐ Is smoking prohibited in the vicinity of fuelling operations?
- ☐ ☐ Are fuelling operators prohibited in buildings or other enclosed areas that are not specifically ventilated for this purpose?
- ☐ ☐ Where fuelling or transfer of fuel is done through a gravity flow system, are the nozzles of the self-closing type?

IDENTIFICATION OF PIPING SYSTEMS

Y N

- ☐ ☐ When non-potable water is piped through a facility, are outlets or taps posted to alert employees that it is unsafe and not to be used for drinking, washing or other personal use?
- ☐ ☐ When hazardous substances are transported through above ground piping, is each pipeline identified at points where confusion could introduce hazards to employees?
- ☐ ☐ When pipelines are identified by colour painting, are all visible parts of the line so identified?
- ☐ ☐ When pipelines are identified by colour painted bands or tapes, are the bands or tapes located at reasonable intervals and at each outlet, valve or connection?
- ☐ ☐ When pipelines are identified by colour, is the colour code posted at all locations where confusion could introduce hazards to employees?
- ☐ ☐ When the contents of pipelines are identified by name or name abbreviation, is the information readily visible on the pipe near each valve or outlet?
- ☐ ☐ When pipelines carrying hazardous substances are identified by tags, are the tags constructed of durable materials, the message carried clearly and permanently distinguishable and are tags installed at each valve or outlet?
- ☐ ☐ When pipelines are heated by electricity, steam or other external source, are suitable warning signs or tags placed at unions, valves, or other serviceable parts of the system?

MATERIAL HANDLING

Y N

- ☐ ☐ Is there safe clearance for equipment through aisles and doorways?
- ☐ ☐ Are aisleways designated, permanently marked, and kept clear to allow unhindered passage?
- ☐ ☐ Are motorized vehicles and mechanized equipment inspected daily or prior to use?
- ☐ ☐ Are vehicles shut off and brakes set prior to loading or unloading?
- ☐ ☐ Are containers of combustibles or flammables, when stacked while being moved, always separated by dunnage sufficient to provide stability?
- ☐ ☐ Are dock boards (bridge plates) used when loading or unloading operations are taking place between vehicles and docks?
- ☐ ☐ Are trucks and trailers secured from movement during loading and unloading operations?
- ☐ ☐ Are dock plates and loading ramps constructed and maintained with sufficient strength to support imposed loading?
- ☐ ☐ Are hand trucks maintained in safe operating condition?
- ☐ ☐ Are chutes equipped with sideboards of sufficient height to prevent the materials being handled from falling off?
- ☐ ☐ Are chutes and gravity roller sections firmly placed or secured to prevent displacement?
- ☐ ☐ At the delivery end of the rollers or chutes, are provisions made to brake the movement of the handled materials?
- ☐ ☐ Are pallets usually inspected before being loaded or moved?
- ☐ ☐ Are hooks with safety latches or other arrangements used when hoisting materials so that slings or load attachments won't accidentally slip off the hoist hooks?
- ☐ ☐ Are securing chains, ropes, chokers or slings adequate for the job to be performed?
- ☐ ☐ When hoisting material or equipment, are provisions made to assure no one will be passing under the suspended loads?
- ☐ ☐ Are material safety data sheets available to employees handling hazardous substances?

TRANSPORTING EMPLOYEES AND MATERIALS

Y N

- ☐ ☐ Do employees who operate vehicles on public thoroughfares have valid operator's licences?
- ☐ ☐ When seven or more employees are regularly transported in a van, bus or truck, is the operator's licence appropriate for the class of vehicle being driven?
- ☐ ☐ Is each van, bus or truck used regularly to transport employees equipped with an adequate number of seats?
- ☐ ☐ When employees are transported by truck, are provisions provided to prevent their falling from the vehicle?
- ☐ ☐ Are vehicles used to transport employees equipped with lamps, brakes, horns, mirrors, windshields and turn signals and are they in good repair?
- ☐ ☐ Are transport vehicles provided with handrails, steps, stirrups or similar devices, so placed and arranged that employees can safely mount or dismount?
- ☐ ☐ Are employee transport vehicles equipped at all times with at least two reflective type flares?
- ☐ ☐ Is a full charged fire extinguisher, in good condition, with at least 4 B: C rating maintained in each employee transport vehicle?
- ☐ ☐ When cutting tools or tools with sharp edges are carried in passenger compartments of employee transport vehicles, are they placed in closed boxes or containers which are secured in place?
- ☐ ☐ Are employees prohibited from riding on top of any load which can shift, topple, or otherwise become unstable?

CONTROL OF HARMFUL SUBSTANCES BY VENTILATION

Y	N	
☐	☐	Is the volume and velocity of air in each exhaust system sufficient to gather the dusts, fumes, mists, vapours or gases to be controlled, and to convey them to a suitable point of disposal?
☐	☐	Are exhaust inlets, ducts and plenums designed, constructed, and supported to prevent collapse or failure of any part of the system?
☐	☐	Are clean-out ports or doors provided at intervals not to exceed 3.7 metres (12 feet) in all horizontal runs of exhaust ducts?
☐	☐	Where two or more different type of operations are being controlled through the same exhaust system, will the combination of substances being controlled, constitute a fire, explosion or chemical reaction hazard in the duct?
☐	☐	Is adequate makeup air provided to areas where exhaust systems are operating?
☐	☐	Is the source point for makeup air located so that only clean, fresh air, which is free of contaminates, will enter the work environment?
☐	☐	Where two or more ventilation systems are serving a work area, is their operation such that one will not offset the functions of the other?

SANITIZING EQUIPMENT AND CLOTHING

Y	N	
☐	☐	Is personal protective clothing or equipment that employees are required to wear or use, of a type capable of being cleaned easily and disinfected?
☐	☐	Are employees prohibited from interchanging personal protective clothing or equipment, unless it has been properly cleaned?
☐	☐	Are machines and equipment, which process, handle or apply materials that could be injurious to employees, cleaned and/or decontaminated before being overhauled or placed in storage?
☐	☐	Are employees prohibited from smoking or eating in any area where contaminates that could be injurious if ingested are present?
☐	☐	When employees are required to change from street clothing into protective clothing, is a clean change room with separate storage facility for street and protective clothing provided?
☐	☐	Are employees required to shower and wash their hair as soon as possible after a known contact has occurred with a carcinogen?
☐	☐	When equipment, materials, or other items are taken into or removed from a carcinogen regulated area, is it done in a manner that will contaminate non-regulated areas or the external environment?

Notes/Comments:

_____

_____

_____

_____

_____

_____

_____

_____

Signature of Person Performing Inspection Date

_____

Signature of Person Performing Inspection Date

File this document in your "Company Health and Safety File."

Job Safety Analysis			
Project **Contract:**		**Activity:**	
Location:			
#	**Job Steps**	**Potential Hazards**	**Safe Procedures/Controls**
1			
2			
3			
4			
5			
6			
7			

Job Safety Analysis			
#	**Job Steps**	**Potential Hazards**	**Safe Procedures/Controls**
8			
9			
10			
11			
12			
Equipment to be used		**Inspection Requirements**	**Training Requirements**

Chapter 4

Emergency Response

Emergency Response Planning for Construction Projects

Objective

The Workers' Compensation Act requires that the constructor establish Emergency Response Procedures for every project. This chapter provides a plan to assist constructors in developing these procedures.

Emergency preparedness helps to minimize the human suffering and economic losses that can result from emergencies.

It should be understood that the size and complexity of projects, as well as their access and location, have a bearing on the degree of planning necessary for emergencies. It is therefore strongly recommended that the constructor ensure that a member of staff on site assist in developing the emergency response plan.

How to Develop a Plan

Planning must begin before any work commences on the project. Although there may be little time between the award of the contract and the start of the project, a good emergency response plan can be generic and, with some minor changes, can be easily adapted to specific sites and readily implemented. This is especially the case where a constructor specializes in similar types of projects.

Development should include the following considerations:

1. Hazard identification/assessment
2. Emergency resources
3. Communication systems
4. Administration of the plan
5. Emergency response procedure
6. Communication of the procedure
7. Debriefing and post-traumatic stress procedure

Hazard Identification/Assessment

The process of hazard identification and assessment involves a thorough review that should include, but not be limited to, the following points:

1. Transportation, materials handling, hoisting, equipment or product installation, temporary structures, material storage, start-up, and commissioning activities
2. Environmental concerns
3. Consultation with the client regarding potential hazards when working in or adjacent to operating facilities
4. Resources such as material safety data sheets (MSDSs) to determine potential hazards from on-site materials
5. Proximity to traffic and public ways

Because construction sites are frequently fast-changing, the process of hazard assessment must be ongoing to accommodate the dynamic environment. Once hazards are identified, the next task is to assess the potential or risk involved in each.

For each hazard identified, ask:

- What can go wrong?
- What are the consequences?

For each potential hazard it is important to identify resources necessary for an appropriate emergency response. For most events in construction, a simple analysis based on the experience of the people involved on the project is likely sufficient.

Emergency Resources

It is important to identify which resources are available and have contingency plans in place to make up for any deficiencies.

The most important resource on most projects will be a 911 system. It is essential to verify that 911 is in effect in the area. Most British Columbia communities have a 911 system in place, but it is important to know the facilities or limitations available in that location. Is a high-reach rescue team available? What is the response time? What must site personnel do in the meantime?

Other on-site resources such as fire extinguishers, spills containment equipment, and first aid kits must be maintained and clearly identified. Construction equipment may be included among potential emergency resources. Personnel, especially on-site medical staff or workers trained in first aid, should be included in the plan.

There may be situations where outside resources are so far away that an adequate response is not possible. In these situations, resources may have to be obtained and kept on site. Examples would include fire protection or ambulance/medical resources in remote areas.

Whatever the situation may be, people, equipment, facilities, and materials are needed for emergency response. Where they will come from must be determined in advance. Moreover, the people supplying these resources must be made aware of their role in the plan.

Communication Systems

An important key to effective emergency response is a communications system that can relay accurate information quickly. To do this, reliable communications equipment must be used, procedures developed, and personnel trained. It is a good idea to have a backup system in place, in case the system is rendered useless by the emergency. For example, telephone lines may be cut.

The type and location of emergency communication systems must be posted on the project. This will include location of telephones, a list of site personnel with cellular phones or two-way radios, and any other equipment available. Emergency phone numbers and the site address/location should be posted beside all site phones. On large sites, the location of emergency phones must be clearly marked.

A communication system must be made up of strategically placed equipment and properly defined responsibilities. The emergency response plan posted in a conspicuous place on the project must identify the designated equipment and the people to operate it.

Administration of the Plan

The task of administering and organizing the plan is vital to its effectiveness. The person who has this task will normally be the person in charge of the emergency response operation.

It is their task to ensure:

- that everyone clearly understands their roles and responsibilities within the emergency response plan (a chart may be helpful in this regard)
- that emergency resources, whether people or equipment, are kept at adequate levels in step with the progress of the project

It is very important to review the emergency plan on a regular basis and especially after an emergency has occurred. Changes may be necessary where deficiencies became apparent as the plan went into operation.

Emergency Response Procedure

An emergency can be reported from any source—a worker on site, an outside agency, or the public. Remember that circumstances may change during the course of an emergency. Any procedures you develop must be able to respond to the ongoing situation.

The following list covers basic actions to take in an emergency. These steps apply to almost any emergency and should be followed in sequence.

- Stay calm
- Assess the situation
- Take command
- Provide protection
- Aid and manage
- Maintain contacts
- Guide emergency services

Stay calm – Your example can influence others and thereby aid the emergency response.

Assess the situation – Determine what happened and what the emergency is. Look at the big picture. What has happened to whom and what will continue to happen if no action is taken? Try to identify the cause that must be controlled to eliminate immediate, ongoing, or further danger.

Take command – The most senior person on the scene should take charge and call, or delegate someone to call, emergency services—generally 911—and explain the situation. Assign tasks for controlling the emergency. This action also helps to maintain order and prevent panic.

Provide protection – Eliminate further losses and safeguard the area. Control the energy source causing the emergency. Protect victims, equipment, materials, environment, and accident scene from continuing damage or further hazards. Divert traffic, suppress fire, prevent objects from falling, shut down equipment or utilities, and take other necessary measures. Preserve the accident scene; only disturb what is essential to maintain life or relieve human suffering and prevent immediate or further losses.

Aid and manage – Provide first aid or help those already doing so. Manage personnel at the scene. Organize the workforce for both a headcount and emergency assignments. Direct all workers to a safe location or command post. This makes it easier to identify the missing, control panic, and assign people to emergency duties. Dispatch personnel to guide emergency services on arrival.

Maintain contact – Keep emergency services informed of situation. Contact utilities such as gas and hydro where required. Alert management and keep them informed. Exercise increasing control over the emergency until immediate hazards are controlled or eliminated and causes can be identified.

Guide emergency services – Meet services on site. Lead them to emergency scene. Explain ongoing and potential hazards and cause(s), if known.

Communication of the Procedure

To be effective, an Emergency Response Procedure must be clearly communicated to all site personnel. The following activities should be considered:

- Review the procedure with new site subcontractors and new workers to ensure that it covers their activities adequately.
- Review the procedure with suppliers to ensure that it covers any hazards that the storage or delivery of their materials might create.
- Review new work areas in operating plants with owner/client to ensure that new hazards are identified and covered in the procedure.
- Review the procedure with the Joint Committee or Health and Safety Representative on a regular basis to address new hazards or significant changes in site conditions.
- Post the procedure in a conspicuous location.

The Emergency Response Procedure for a construction project must continually undergo review and revision to meet changing conditions.

Debriefing and Post-Traumatic Stress Procedure

The recovery process, or what happens after the emergency response has been completed, is a critical step in the plan.

Many emergency tasks may be handled by people who are not accustomed to dealing with emergencies. People may have seen their work partners and friends badly injured and suffering great pain.

Once the emergency is over, the attitude should not be "Okay, let's get back to work" or "Let's go home." Some of the people involved may need assistance in order to recover. In some cases professional counselling may be needed. As part of site emergency planning, construction companies should have measures in place to deal with post-traumatic stress. Local hospitals, ambulance services, and medical practitioners may also be able to help.

Debriefing is necessary to review how well the plan worked in the emergency and to correct any deficiencies that were identified. Debriefing is critical to the success of future emergency response planning.

Summary

Slow response, lack of resources, or the absence of trained personnel will lead to chaos in an emergency. To minimize human suffering and financial losses, all personnel must know their responsibilities under the emergency response plan.

- Always take precautions to prevent fires which may be started, particularly from oily waste, rags, gasoline, flammable liquids, acetylene torches, improperly installed electrical equipment and trash.
- Firefighting equipment is to be inspected on a regular basis. All discharged, damaged or missing equipment is to be immediately reported to a supervisor. Tampering with fire equipment is prohibited.
- Access to fire extinguishers must be kept clear at all times. Make note of the location of firefighting equipment in your work area.
- Never use gasoline or flammable solvents for cleaning purposes.
- Smoking is prohibited where flammable substances are stored, handled, processed or used.
- In case of fire, employees shall consider the safety of themselves and other individuals before saving property.
- Keep your work areas free of debris. Remove useless material from the work area as fast as required to help reduce tripping hazards.
- Maintain awareness of potential hazards when walking about the job site.
- Keep tools, materials and equipment out of walkways and stairways at all times.
- Sharp wires or protruding nails must be kept bent.
- Place tools and equipment so they will not slide off the roof.
- Tie material down at day's end so the wind will not blow it off the roof.

Fire Prevention Plan (Minimum Elements)

A fire prevention plan should include:

- a list of all major fire hazards, including proper handling and storage procedures for hazardous materials, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard;
- procedures to control accumulations of flammable and combustible waste materials;
- procedures for regular maintenance of safeguards on heat producing equipment to prevent accidental ignition of combustible materials;
- names or job titles of employees responsible for maintaining equipment to prevent or control sources of ignition or fires; and,
- names or job titles of those responsible for control of fuel source hazards.

Employee Information

The employer must:

- inform employees of the fire hazards in their work area; and
- review with each employee, when first assigned to a job, those parts of the fire prevention plan necessary for self-protection.

Portable Fire Extinguishers

General Requirements

- The employer shall provide portable fire extinguishers and shall mount, locate and identify them so that they are readily accessible to employees without subjecting the employees to possible injury.
- Only approved portable fire extinguishers shall be used to meet the requirements of this section.
- The employer shall not provide or make available in the workplace portable fire extinguishers using carbon tetrachloride or chlorobromomethane extinguishing agents.
- The employer shall assure that portable fire extinguishers are maintained in a fully charged and operable condition and kept in their designated places at all times except during use.
- The employer shall remove from service all soldered or riveted shell self-generating soda acid or self-generating foam or gas cartridge water type portable fire extinguishers which are operated by inverting the extinguisher to rupture the cartridge or to initiate an uncontrollable pressure generating chemical reaction to expel the agent.

Training and Education

1. Where the employer has provided portable fire extinguishers for employee use in the workplace, the employer shall also provide an educational program to familiarize employees with the general principles of fire extinguisher use and the hazards involved with incipient stage fire fighting.
2. The employer shall provide the education required in paragraph (1) of this section upon initial employment and at least annually thereafter.
3. The employer shall provide employees who have been designated to use firefighting equipment as part of an emergency action plan with training in the use of the appropriate equipment.
4. The employer shall provide the training required in paragraph (3) of this section upon initial assignment to the designated group of employees and at least annually thereafter.

EMERGENCY RESPONSE PLAN

Company Name: **Job Location:**

Street Address:

City: **Province:** **Postal Code:**

Prepared By: (Print Name of Preparer)

Title: **Phone Number:**

Signature: **Date:**

PURPOSE

This plan is for the safety and well-being of the employees of: (Name of Company)

It identifies necessary management and employee actions during fires and other emergencies. Education and training are provided so that all employees know and understand the Emergency Response Plan.

LOCATON OF PLAN

The Emergency Response Plan can be found at the station or office of each: (Foreman, Supervisor, etc.)

A copy is also maintained in THE COMPANY general offices.

Upon request, an OHS representative may obtain a copy of the plan from: (Name and Title)

EXIT ROUTES

Draw a diagram of jobsite or facility exit routes in space below:

Locate meeting place or "Roll-Call" area on above diagram:

ACCOUNTING FOR EMPLOYEES

After exiting jobsite or facility, all employees are to assemble for "Roll-Call" at this location:

Note location on above diagram

The following persons are responsible for ensuring that employees comply with this requirement:

Name and Title:

Name and Title:

CRITICAL OPERATIONS

To minimize damage from the emergency, the following personnel are responsible for shutting down the listed critical operations:

Personnel Names	Critical Operations

As soon as shutdowns are completed, the employees who performed critical operations must take the nearest exit route in accordance with general emergency procedures.

RESCUE AND MEDICAL DUTIES

The following personnel are certified and trained in both CPR and general first aid. These persons are to be contacted as specified in the "General Emergency Training":

Name and Title	Phone Number

REPORTING EMERGENCIES

The following personnel have the duty of contacting public responders to come to the emergency scene. The personnel are listed in descending order of availability:

Name and Title	Phone Number

ALARM SYSTEMS AND NOTIFICATION OF EMERGENCIES

In the event of a workplace or facility emergency, employees will be notified as follows:

Identify method(s) of notification:

TYPES OF EVACUATION

OHS requires this Company to have an established system of types of evacuation to follow for different emergency circumstances. The following listing represents company policy for various emergency situations:

PARTIAL EVACUATION: Code Yellow – 3 rings or horn blasts: RESPONDERS (trained extinguisher personnel and trained rescue and medical personnel)

FULL EVACUATION: Code Red – 4 rings or horn blasts: RESPONDERS (n/a)

NOTE: If there is more than one evacuation type, the alarm signal for each must be distinctive.

OTHER: (describe)

OTHER: (describe)

PUBLIC EMERGENCY RESPONSE INFORMATION

Ensure that 911 emergency services cover the area this Emergency Response Plan covers.

Local Police Department:

Local Fire Department:

Local Ambulance/EMS:

Local Hospital:

FURTHER INFORMATION

For further information or explanation about any duties under this Plan, contact:

Name and Title:

Name and Title:

This Emergency Response Plan is authorized and approved by:
(Name and Title)

Signature

Chapter 5

First Aid

Dan-Ex Contracting Ltd. is committed to the Health and Safety of our employees and ensures that first aid boxes are stocked and available to all employees.

Procedures In Case Of Injury

Management's Responsibilities

First Aid Only:

- Ensure first aid will be administered immediately by a certified person.
- The first aid treatment will be recorded on the Injury Treatment Record.
- Medical Attention Required:
- Provide treatment memorandum and transportation to medical attention.
- Submit Employer's Report of Accident to the Board within three days (with a copy to the union office, where applicable).

Modified Work:

Often an injured worker will be capable of performing duties that will not aggravate the injury. Wherever possible, ***Dan-Ex Contracting Ltd.*** will endeavour to provide immediate, suitable modified work in order to avoid a possible loss in wages for injured employees.

Lost Time From Work Required:

- Pay wages for the day of injury.
- Monitor the employee's recovery.

Employee's Responsibilities

- Obtain first aid promptly.
- Report injury immediately to your supervisor.
- Ensure you are accompanied by management to a hospital or medical clinic.
- Obtain a Treatment Memorandum form from the supervisor when medical attention is required. Ensure this form is completed by the first doctor to treat you and return it to your supervisor without delay.

First Aid Attendant Responsibilities

The first aid attendant has general control and supervision of the first aid kit, and where one is required, the first aid room. They are to be available at all times during their shift to treat an injured or ill person without any undue delay. (i.e. available to leave at a moment's notice). The first aid attendant must keep their first aid certificate at the worksite and have it available on request of a government occupational health and safety officer.

- First Aid kits are located in/at: ***company trucks & equipment shop***.
- First Aid Station(s) shall be located at the time office, or at a vehicle or other building on the worksite.
- A worker who holds a valid first aid certificate issued by the Board or by a person recognized by the Board, and who works in the vicinity of the First Aid Station shall be in charge of providing First Aid.
- ***Dan-Ex Contracting Ltd.*** shall inspect first aid boxes at least every three months.
- First Aid kits shall not contain equipment outside the scope of the first aider, or equipment that may deteriorate or be potentially dangerous.
- Any worker who is injured must seek first aid immediately.
- All injuries and accidents must be reported to ***Glenn Willesen***.
- Immediate transportation to a hospital or doctors office will be available in case of injury.
- All injuries will be reported to the Board immediately.

Dan-Ex Contracting Ltd. ensures (when necessary) that:

- First-aid trained personnel are available to provide quick and effective first aid.
- First-aid training contains required subjects.
- First-aid training will be current documented.
- Appropriate first-aid supplies are readily available.
- A first-aid station is available.
- Emergency eyewash station(s) are available if applicable.
- Emergency shower(s) are available if applicable.
- First Aid is available to any sub-contracted workers.

First Aid

Should an accident occur, it is essential that first aid be administered immediately, followed by proper medical treatment if necessary.

Basic First Aid

- A first aid kit with required contents will be available at each workplace/worksite.
- There will be a certified first aider on each shift/location.
- All new employees will be advised of the location of the first aid kit, and the person holding a first aid certificate.
- Each first aid kit will contain an Injury Treatment Record. Any use of the first aid kit will be recorded, including details of the injury, the injured person's name, the date and time of first aid treatment, the nature of the treatment and the name of the person rendering treatment.
- This record is required legally and compliance will be strictly enforced.

Note: See Schedule 3-A - Minimum Levels of First Aid in the Occupational Health and Safety Regulations (OHSR) for more information.

Emergency Procedures

1. Take Command

   Assign the following duties to specific personnel:

2. Provide Protection

   Protect the accident scene from continuing or further hazards-for instance, traffic, operating machinery, fore or love wires.

3. Give First Aid

   Give first aid to the injured as soon as possible.

4. Call an Ambulance

   Call an ambulance and any other emergency services required. In some locales dialling 911 puts you in touch with all emergency services.

5. Guide the Ambulance

   Meet and direct the ambulance to the accident scene.

6. Get the Name of the Hospital

   For follow-up, find out where the injured person is being taken.

7. Advise Management

   Inform senior management. They can then contact relatives, notify authorities and start procedures for reporting and investigating the accident.

8. Isolate the Accident Scene

   Barricade, rope off or post a guard at the scene to make sure that nothing is moved or changed until authorities have completed their investigation.

First Aid Kit Contents

Level 1 First Aid Kit (Moderate Risk Work, 6-25 workers, 20 minutes or less travel time from hospital)

3	blankets
24	14 cm x 19 cm wound cleaning towelettes, individually packaged
60	hand cleansing towelettes, individually packaged
100	sterile adhesive dressings, assorted sizes, individually packaged
12	10 cm x 10 cm sterile gauze dressings, individually packaged
4	10 cm x 16.5 cm sterile pressure dressings with crepe ties
2	7.5 cm x 4.5 m crepe roller bandages
1	2.5 cm x 4.5 m adhesive tape
4	20 cm x 25 cm sterile abdominal dressings, individually packaged
6	cotton triangular bandages, minimum length of base 1.25 m
4	safety pins
1	14 cm stainless steel bandage scissors or universal scissors
1	11.5 cm stainless steel sliver forceps
12	cotton tip applicators
1	pocket mask with a one-way valve and oxygen inlet
6	pairs of medical gloves (preferably non-latex)
1 each	first aid records and pen
3	blankets
24	14 cm x 19 cm wound cleaning towelettes, individually packaged
60	hand cleansing towelettes, individually packaged
100	sterile adhesive dressings, assorted sizes, individually packaged
12	10 cm x 10 cm sterile gauze dressings, individually packaged
4	10 cm x 16.5 cm sterile pressure dressings with crepe ties
2	7.5 cm x 4.5 m crepe roller bandages

FIRST AID TREATMENT RECORD

ANYONE USING THESE FIRST AID SUPPLIES MUST FILL OUT THIS RECORD

INJURED PERSON	INJURED DETAILS	TIME & DATE RECEIVED	TREATMENT	TIME & DATE GIVEN	BY WHOM	WITNESS

Dan-Ex Contracting Ltd. is committed to the health and safety of our employees and prohibiting the spread of blood-borne pathogens. Therefore, the following blood-borne pathogens safety plan has been adopted. In the event an employee is exposed to blood-borne pathogens all measures within this program shall be provided to eliminate the spread of disease.

Exposure Determination

All employees who, as a result of performing their job duties, must engage in activities where exposure to blood or other potentially infectious materials is reasonably anticipated are considered to have occupational exposure to blood-borne pathogen. Employees shall take necessary precautions to avoid direct contact with body fluids.

- The most common concern for spread of blood-borne pathogen is during the administration of first aid. Employees designated as First Aid Responders are considered at risk of occupational exposure due to the nature of these duties (e.g., assisting bleeding victims, resuscitation).

Contaminated Equipment

In order to prevent occupational exposure to blood or other potentially infectious material, all equipment or material that comes into contact with pathogens shall be decontaminated. Contaminated equipment or other contaminated items are not to be placed or stored in areas where food is kept, and decontamination should be accomplished as soon as possible. Decontamination is not to take place in any area where food or drink is consumed. Cloths used to wipe contaminated equipment can be discarded as refuse unless they would somehow become contaminated to the extent that they would be considered regulated waste. A biohazard label is to be attached to any large contaminated equipment and is to state which portions are or remain contaminated. For smaller pieces of equipment, the biohazard label should be attached as above, and the piece of equipment should be placed in a bag prior to shipping.

Examples of Contaminated Equipment or Material:

- Objects that may have been bled upon
- Bandages or gauze
- Equipment used during first aid

Personal Protective Equipment

Although employees are expected to avoid the handling of blood or other potentially infectious materials as well as contact with surfaces or items contaminated with such materials during the course of first aid administration, it is likely that the employee shall be exposed to blood. Therefore, personal protective equipment such as gloves shall be provided in the first aid kit.

These gloves are not to be washed or decontaminated for reuse. First Aid Responders are to include disposable resuscitation masks as well. Such equipment is to be used for the employee's protection in cases where the employee is expected to provide ventilator assistance. Decontaminant shall also be available to all employees to decontaminate equipment.

How are people exposed to infected blood and body fluids?

The virus must have the opportunity to enter the body for contact with infected blood and certain body fluids to pose a risk of infection. Whether an infection occurs depends on the individual's ability to fight infection.

Workers can be exposed to infected blood and body fluids at work in the following ways:

- Puncturing the skin with sharp objects contaminated with infected blood and body fluids. (Sharp objects are commonly known as sharps. These include needles, scalpels, knives, razors, scissors, broken glass, or anything that can pierce, puncture, or cut skin.)
- Splashing infected blood and body fluids into the tissues lining the eyes, nose, or mouth. (These tissues are called mucous membranes.)
- Splashing infected blood and body fluids on non-intact skin (that is, fresh open cuts, nicks, wounds, skin abrasions, chapped and damaged skin, and skin with diseases such as eczema and dermatitis).

How to reduce the risk of infection at work

Employer responsibilities

Where it is reasonable to expect that workers could be exposed to blood and certain body fluids as part of their normal job duties, employers must comply with the sections on bio-hazardous materials in the Occupational Health and Safety Regulation. Under these requirements, employers will typically have to develop and implement exposure control plans that eliminate or minimize the specific risks and hazards in their workplaces.

Accident investigations are an important source of health and safety information. If a review of accident reports shows that exposure incidents involving blood and certain body fluids have occurred in the past, an exposure control plan may also be required.

There's a lot of concern in the workplace about HIV/AIDS, and hepatitis B and C. Even if contact is not likely to occur at a worksite, the employer can help with such concern and can ensure that workers are prepared for unexpected events.

Employers should do the following:

- Inform and instruct workers in how to eliminate or reduce the risk of contact with blood and certain body fluids.
- Ensure that work practices eliminate or minimize the risk of unforeseen contact.
- Develop ways to address chance encounters with blood and certain body fluids.
- Provide workers with the equipment, tools, and personal protective equipment (PPE) needed to deal with an unforeseen contact.
- Monitor the workplace to ensure that safeguards are used and safe work practices are followed.

In case of an exposure incident, ensure that:

- Prompt, easy-to-access first aid and medical attention is available
- Employees are aware of procedures for obtaining immediate first aid and medical attention and for reporting incidents of exposure to blood and certain body fluids

If an exposure incident occurs at the workplace, the employer must investigate it and, based on the findings, must develop ways to prevent similar incidents from occurring.

Worker responsibilities

Workers also have responsibilities to help reduce the risk of contact with blood and certain body fluids.

Workers must:

- Attend education and training sessions provided by the employer
- Use controls and follow safe work practices established by the employer for their protection
- Use the available tools and PPE that have been provided for use in chance encounters with blood and certain body fluids
- Know how to get immediate first aid and medical attention and how to report exposure incidents to blood and certain body fluids
- Know that they should not clean up spilled blood and body fluids unless they have the proper equipment and PPE, and have been trained to do so safely

Safe work practices

Even if workers aren't expected to be in contact with blood and certain body fluids, all workplaces should have basic work practices to deal with the rare incidents that could occur.

Safe work practices explain how tasks are to be performed to reduce the likelihood of contact with blood and certain body fluids. These sample safe work practices should be tailored specifically to your workplace and should explain how to:

- Follow standard precautions (see below)
- Get or administer first aid
- Report exposure incidents and seek medical attention
- Safely clean up blood and body fluids after spills
- Safely decontaminate or dispose of contaminated objects

Standard precautions

Standard precautions were first used in health care where medical personnel work frequently and directly with blood and certain body fluids. Other workers should also follow standard precautions to control their risk of contact with blood and body fluids that may be infected. Standard precautions treat the blood and body fluids of every person as if they're infectious. Standard precautions are steps you should take to protect yourself from coming into contact with the blood or body fluids of other people. An example of a standard precaution is wearing waterproof gloves when handling objects contaminated with blood.

Standard precautions are necessary because:

- People can carry HIV and the hepatitis B and C viruses without any signs and without knowing it; so you don't know who is infected
- It's possible to become infected with one exposure incident to infected blood or body fluids

Keep broken skin covered

Breaks in your skin can be caused by cuts, scrapes, dermatitis, chapping, and other injuries. It is important to protect fresh breaks because they can provide an entry route for blood-borne pathogens. Cover injuries or non-intact skin with a waterproof dressing or bandage if there is a possibility that you may contact blood or certain body fluids, even though you wear gloves. The bandage will provide more protection to the broken

skin in case the glove is punctured or in case blood or body fluids seep in around the top of the glove.

Wash hands

Hand washing is one of the best defences against spreading infections. It stops you from transferring infectious material from your hands to other areas of your body or other surfaces you may touch, and vice versa.

Wash your hands thoroughly, in a suitable facility such as a rest room or utility sink, using warm running water and non-abrasive soap.

- Wash your hands immediately after accidental contact of unprotected but intact skin with blood or certain body fluids.
- Wash your hands before leaving a work area.
- Wash your hands before eating, drinking, smoking, biting your nails, handling contact lenses, and applying personal care products (such as lip balm or make-up).

What do you do when hand-washing facilities aren't available?

- Use a waterless hand cleanser. Follow the manufacturer's directions on how to use the cleanser.
- Thoroughly wash your hands with soap and water in a proper facility as soon as possible after using the cleanser.

HAZARD ALERT

Don't reach for objects you can't see

A worker on a ski patrol was assisting an unconscious skier. The worker received a poke from a needle when emptying the skier's pack.

- Look before reaching. Don't use your hands to feel or reach into any area or container if you can't see the contents or if you don't know what's there. Use a long-handled stick or other object — not your hands — to explore hidden spots. A flashlight could be used to move objects and to shed light on hard-to-see objects.
- Empty the contents of purses, packs, and other containers by turning them upside down over a table or other flat surface.

If exposure occurs, follow these steps:

1. Get first aid immediately.

- If the mucous membranes of the eyes, nose, or mouth are affected, flush with lots of clean water at a sink or eyewash station.
- If there is a sharps injury, allow the wound to bleed freely. Then wash the area thoroughly with non-abrasive soap and water.
- If an area of non-intact skin is affected, wash the area thoroughly with nonabrasive soap and water.

2. Report the incident.

Report the incident as soon as possible to your supervisor and first aid attendant, or occupational health staff. This should not cause significant delay in seeking medical attention.

3. Seek medical attention immediately.

Seek medical attention immediately — preferably within two hours — at the closest hospital emergency room, or at a health care facility if there's no hospital emergency room in the vicinity. Immunizations or medications may be necessary. These may prevent infection or favourably alter the course of the disease if you do become infected. Blood tests should also be done at that time. You may need to see your family doctor within the next five days for follow-up, such as counselling and medications.

4. Complete appropriate claim forms for your area.

If the exposure incident occurred at work, the employer and worker must complete and submit the appropriate forms.

Blood and body fluid contact with intact skin is not considered to be a risk for the spread of blood-borne pathogens. You should, however, thoroughly wash your hands and other affected areas immediately. If you have any further concerns, contact your family physician or nearest health unit office (see the blue pages of the telephone directory).

How to clean up spills of blood and certain body fluids

Once any exposure incident has been attended to, clean up spills as soon as possible. Don't clean up blood and -certain body fluids unless you have been trained to do so and have the equipment and PPE needed to do so safely.

Kits that contain the supplies needed to clean up spills are available from safety supply companies.

DECLINATION STATEMENT

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring Hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with Hepatitis B vaccine, at no charge to myself. However, I decline Hepatitis vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.

_____

Employee Signature

_____

Date

Written Opinion

To the Evaluating Physician:

After you have determined whether there are contra indications to vaccination of this employee with Hepatitis B vaccine, please state in the space below only:

(A) _____ If vaccine was indicated

(B) _____ If vaccine was received.

(All other findings are to remain confidential and are not to be included on this page)

Please return this sheet to this employee:

(Name of Employee)_____

Thank you for your evaluation of this employee.

_____

Physician's name (printed) date

Physician's signature_____

Instructions for the Evaluating Physician

This employee may have suffered an exposure incident to a Blood-borne Pathogen. In accordance with the standard's provision for post exposure evaluation and follow up, the employer submits to you for the following evaluations:

(A) A copy of Occupational Exposure to Blood-borne Pathogens;

(B) A description of the exposed employee's duties as they relate to the exposure incident;

(C) Documentation of the routes of exposure and circumstances under which exposure occurred;

(D) Results of the source individual's blood testing, if available; and

(E) All medical records relevant to this employee's appropriate treatment, including vaccination status.

After completing the evaluation, please:

(A) Inform the employee regarding the evaluation results and any follow up needed;

(B) Complete the attached written opinion form and give it to the employee. (This form will be maintained in the office to which the employee is assigned); and

Date exposure incident occurred? _____

Describe the circumstances under which the exposure incident occurred (what happened that resulted in the incident)

_____

_____

What body fluid(s) were you exposed to? _____

_____

What was the route of exposure (e.g., mucosal contact, contact with non-intact skin, percutaneous)? _____

_____

Describe any personal protective equipment in use at time of exposure incident _____

_____

Did PPE fail? _____If yes, how? _____

_____

Identification of source individual(s) (names) _____

_____

Other pertinent information _____

_____

Chapter 6

Accident & Incident Investigation

Purpose

It is the goal of ***Dan-Ex Contracting Ltd.*** to provide an accident-free workplace for all employees. It is our belief that all accidents are preventable. Though great time and effort is spent identifying hazards and reducing the possibility of an accident happening, there is still the possibility that an accident may occur. Whenever there is an accident, it is our obligation to investigate that accident and to install measures to prevent a reoccurrence. This procedure establishes methods to be used in the investigation, reporting and record keeping of accidents to include fatalities, first aid cases, vehicle accidents, property damage, spills, fires, and significant near misses.

Responsibility

It shall be the responsibility of management to ensure this procedure is implemented and revised as necessary to ensure effectiveness in the determination of the root cause of accidents. ***Dan-Ex Contracting Ltd.*** shall provide the necessary tools and training for supervisors, and foremen to allow the successful implementation of this procedure.

The principal responsibility for conducting accident investigation has been assigned to _____. An investigation shall be conducted into the events and circumstances leading up to and surrounding each and every accident, incident, exposure, and near miss accident that occurs in the workplace.

Procedure

The Goal of the Investigation

1. Survey the accident scene. Make a list of people who were present at the time of the accident. Make drawings of the layout of the area; take measurements and photographs of the scene.
2. Interview the worker who was injured and anyone else who has information relevant to the investigation. Verify your understanding and recording of the accident with the person who is being interviewed. Each witness should sign and date their statement after having reviewed it.
3. Examine the site of the accident in detail. If there was a death or critical injury, you must ensure that the scene is not disturbed before OHS and/or police investigators have done their jobs. Look for equipment damage. Take note of environmental details: noise level, visibility, temperature and exposure to hazardous materials.
4. Organize the facts and have the information analysed. Ask the questions who, what, when, where, why and how to see if any information is missing.
5. Prepare the report. Ensure to include sufficient detail so that the events leading up to the accident are understood. The report should identify all the causes of the accident including underlying causes.
6. Take corrective action; notify workers about actions taken and recommendations made to management.

7. Follow up. Monitor actions taken on recommendations for preventing recurrences. Be persistent to ensure that they are implemented. Keep records of the date of implementation of the recommendations.

Typical contributing factors can be, but are not limited to, the following:

1. Communication Problems: procedures, policy, training, work practices, maintenance, proper equipment operation, scheduling, etc.
2. Preparation Problems: inadequate employee training, non-routine tasks, lack of or improper tools and equipment, lack of hazard identification and assessment, etc.
3. Environmental Problems: weather conditions, slippery work surfaces and other slip, trip, and fall hazards, elevated work surfaces, personal protective equipment, etc.
4. Improper Work Practices: body positioning, improper or misuse of personal protective equipment, work load, using shortcuts, improper use of tools or equipment, tool condition, etc.

Investigation Method

A. Before the Accident

In order to minimize the effects of any accident and to preserve crucial evidence, it is necessary that all employees are aware of the following:

- How accidents are reported and by whom.
- To who are accidents reported.
- Methods used to alert other employees that an accident has occurred and areas to be avoided.
- Who contacts emergency personnel.
- Emergency methods to shut down the operation.
- The capability of emergency services and how to contact them.

B. When an Accident Occurs

1. Take Charge of the Situation
   a. Assess the situation
   b. Provide direction
   c. Preserve evidence
2. Take Care of the Injured
   a. Notify emergency services as required
   b. Assist the injured
   c. Provide first aid when necessary
   d. Reduce or eliminate the possibility of further injury
3. Neutralize the Area
   a. Clear non-essential personnel
   b. Prevent related accidents
   c. Turn off or neutralize power equipment
   d. In case of chemical spills, evacuate as necessary
   e. Preserve evidence
   f. Ensure nobody alters the scene

g. If possible, record names of witnesses and any remarkable information

h. Look for obvious clues

i. Write it down, do not depend on your memory

C. Collect Evidence

1. *People Evidence:* Interview witnesses (Remember, the victim is a witness) and determine:

   a. What they knew concerning the situation leading up to the accident.

   b. What they saw when the accident occurred.

   c. What they saw and what they did after the accident.

2. *Position Evidence:* Determine the locations of:

   a. The victim and other personnel,

   b. Structures, equipment and tools.

3. *Parts Evidence:* Determine any contributing factors:

   c. Condition of equipment (i.e. failed parts)

   d. Parts of product or structure involved.

4. *Paper Evidence:* Collect data pertaining to:

   a. Employee training (both safety and operational).

   b. Equipment maintenance and inspection records.

   c. Work instructions and procedures.

   d. Hazard assessments.

   e. Disciplinary actions for earlier unsafe acts.

D. Root Cause Determination

1. The immediate cause (not necessarily the root cause) of the accident

2. Elements contributing to the accident.

3. Root cause of the accident. Remember, if the root cause had been properly addressed before the accident, the accident would not have occurred.

Accident Investigation and Reporting Guidelines and Procedures

Purpose

The investigation and reporting of accidents involving personal injury to an employee and/or vehicle or property damages are necessary elements of an effective Health and Safety Program. The investigative reports required by this section provide a mechanism for gathering information and data relative to the accidents and are invaluable in preventing reoccurrences of similar accidents. The investigation reports shall also be used for the preparation of claim reports as required, notification of regulatory authorities, and to ensure that injured employees receive timely and appropriate medical care and benefits to which they are entitled.

Responsibilities

Supervisors shall ensure that necessary emergency care of injured personnel shall be of the highest priority and any procedures contained herein shall be secondary to ensuring that injured personnel receive adequate medical attention.

Employees involved in, or a party to, an accident involving personal injury and/or illness, vehicle or property damage are responsible for reporting the occurrence to their immediate supervisor as soon as possible. They shall assist the supervisor in completing the required investigative reports. The appropriate supervisor is responsible for conducting the initial investigation of all accidents when an employee has sustained and injury on the job to include non-lost time or medical only type injuries or when property or equipment has been damaged as a result of an accident. The appropriate supervisor will also investigate all near miss occurrences that could have resulted in personal injury and/or property damage. The joint health and safety committee or health and safety representative shall review all initial investigation reports and assist in completing the investigations as required.

The completed investigation report shall be submitted to management for review and to implement the necessary corrective actions to prevent reoccurrence. Where accidents involve loss of life or serious injuries to any person, catastrophic occurrences (involving three or more victims), and major property and/or equipment losses, legal counsel shall be notified as soon as possible and shall direct all such investigations.

Investigation Process

The supervisor’s investigation shall be initiated as soon as possible after the occurrence of an accident.

The names of all witnesses and their pertinent statements should be obtained and any failed parts or other evidence should be noted, identified, and taken into custody where feasible. Reporting forms are provided and all pertinent information specified on the form should be obtained. Only factual information shall be included in the investigation report. Photos may be taken as appropriate and when taken shall be specifically identified as to the scene depicted. Additional documentation, such as personnel records, maintenance records, etc., may be necessary in order to complete the investigation report. However, the safety committee/health and safety representative and/or legal counsel should be consulted as this becomes necessary.

The Supervisor’s Accident Report and Accident report forms shall be completed as appropriate and forwarded to management as soon as possible.

Serious Accident Notification and Procedures

In the event of an employment-related accident that involves loss of life, serious injury to any person (hospitalization), catastrophic occurrences, or major property and/or equipment loss, the following procedures shall be implemented:

1. Equipment, material, or product related to injury or fatality will not be moved or altered until clearance is given by management.
2. In situations where compliance with the above would interfere for an unreasonable length of time or create additional hazards to persons, the onsite supervisor is authorized to alter the position of equipment, materials, or products before clearance is obtained from management. Documentation shall be made of any alterations or changes made to the accident scene.
3. Reports to regulatory authorities shall be made by the appropriate division or company management personnel in accordance with the regulations of the jurisdiction in which the accident occurred.

Claims Reporting Procedures

Worker's Compensation Claims reports shall be filed in accordance with the claim reporting procedures.

Employee's Report of Injury Form

Employees shall use this form to report all work related injuries, illnesses, or "near miss" events (which could have caused an injury or illness) – no matter how minor. This helps us to identify and correct hazards before they cause serious injuries. This form shall be completed by employees as soon as possible and given to a supervisor for further action.

I am reporting a work related: ☐ Injury ☐ Illness ☐ Near miss	
Your Name:	
Job title:	
Supervisor:	
Have you told your supervisor about this injury/near miss? ☐ Yes ☐ No	
Date of injury/near miss:	Time of injury/near miss:
Names of witnesses (if any):	
Where, exactly, did it happen?	
What were you doing at the time?	
Describe step by step what led up to the injury/near miss. (continue on the back if necessary):	
What could have been done to prevent this injury/near miss?	
What parts of your body were injured? If a near miss, how could you have been hurt?	
Did you see a doctor about this injury/illness? ☐ Yes ☐ No	
If yes, whom did you see?	Doctor's phone number:
Date:	Time:
Has this part of your body been injured before? ☐ Yes ☐ No	
If yes, when?	Supervisor:
Your signature:	Date:

Supervisor's Accident Investigation Form

Name of Injured Person _____

Date of Birth _____ Telephone Number _____

Address _____

City _____ Province _____ Postal Code _____

(Circle one) Male Female

What part of the body was injured? Describe in detail. _____

_____

What was the nature of the injury? Describe in detail. _____

_____

_____

Describe fully how the accident happened? What was employee doing prior to the event? What equipment, tools being using? _____

_____

_____

Names of all witnesses: _____

_____

Date of Event _____ Time of Event _____

Exact location of event: _____

What caused the event? _____

_____

_____

Were safety regulations in place and used? If not, what was wrong? _____

_____

Employee went to doctor/hospital? Doctor's Name _____

Hospital Name _____

Recommended preventive action to take in the future to prevent reoccurrence:

_____

_____

_____

_____ _____

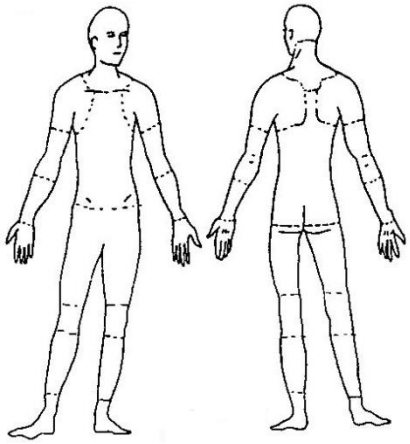
Supervisor Signature Date

Incident Investigation Report

Instructions: Complete this form as soon as possible after an incident that results in serious injury or illness. (Optional: Use to investigate a minor injury or near miss that could have resulted in a serious injury or illness.)

This is a report of a: ☐ Death ☐ Lost Time ☐ Dr. Visit Only ☐ First Aid Only ☐ Near Miss	
Date of incident:	This report is made by: ☐ Employee ☐ Supervisor ☐ Team ☐ Other_____

Step 1: Injured employee (complete this part for each injured employee)

Name:	Sex: ☐ Male ☐ Female	Age:
Department:	Job title at time of incident:	
Part of body affected: (shade all that apply) 	Nature of injury: (most serious one) ☐ Abrasion, scrapes ☐ Amputation ☐ Broken bone ☐ Bruise ☐ Burn (heat) ☐ Burn (chemical) ☐ Concussion (to the head) ☐ Crushing Injury ☐ Cut, laceration, puncture ☐ Hernia ☐ Illness ☐ Sprain, strain ☐ Damage to a body system: ☐ Other _____	This employee works: ☐ Regular full time ☐ Regular part time ☐ Seasonal ☐ Temporary Months with this employer Months doing this job:

Step 2: Describe the incident

Exact location of the incident:	Exact time:
What part of employee's workday? ☐ Entering or leaving work ☐ Doing normal work activities ☐ During meal period ☐ During break ☐ Working overtime ☐ Other_____	
Names of witnesses (if any):	

Number of attachments:	Written witness statements:	Photographs:	Maps / drawings:

What personal protective equipment was being used (if any)?

Describe, step-by-step the events that led up to the injury. Include names of any machines, parts, objects, tools, materials and other important details.

Description continued on attached sheets: ☐

Step 3: Why did the incident happen?

Unsafe workplace conditions: (Check all that apply)
- ☐ Inadequate guard
- ☐ Unguarded hazard
- ☐ Safety device is defective
- ☐ Tool or equipment defective
- ☐ Workstation layout is hazardous
- ☐ Unsafe lighting
- ☐ Unsafe ventilation
- ☐ Lack of needed personal protective equipment
- ☐ Lack of appropriate equipment / tools
- ☐ Unsafe clothing
- ☐ No training or insufficient training
- ☐ Other: _____

Unsafe acts by people: (Check all that apply)
- ☐ Operating without permission
- ☐ Operating at unsafe speed
- ☐ Servicing equipment that has power to it
- ☐ Making a safety device inoperative
- ☐ Using defective equipment
- ☐ Using equipment in an unapproved way
- ☐ Unsafe lifting
- ☐ Taking an unsafe position or posture
- ☐ Distraction, teasing, horseplay
- ☐ Failure to wear personal protective equipment
- ☐ Failure to use the available equipment / tools
- ☐ Other: _____

Why did the unsafe conditions exist?

Why did the unsafe acts occur?

Is there a reward (such as "the job can be done more quickly", or "the product is less likely to be damaged") that may have encouraged the unsafe conditions or acts? ☐ Yes ☐ No
If yes, describe:

Were the unsafe acts or conditions reported prior to the incident? ☐ Yes ☐ No

Have there been similar incidents or near misses prior to this one? ☐ Yes ☐ No

Step 4: How can future incidents be prevented?

What changes do you suggest to prevent this incident/near miss from happening again?

☐ Stop this activity ☐ Guard the hazard ☐ Train the employee(s) ☐ Train the supervisor(s)

☐ Redesign task steps ☐ Redesign work station ☐ Write a new policy/rule ☐ Enforce existing policy

☐ Routinely inspect for the hazard ☐ Personal Protective Equipment ☐ Other: _____

What should be (or has been) done to carry out the suggestion(s) checked above?

☐ Description continued on attached sheets:

Step 5: Who completed and reviewed this form? (Please Print)

Written by: Department:	Title: Date:
Names of investigation team members:	
Reviewed by:	Title: Date:

Chapter 7

Workplace Violence

Earle Macloed is responsible for the implementation and enforcement of the workplace violence and harassment program. In the event this policy is violated disciplinary procedures will be enforced and legal action taken as needed.

An employer must develop a policy and procedures respecting potential workplace violence. The employer must ensure that workers are instructed in how to recognize workplace violence, the policy, procedures and workplace arrangements that effectively minimize or eliminate workplace violence, the appropriate response to workplace violence, including how to obtain assistance, and procedures for reporting, investigating and documenting incidents of workplace violence.

An employer must ensure that a worker is advised to consult a health professional of the worker's choice for treatment or referral if the worker reports an injury or adverse symptom resulting from workplace violence, or is exposed to workplace violence.

Our company has adopted the following policy to deal with any violence that may occur on the company's premises and to ensure the safety of our employees.

For our purposes the term violence may include:

- Any act or threat of physical violence made by an employee or visitor against another person's life, health, safety, well being, family or property.
- Intimidation or harassment, including sexual harassment.
- Threats made directly or indirectly by words, gestures, or symbols.
- Carrying weapons on company property, vehicles, or worksites

Coverage

Our company shall provide a safe environment for all personnel, including visitors, customers, and vendors. Acts and/or threats of violence by employees on this company's property including carrying weapons in other than an official capacity **will not be tolerated**. These acts and/or threats will be grounds for appropriate remedial action, including but not limited to, discipline up to and including termination of employment and criminal prosecution. Similarly, acts and/or threats or violence by visitors against employees will not be tolerated and will be grounds for appropriate remedial action, including but not limited to criminal prosecution.

Responsibility

Employees must report all threats or acts of violence, both direct and indirect, as soon as possible. If your immediate supervisor cannot be reached, contact any other Company supervisory personnel. Be specific when reporting the facts of the incident.

Reporting & Investigation Procedures

In keeping with a policy of zero tolerance of workplace violence, all reported incidents will be investigated in the interest of a safe and productive workplace, An employee who engages in prohibited conduct will be subject to appropriate disciplinary action, as determined by the findings of an objective and impartial investigation.

Discipline for inappropriate conduct may include warnings, reprimand, suspension, or immediate termination. In addition, certain actions may cause the employee to be subject to criminal prosecution, or held legally liable under provincial and/or federal law.

Legislative Provisions on Violence in the Workplace

In addition to regulating working alone, Alberta, British Columbia and Saskatchewan have enacted special provisions on violence in the workplace in their occupational health and safety legislation.

ALBERTA. Violence, whether at a work site or work related means the threatened, attempted or actual conduct of a person that causes or is likely to cause physical injury.

BRITISH COLUMBIA. Violence means the attempted or actual exercise by a person, other than a worker, or any physical force so as to cause injury to a worker, and includes any threatening statement or behaviour which gives a worker reasonable cause to believe that he/she is at risk of injury.

SASKATCHEWAN. Violence means the attempted, threatened or actual conduct of a person that causes or is likely to cause injury, and includes any threatening statement or behaviour that gives a worker reasonable cause to believe that he/she is at risk of injury.

Also, under the Canada Labour Code (Part II: Occupational Health and Safety), specific duties for employers include the obligation, in respect of every workplace or work activity under their control, to "take the prescribed steps to prevent and protect against violence in the work place."

There is a "general duty" clause in each provincial and federal health and safety act which requires the employer to take every reasonable precaution for the safety of workers. This can be invoked to require the employer to provide safe working conditions when working alone or the potential for violence.

Factors that Contribute to Violence in the Workplace

No one thing can "cause" violence, and to express it thus would be to reduce its impact. Factors contributing to it can heighten understanding, but does not excuse the execution of it.

Certainly, job loss or insecurity, overcrowded classes, lack of resources, or personal issues can cause people to lash out. Fear of failure both on the part of staff and student, mental illness, low self-esteem and a need to control are other examples.

Loss of control over the work environment and the ensuing fall-out often leave staff feeling helpless and undervalued.

One of the biggest contributing factors may be the employer's lack of awareness and attention to staff morale and a true grasp of the day-to-day needs and dynamics within the workplace setting.

Trying to meet the bottom line can cause resentment, hostility and paranoia amongst otherwise healthy individuals.

The Many Forms of Violence

Violence is any action imposed on another that harms, injures or intimidates. Violence is typically physical in nature. Violence includes, but is not limited to threats, assaults and abuse.

Abuse: Abuse is any verbal statement (including tone of voice) or physical act which may be construed as a derogatory, intimidating, bullying or psychologically or emotionally disturbing.

Assault: An assault occurs when a person, by an act or gesture, attempts to apply force to another person, whether or not an injury occurs.

Bullying and Intimidation

"Bullying constitutes offensive behaviour through vindictive, cruel, malicious or humiliating attempts to undermine an individual or groups of employees. These persistently negative attacks are typically unpredictable, irrational and unfair. Although commonly thought of as a school yard behaviour, it happens with great regularity within the workplace. Bullying and intimidation can happen at every level of the organization, often tolerated in managers who are relentless in getting results in a highly competitive market ... Demoralized over time, co-workers or subordinates of the bully, lose productivity, become depressed and feel the only option left is that of retaliation or simply resigning." [Canadian Initiative on Workplace Violence: www.workplaceviolence.ca] Bullies can come in many forms: employers, supervisors, even colleagues and students.

Harassment

Any unwelcome action by a person, whether verbal or physical, on a single or repeated basis, which humiliates, insults or degrades.

Physical and Sexual Assault

Physical and sexual assault are the most easily understood types of violence, as they involve the non-consensual touching and/or injuring of another person's body and is a criminal offence. This may involve grabbing, punching, touching, pinching, hitting with an object, pushing, non-consensual kissing and/or forcible sex.

Stalking

Stalking, both on and off the internet, is quickly becoming an issue in the workplace, although in Canada we do not have reliable data to fully understand the magnitude of the problem. One of the difficulties in addressing this behaviour is that incidents of stalking are frequently not reported. Stalking can erode confidence, be anxiety producing and have a negative impact in the workplace. Research by the Metropolitan Action Committee on Violence Against Women and Children (METRAC), shows that 28% of stalkers are friends or co-workers. More than 26% of people who are stalked said they lost time from work.

Criminal harassment is the legal term for stalking.

It is defined as follows:

1) Criminal harassment: No person shall, without lawful authority and knowing that another person is harassed or recklessly as to whether the other person is harassed, engage in conduct referred to in subsection (2) that causes that other person reasonably, in all the circumstances, to fear for their safety or the safety of anyone known to them.

2) Prohibited conduct: The conduct mentioned in subsection (1) consists of:

a. repeatedly following from place to place the other person or anyone known to them;
b. repeatedly communicating with, either directly or indirectly, the other person known to them;
c. besetting or watching the dwelling-house, or place where the other person, or anyone known to them, resides, works, carries on business or happens to be; or
d. engaging in threatening conduct directed at the person or any member of their family.

Responding to Workplace Violence

Violence in any form is unacceptable, and needs to be addressed promptly by the employer. Joint Committees, workplace policies and collective agreement language are effective tools to begin a comprehensive violence prevention program in the workplace.

Tools

Before violence strikes in the workplace, faculty associations can work with employers to develop workplace violence prevention programs.

Develop such programs by:

1. Working in concert with other unions and student associations.
2. Conducting a workplace violence risk assessment and workplace audit.
3. Developing prevention measures.
4. Reporting and investigating workplace violence.
5. Establishing an emergency response plan.
6. Providing support mechanisms.
7. Conducting incident follow-up.
8. Providing workplace violence training and education.
9. Conducting a program review.
10. Using community resources.

How to Write a Workplace Violence Prevention Policy

Note: It is the employer's responsibility to ensure a viable violence prevention policy is implemented in the workplace. The following are some guidelines to remember when writing a workplace violence prevention policy:

- Define what is meant by workplace violence in precise, concrete language.
- Provide clear examples of unacceptable behaviour (verbal and written threats, harassment, physical intimidation or assault) and working conditions (working late or working alone without acceptable safeguards).
- State in clear terms the organization's view toward workplace violence and its commitment to the prevention of workplace violence.
- Precisely state the consequences of making threats or committing acts of violence.

For example: Within a workplace, consider when to apply verbal or written reprimands, suspend or terminate employment, transfer the employee or take legal action.

- Outline the process by which preventive measures will be developed.
- Encourage reporting of all incidents or potential incidents of violence.
- Outline the confidential process, by which employees can report incidents and to whom.
- Provide assurance that reprisals will not be made against reporting employees.
- Outline the procedures for investigating and resolving complaints.
- Describe how information about potential risks of violence will be communicated to employees.
- Provide support services to victims of violence.

- Offer a confidential Employee Assistance Program (EAP) to allow employees with personal problems to seek help.
- Violence prevention training for different levels of personnel with your institution.
- Monitor and regularly review the policy.
- State applicable regulatory requirements.

How to Implement a Violence Prevention Policy

Once a violence prevention program has been developed, work to implement it by:

- Providing training and orientation sessions on the policy.
- Distributing the policy widely.
- Integrating the violence prevention policy into your collective agreement.

How to Provide Support to Victims of Violence

If violence does strike in the workplace, providing adequate support to the victim is essential.

Some ways to provide such support are as follows:

- Medical attention.
- Informal debriefing.
- Formal debriefing.
- Voluntary and confidential counselling.
- Time off work.
- Information regarding rights.
- Assistance with compensation insurance and/or legal advice.

How to Identify Violence in the Workplace

Watch for the following behaviour:

- Threatening behaviour
- Verbal or written threats (direct threats, conditional threats, veiled threats)
- Harassment, verbal abuse, physical attack

Some examples of workplace violence:

- Theft
- Physical assault
- Verbal abuse
- Anger-related accidents
- Property damage
- Arson
- Sexual assault
- Vandalism
- Psychological trauma
- Sabotage
- In some cases, rumours, swearing and arguments can also be included in the context of violence.

Tools for Individuals

When violence occurs, people are often in a state of shock or, if it has been an on-going problem, suffering from an inability to cope. They often do not know where to turn for confidential and dependable assistance.

Listed here are some examples of where to turn for help:

- Association or Union
- Joint Committee
- Local Sexual Assault/Crisis Centre
- Local Police Force

How to Terminate a Negative Interaction

It is best to respond to situations before they turn violent.

What follows are some suggestions on how to end a negative interaction:

- Interrupt the conversation firmly, but politely.
- Tell them that you do not like the tone.
- Tell them that you will not accept abuse.
- Tell them that you will end the conversation.
- Ask them to leave.

If the behaviour persists:

- End the conversation.
- Leave or ask them to leave.
- Inform the appropriate management department.
- File an incident report.
- Contact your union.

How to Respond to Harassment

When a negative interaction moves into harassment, do the following:

- Firmly tell the harasser to stop
- Report the problem
- Keep a diary
- Keep copies of correspondence
- Use your Employee Assistance Program (EAP)
- DO NOT blame yourself
- DO NOT retaliate

Workplace Violence Prevention Checklist

Violence prevention policy and standards

☐ My workplace has a written violence prevention policy developed by management and worker representatives and signed by senior management.

☐ My workplace has clearly established standards and expectations for violence prevention.

Risk assessment

☐ I have reviewed records and reports, e.g. security reports, employee incident reports, staff perception surveys, health and safety inspection reports, first aid records or other related records.

☐ I have reviewed factors at my workplace that may contribute to risk of violence, e.g contact with public, exchange of money, working alone or at night, etc.

☐ I have asked workers if they have concerns about work practices, public interactions, or any other violence-related issues.

☐ I have researched the history of violence in workplaces similar to mine.

☐ I have reviewed my legal responsibilities.

Control violence hazards

☐ I have reviewed workplace design to minimize the risk of violence: for example, use of signs, locks, physical barriers, lighting and electronic surveillance.

☐ I have considered improvements such as placing the reception area in view of other workers, improving lighting in the parking lot or using fences to control access to the workplace.

☐ I have reviewed work practices such as keeping cash on hand to a minimum, varying the time of day that the cash register is emptied, checking the credentials of clients, or using a 'buddy' system.

Education and training

☐ Education and training are provided to workers so they are aware of potential violence risks and procedures for controlling them.

Inspect your workplace and review your program

☐ I regularly inspect my workplace and look for signs of violence such as broken items or holes in walls.

☐ I conduct an annual review of the violence prevention program and make revisions where needed.

Sample Documents

The sample documents are as follows:

Risk assessment summary report

The risk assessment is the foundation upon which you will build your violence prevention program. This sample risk assessment summary report, which you can use as a model for your own report, will summarize the findings of your risk assessment so you and your employees can easily see where the potential for violence exists. It will help you establish policies and procedures, as well as determine your training needs for violence prevention.

Policy statement — Prevention of violence in the workplace

A policy statement is necessary if your risk assessment reveals a potential for violence in your workplace. It will convey your concern for staff safety and your commitment to ensuring that workers are protected from incidents of violence in the workplace.

This document must be signed, dated, and posted prominently where workers will see it.

Record of instruction of workers

If your risk assessment reveals a potential for violence in your workplace, the

Regulation states that you must train workers and their supervisors in violence prevention procedures and keep records of the training. Like the other sample forms, you can use this one or create one that best suits your needs.

Violent incident report form

If there is a risk of violence in your workplace, you must provide a way for employees to report and document any incidents of violence that occur. This should include a violent incident report form that can be used to record all the pertinent information.

Suspect and vehicle identification sheet

If a violent incident occurs in your workplace, employees should complete this form immediately after the incident.

Risk Assessment Summary Report

A risk assessment has been conducted at

_____ on _____

Name of Company *Date*

by _____.

Name of management and worker representatives

The following potential risks of violence were identified:

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

Prevention of Violence in the Workplace

The management of _____
Name of Company

Recognizes the potential for violent acts or threats directed against staff by persons other than _____ employees.
Name of Company

Every effort has been made to identify the sources of such action, and procedures have been developed to eliminate or minimize the risks to staff.

The management of _____
Name of Company

will ensure that all staff members are aware of the hazards and are trained in the appropriate actions to take for protection from acts or threats of violence.

Workers must follow the procedures implemented for their protection, and immediately report all incidents of violence.

Owner or Manager _____

Date _____

Record of Instruction of Workers

Staff have been made aware of the risks for violence identified at this site and have been trained in the appropriate actions as defined in the procedures of this program.

Staff have been instructed on how to fill out the report form whenever a violent incident occurs.

The following list is a list of staff who have received training on workplace violence prevention procedures.

Printed Name	Signature	Date

Victims of violence at the workplace should complete this form as soon as possible.

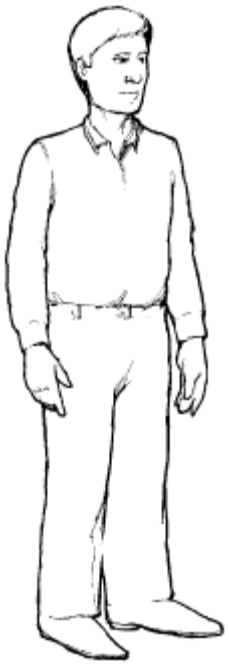
Violent Incident Report Form	
1. Identifying information	
Name	Job Title
Shift	Department or Section
Location of incident:	
Type of Assault ☐ Verbal ☐ Threatened ☐ Struck ☐ Bitten ☐ Pushed ☐ Kicked ☐ Scratched ☐ Other (please specify)	
Medical attention or First Aid obtained? ☐ Yes ☐ No	Advised of right to consult doctor? ☐ Yes ☐ No
Investigation conducted? ☐ Yes ☐ No	Insurance forms completed? ☐ Yes ☐ No
Reported to Supervisor? ☐ Yes ☐ No	Police called? ☐ Yes ☐ No
Action taken:	

2. Assailant			
Description			
Age	Complexion	Height	Weight
Name (if known)			

3. Incident and Injury Information	
Date of incident	Time a.m. / p.m.

4. Other Information
Was the assailant involved in any previous violent incidents with staff. ☐ Yes ☐ No
Are there any measures in place to prevent a similar incident? ☐ Yes ☐ No
Please provide any other information you think is significant.

Suspect and Vehicle Identification Sheet

General Appearance	
Sex Age Height Weight Race Hair Eyes Complexion Scars/Identifying Marks Tattoos **Clothing:** Jewellery Hat Coat Shirt/Blouse Pants/Skirt Shoes/Boots Tie	☐ Male ☐ Female 

Facial Appearance	Write below specific details that you definitely remember.	**Vehicle**
Skin or Hair colour Hair texture Ear size and shape Cheeks (full or sunken) Shape of Nose Neck/Adam's apple Wrinkles Shape of brow Size and shape of eyes Mouth and Lips Moustache or Beard	What did the suspect say?	 
	Describe any weapon or tool seen.	Colour | Make | Model | Licence number Body Style | Damage or Rust Antenna | Bumper Sticker | Wheel Covers Direction of Travel

Chapter 8

Power Tools / Hand Tools Safety

Glenn Willesen is responsible for the implementation and enforcement of the following safety rules for power tools and hand tools. Disciplinary procedures will be enforced.

If an employee notices equipment in need of repair or out of compliance he/she shall notify ***Jay Firman***.

Dan-Ex Contracting Ltd. employees shall practice safe operating procedures when using all power and hand tools. Employees must also use the precautions and procedures below:

- All employees will be trained in proper use of all power tools before starting.
- All employees shall read and understand the manufacturer's operating manual before using any new or unfamiliar tool.
- Make sure the tool is grounded and the cord polarized or double-insulated.
- Never cut off or bend back the ground pin on a three-prong plug, or use a two-prong cheater or adapter to make the plug fit in a two-pole outlet.
- Make sure the casings of double-insulated tools are not cracked, split, or broken.
- Inspect tool cords and extension cords daily for damage.
- Keep cords clear of the tool during use.
- Replace any open-front plugs with dead-front plugs. Dead-front plugs are sealed. They present less danger of shock or short circuit.
- Inspect tool cords and extension cords for kinks, cuts, cracked or broken insulation, and makeshift repairs.
- Never use the cord to lift, lower, or carry an electric tool. Don't disconnect the tool by yanking or jerking on the cord. You'll damage the cord, loosen connections, and run the risk of shocks and short circuits.
- Protect cords from traffic. Run them through conduit or between planks along either side. If necessary, run cords overhead above work or travel areas.
- If any cord feels more than warm to the touch, check the circuit for overloading.
- Report any shocks from tools or cords to your supervisor. Tag the tool and don't use it.
- Use a "Type A" GFCI when outdoors or in damp or wet locations indoors. Inspect all saw blades, drill bits, router bits for chips, nicks or cracks before use.
- Inspect all hand tools for wear or damage before using.
- Use clamps or vises to secure work pieces, especially when using routers.
- Wear proper eye protection when using hand and power tools.
- Carry, handle and use tools in a safe manner
- Maintain tools in proper working condition
- Report any defects to a supervisor

- Place tools in safe and appropriate containers or places when not in use
- Use a holding device to hold any tool to be struck by another worker
- Keep guards in place while using a tool
- Hold the end of a tool with a flexible shaft firmly when starting the motor to prevent the shaft from whipping,
- Do not use defective tools, use a tool for its designed purpose only
- Do not leave a tool on the floor, passageway or stairway where it may create a tripping hazard
- Do not point a tool at any person if it ejects pins, nails or any other projectiles

Safety Basics

- Read and understand the manufacturer's instructions before operating any new or unfamiliar electric tool.
- Make sure that all electric tools are properly grounded or double-insulated.
- Ground fault circuit interrupters (GFCIs) must be used with any portable electric tool operated outdoors or in wet locations.
- Always disconnect the tool from the power source before making adjustments or changing attachments,.
- Never remove or tamper with guards or other safety devices.
- Always wear eye protection when operating electric tools.
- Wear hearing protection when operating tools in confined spaces or for prolonged periods.
- Hold the tool firmly and secure the material properly before turning on the tool.

DRILLS

Trim carpenters will generally select a ¼ or ⅜ inch trigger-controlled variable speed drill. Simply by increasing pressure on the trigger, the operator can change drill speed from 0 to 2,000 rpm.

Carpenters working in heavy structural construction such as bridges, trusses, and waterfront piers will usually select the slower but more powerful one- or two-speed reversible ½ or ¼ inch drill.

Size of the drill is determined by the maximum opening of the chuck. For instance, a ⅜ inch drill will take only bits or attachments with a shank up to ⅜ inch wide.

For drywall screws, a drywall screw gun should be used. The driving bit should be replaced when worn.

Attachments

Attachments such as speed-reducing screwdrivers, disk sanders, and buffers can help prevent fatigue and undue muscle strain. A right-angle drive attachment is very useful in tight corners and other hard-to-reach places.

Cutting and drilling attachments must be kept sharp to avoid overloading the motor.

Never crowd or push the tool beyond capacity. Such handling can burn out the motor, ruin the material, and injure the operator in the event of a kickback.

Some attachments, such as hole saws, spade bits, and screwdrivers, require considerable control by the operator. If the operator does not feed the attachment slowly and carefully into the material, the drill can suddenly stop and severely twist or break

the operator's arm. Stock should be clamped or otherwise secured to prevent it from moving. This will also enable the operator to control the tool with both hands and absorb sudden twists or stops caused by obstructions such as knots or hidden nails.

Operators must restrain the drill just before the bit or cutting attachment emerges through the material, especially when oversized spade bits are used. Sides of the bit often become hooked on the ragged edge of the nearly completed hole and make the drill come to a sudden stop that can wrench the operator's arm.

At the first sign of the bit breaking through the material, the operator should withdraw the drill and complete the work from the other side. This will produce a cleaner job and prevent the material from cracking or splintering. The same result can be obtained by clamping a back-up piece to the material and drilling into that.

Select the bit or attachment suitable to the size of the drill and the work to be done. To operate safely and efficiently, the shanks of bits and attachments must turn true. Make sure that the bit or attachment is properly seated and tightened in the chuck.

Some operations require the use of an impact or hammer drill. For instance, drilling large holes in concrete or rock with a carboloy bit should be done with an impact drill

Follow manufacturer's instructions when selecting and using a bit or attachment, especially with drills or work you are not unfamiliar with.

Working with Small Pieces

Drilling into small pieces of material may look harmless, but if the pieces are not clamped down and supported, they can spin with the bit before the hole is completed.

If a small piece starts to twist or spin with the drill, the operator can be injured. Small work pieces should be properly secured and supported. Never try to drill with one hand and hold a small piece of material with the other.

Drilling from Ladders

- Standing on a ladder to drill holes in walls and ceilings can be hazardous. The top and bottom of the ladder must be secured to prevent the ladder from slipping or sliding when the operator puts pressure on the drill.
- When drilling from a ladder, never reach out to either side. Overreaching can cause the ladder to slide or tip.
- Never stand on the top step or paint shelf of a stepladder. Stand at least two steps down from the top. When working from an extension ladder, stand no higher than the fourth rung from the top.
- When drilling from a ladder, never support yourself by holding onto a pipe or any other grounded object. Electric current can travel from the hand holding the drill through your heart to the hand holding the pipe. A minor shock can make you lose your balance. A major shock can badly burn or even kill you.

Operation

- Always plug in the drill with the switch OFF.
- Before starting to drill, turn on the tool for a moment to make sure that the shank of the bit or attachment is centred and running true.
- Punch a layout hole or drill a pilot hole in the material so that the bit won't slip or slide when your start drilling. A pilot hole is particularly important for drilling into hard material such as concrete or metal.
- With the drill OFF, put the point of the bit in the pilot hole or punched layout hole.

- Hold the drill firmly in one hand or, if necessary, in both hands at the correct drilling angle.
- Turn on the switch and feed the drill into the material with the pressure and control required by the size of the drill and the type of material.
- Don't try to enlarge a hole by reaming it out with the sides of the bit. Switch to a larger bit.
- While drilling deep holes, especially with a twist bit, withdraw the drill several times with the motor running to clear the cuttings.
- Never support material on your knee while drilling. Material should be firmly supported on a bench or other work surface for drilling.
- Unplug the drill and remove the bit as soon as the work is finished.
- When drilling into floors, ceilings, and walls, beware of wiring and plumbing.
- Rotary and hammer drills generate extreme torque and must be handled with caution. Take occasional breaks to relax your arms and shoulders.

Drilling Timbers

When drilling timbers with a self-feeding auger bit, do not underestimate the physical pressure required to maintain control of the tool. Such work calls for a heavy-duty, low-rpm drill, ½ or ¼ inch in size.

Never attempt to drill heavy timbers by yourself, especially when working on a scaffold or other work platform. If the self-feeding auger bit digs into a hidden knot or other obstruction, the sudden torque can twist or wrench your arm and throw you off balance.

Other Materials

The main hazard in drilling materials other than wood is leaning too heavily on the tool. This can not only overload and burn out the motor but also cause injury if you are thrown off balance by the drill suddenly twisting or stopping.

Always use a drill powerful enough for the job and a bit or attachment suited to the size of the drill and the nature of the work. As at other times, punching a layout hole or drilling a pilot hole can make the job safer and more efficient.

A drill press stand is ideal for drilling holes in metal accurately and safely. Small pieces can be clamped in a vise and bolted to he table. This prevents the workpiece from spinning when the drill penetrates the metal.

A drill press can also be used for cutting large holes in wood with a hole saw or speed bit. The stability of the press and the operator's control over cutting speed eliminate sudden torque.

PLANES

Electric planes are available in various types and sizes, and are operated in similar ways. Depending on specific features adjustments between models may differ.

Planes may be equipped with:

- Outfeed tables (back shoes) that are either fixed or movable
- Infeed tables (front shoes) that move straight up and down or move up and down on an angle to keep the gap between cutter head and table as small as possible
- Cutter heads with two or more straight blades (also called knives or cutter blades) or cutter heads with two curved blades.

Never operate an electric plane while wearing a scarf, open jacket, or other loose clothing. Keep long hair tied up. Always wear eye protection and practice good housekeeping.

Standard Plane

- Hold with both hands to avoid contact with cutter blades.
- Always keep both hands on the plane until motor stops.
- Use the edge guide to direct the plane along the desired cut. Never try to guide the plane with your fingers. If the plane runs into an obstruction or starts to vibrate, your fingers can slide into the unprotected cutter head.

Block Plane (Electric)

Designed for use on small surfaces, the block plane is operated with only one hand. It is more dangerous than the larger, standard plane.

Operators tend to support the work with one hand while operating the block plane with the other. Any unexpected twist or movement can force the plane or the material to kick back and injure the operator. Keep your free hand well out of the way, in case the plane slips accidentally.

Maintaining Blades

- To avoid striking staples, nails, sand, or other foreign objects, make sure the work is free of obstructions.
- Keep blades in good condition and sharp. A sharp blade is safer to use than a dull blade that requires more pressure. A dull blade will float over the work and can bounce off, causing injury.
- Use a fine-grit oilstone when sharpening blades. Blades can be resharpened several times if they are not nicked or cracked.

Changing Blades

Time and patience is required when raising or replacing cutter blades. Blades must be the same weight and seated at the same height to prevent the cutter head from vibrating. Any deviation can cause the head to run off balance. Blades can fly out, inuring the operator or fellow workers.

Replacing cutter blades involves two steps: Removing and Installing

Removing Blades

1. Disconnect the plane from the power source.
2. Turn the plane upside down and secure it in a fixed position.
3. Hold the cylinder head stationary by tapping a softwood wedge between the cutterhead and the bearing (some tools are equipped with a locking device).
4. Loosen all the screws and lift out one blade and throat piece.
5. Turn the cutter head and repeat this procedure with other blades.
6. If necessary, clean parts thoroughly with recommended solvent

Installing Blades

1. Replace one throat piece and blade.
2. Tighten the two end screws lightly.
3. Take a hardwood straight edge and use the outfeed table (back shoe) as a gauge. Raise or lower the blade until both ends are level with the outfeed table at the blade's highest point of revolution.
4. Tighten up the remaining screws.
5. Set the rest of the blades in the same way.
6. Turn the cylinder head and make sure that all blades are the same height.
7. Tighten up all the screws.
8. Double-check the height of all blades. Tightening can sometimes shift the set.
9. Double-check all the screws.
10. Turn the tool right side up and plug it in.
11. Hold the tool in both hands with the cutter blades facing away from you and switch it on.

Operation

- Always disconnect the plane from the power source before adjusting or changing blades or the cutter head.
- For safe operation make sure that blades (at their highest point of revolution) are exactly flush with the outfeed table.
- Make sure to support work securely for safety and accuracy.
- Use a jack (e.g. when planing doors and large pieces of plywood) to secure material and keep edges clear of dirt and grit.
- When using an electric block plane, clamp or fasten the workpiece whenever possible. Keep your free hand well away from plane and material.
- When using the standard power plane, adjust the edge guide to provide desired guidance.
- Adjust depth of cut to suit the type and width of wood to be planed.
- To start a cut, rest the infeed table (front shoe) firmly on the material with cutter head slightly behind the edge of the material. After finishing a cut, hold both hands on the plane until motor stops.

ROUTERS

With special guides and bits, the portable electric router can be used to cut dadoes, grooves, mortises, dovetail joints, moldings, and internal or external curves. Carpenters find routers especially useful for mortising stair stringers and recessing hinges and lockplates on doors. The router motor operates at very high speed (up to 25,000 rpm) and turns clockwise.

When starting a router with a trigger switch in the handle, keep both hands on the tool to absorb the starting torque.

When starting a router with a toggle switch on top of the motor, hold the router firmly with one hand and switch on power with the other, then put both hands on the tool for control and accuracy.

Operation

- Always support and secure the work in a fixed position by mechanical means such as a vise or clamps. Never try to hold the work down with your hand or knee. Never rely on a second person to hold the material. Human grip is no match for the torque and kickback that a router can generate.
- Make sure that the bit is securely mounted in the chuck and the base is tight.
- Set the base on the work, template, or guide and make sure that the bit can rotate freely before switching on the motor.
- For work along edges such as bevels and moldings, make sure that the cutting edge of the router bit contacts the material to the left of the cutting direction.
- Otherwise the router will kick back or fly away from you.
- When routing outside edges, guide the router around the work counter-clockwise. Splinters left at corners by routing across the grain will be removed by the next pass with the grain.
- Feed the router bit into the material at a firm but controllable speed. There is no rule on how fast to cut. When working with softwood, the router can sometimes be moved as fast as it can go. Cutting may be very slow, however, with hardwood, knotty or twisted wood, and larger bits.
- Listen to the motor. When the router is fed into the material too slowly, the motor makes a high-pitched whine. Push too hard and the motor makes a low growling noise. Forcing the tool can cause burnout or kickback. Cutting through knots may cause slowdown or kickback.
- When the type of wood or size of bit requires going slow, make two or more passes to prevent the router from burning out or kicking back.
- If you're not sure about depth of cut or how many passes to make, test the router on a piece of scrap similar to the work.
- When the cut is complete, switch off power and keep both hands on the router until the motor stops. In lifting the tool from the work, avoid contact with the bit.

SAW SAFETY

- Wear protective clothing and equipment. Eye protection is essential.
- Where saws are used in confined spaces or for prolonged periods, wear hearing protection.
- Where ventilation is inadequate, wear a dust mask for protection against dust. Over time, exposure to dust from particle board and other materials may cause respiratory problems.

Note: With electric saws operated outdoors or in wet locations, you must use a ground fault circuit interrupter.

- Never wear loose clothing, neck chains, scarves, or anything else that can get caught in the saw.
- Leave safety devices in place and intact on the saw. Never remove, modify, or defeat guards. Keep your free hand away from blade.
- Always change and adjust blades with the power OFF. Disconnect electric saws from the power source before making changes or adjustments.

CIRCULAR SAWS

Circular saws are either worm-drive or direct-drive. The worm-drive saw has gears arranged so that the blade runs parallel to the motor shaft. The direct-drive saw has the blade at a right angle to the motor shaft.

The worm-drive saw periodically requires special gear oil to keep the inner gears lubricated. This requirement is usually eliminated in the direct-drive saw, which has sealed bearings and gears.

Both saws must be inspected regularly for defects, and operated and maintained in accordance with manufacturers' recommendations.

Check for:

- damaged cord – loose blade
- faulty guards – defective trigger
- chipped or missing
- cracked or damaged teeth casing

Safety Features

Sawdust Ejection Chute

This feature prevents sawdust from collecting in front of the saw and obscuring the cutting line. The operator can continue cutting without having to stop the saw and clear away sawdust.

Clutch

Some worm-drive saws are equipped with a clutch to prevent kickback. Kickback occurs when a saw meets resistance and violently backs out of the work. The clutch action allows the blade shaft to continue turning when the blade meets resistance. The blade stud and friction washer can be adjusted to provide kickback protection for cutting different materials. Check friction washers for wear.

Brake

An electric brake on some circular saws stops the blade from coasting once the switch is released. This greatly reduces the danger of accidental contact.

Trigger Safety

On some light-duty saws a latch prevents the operator from accidentally starting the motor. The trigger on the inside of the handle cannot be pressed without first pressing a latch on the outside of the handle. On heavy-duty saws a bar under the trigger switch helps to prevent accidental starting.

Blades

Blades should be sharpened or changed frequently to prolong saw life, increase production, and reduce operator fatigue. The teeth on a dull or abused blade will turn blue from overheating. Cutting will create a burning smell. Such blades should be discarded or reconditioned.

Before changing or adjusting blades, disconnect the saw from the power source.

Take care to choose the right blade for the job. Blades are available in a variety of styles and tooth sizes.

Combination blades (rip and crosscut) are the most widely used.

Ensure that arbor diameter and blade diameter are right for the saw.

Because all lumber is not new, make sure it is clean and free of nails, concrete, and other foreign objects. This precaution not only prolongs blade life but may also prevent serious injury.

Take special care to ensure that blades are installed in the proper rotational direction. Remember that electrical circular handsaws cut with an upward motion. The teeth visible between the upper and lower guard should be pointing toward the front of the saw. Most models have a directional arrow on both blade and guard to serve as a guide.

Blade Guards

Never operate an electric saw with the lower guard tied or wedged open. The saw may kick back and cut you, or another worker who uses the saw.

An exposed blade, still in motion, will force the saw to move, cutting anything in its path. Make sure that the lower guard returns to its proper position after a cut. Never operate a saw with a defective guard-retracting lever.

On most saws the lower guard is spring-loaded and correct tension in the spring will automatically close the guard. However, a spring weakened by use and wear can allow the guard to remain open after cutting. Operators must maintain complete control of the saw until the blade stops turning.

Note: The guard may also be slow to return after 45° cuts.

Choosing the Proper Blade

For safety, saw operators must understand the different designs and uses of blades. Blades unsuited for the job can be as hazardous as dull blades. For instance, a saw fitted with the wrong blade for the job can run hot so quickly that blade tension changes and creates a wobbly motion. The saw may kick back dangerously before the operator can switch it off.

Resharpened blades can be substantially reduced in diameter. Make sure that the blade diameter and arbor diameter are right for the saw.

Carbide-Tipped Blades – Take special care not to strike metal when using a carbide-tipped blade. The carbide tips can come loose and fly off, ruining the blade and injuring the operator. Inspect the blade regularly for cracked or missing tips.

Changing, Adjusting, and Setting Blades

When changing blades, take the following precautions:

1. Disconnect the saw from the power source.
2. Place the saw blade on a piece of scrap lumber and press down until the teeth dig into the wood. This prevents the blade from turning when the locking nut is loosened or tightened. Some machines are provided with a mechanical locking device.
3. Make sure that keys and adjusting wrenches are removed before operating the saw.

Proper adjustment of cutting depth keeps blade friction to a minimum, removes sawdust from the cut, and results in cool cutting.

The blade should project the depth of one full tooth below the material to be cut.

When using carbide-tipped blades or mitre blades let only half a tooth project below the material. If the blade is to run freely in the kerf (saw cut), teeth must be set properly, that is, bent alternate.

The setting of teeth differs from one type of blade to another. Finer toothed blades require less set than rougher-toothed blades. Generally, teeth should be alternately bent ½ times the thickness of the blade.

Sharp blades with properly set teeth will reduce the chance of wood binding. They will also prevent the saw from overheating and kicking back.

Cutting

Place the material to be cut on a rigid support such as a bench or two or more sawhorses. Make sure that the blade will clear the supporting surface and the power cord. The wide part of the saw shoe should rest on the supported side of the cut if possible.

Plywood is one of the most difficult materials to cut with any type of saw. The overall size of the sheet and the internal stresses released by cutting are the main causes of difficulty. Large sheets should be supported in at least three places, with one support next to the cut.

Short pieces of material should not be held by hand. Use some form of clamping to hold the material down when cutting it.

NEVER use your foot or leg to support the material being cut. Too many operators have been seriously injured by this careless act.

The material to be cut should be placed with its good side down, if possible. Because the blade cuts upward into the material, any splintering will be on the side which is uppermost.

Use just enough force to let the blade cut without labouring. Hardness and toughness can vary in the same piece of material, and a knotty or wet section can put a heavier load on the saw. When this happens, reduce pressure to keep the speed of the blade constant. Forcing the saw beyond its capacity will result in rough and inaccurate cuts. It will also overheat the motor and the saw blade.

Take the saw to the material. Never place the saw in a fixed, upside-down position and feed material into it. Use a table saw instead.

If the cut gets off line, don't force the saw back onto line. Withdraw the blade and either start over on the same line or begin on a new line.

If cutting right-handed, keep the cord on that side of your body. Stand to one side of the cutting line. Never reach under the material being cut.

Always keep your free hand on the long side of the lumber and clear of the saw. Maintain a firm, well-balanced stance, particularly when working on uneven footing.

Plywood, wet lumber, and lumber with a twisted grain tend to tighten around a blade and may cause kickback. Kickback occurs when an electric saw stalls suddenly and jerks back toward the operator. The momentarily exposed blade may cause severe injury.

Pocket Cutting

1. Tilt saw forward.
2. Rest front of shoe on wood.
3. Retract lower guard.
4. Lower saw until front teeth almost touch wood.
5. Release guard to rest on wood.
6. Switch on the saw.
7. Keep the saw tilted forward and push it down and forward with even pressure gradually lowering it until shoe rests flat on wood.
8. Follow these steps with extreme care.

SABRE SAWS

The sabre saw, or portable jigsaw is designed for cutting external or internal contours. The saw should not be used for continuous or heavy cutting that can be done more safely and efficiently with a circular saw.

The stroke of the sabre saw is about ½ inch for the light duty model and about ¼ inch for the heavy duty model.

The one-speed saw operates at approximately 2,500 strokes per minute. The variable-speed saw can operate from one to 2,500 strokes per minute.

The reciprocating saw is a heavier type of sabre saw with a larger and more rugged blade. The tool is often used by drywall and acoustical workers to cut holes in ceilings and walls. Equipped with a small swivel base, the saw can be used in corners or free-hand in hard-to-reach places. The reciprocating saw must be held with both hands to absorb vibration and to avoid accidental contact.

Eye protection is a must. You may also need respiratory protection.

Choosing the Proper Blade

Various blades, ranging from 7 to 32 teeth per inch, are available for cutting different materials. For the rough cutting of stock such as softwood and composition board, a blade with 7 teeth per inch will cut the fastest. For all-round work with most types of wood, a blade with 10 teeth per inch is satisfactory.

Cutting

The sabre saw cuts on the upstroke. Splintering will therefore occur on the top side of the material being cut. Consequently, the good side should be facing down. The degree of splintering depends on the type of blade, the vibration of the material, and the feed of the saw.

To avoid vibration, the material should be clamped or otherwise secured and supported as close to the cutting line as possible. If the material vibrates excessively or shifts during cutting, the saw can run out of control, damaging the blade and injuring the operator.

- Before starting a cut make sure that the saw will not contact clamps, the vise, workbench, or other support.
- Never reach under the material being cut.
- Never lay down the saw until the motor has stopped.
- Do not try to cut curves so tight that the blade will twist and break.
- Always hold the base or shoe of the saw in firm contact with the material being cut.

Note: When sawing into floors, ceilings, or walls, always check for plumbing and wiring.

External Cut

To start an external cut (from the outside in), place the front of the shoe on the material. Make sure that the blade is not in contact with the material or the saw will stall when the motor starts.

Hold the saw firmly and switch it on. Feed the blade slowly into the material and maintain an even pressure. When the cut is complete, do not lay down the saw until the motor has stopped.

Inside Cuts

To start an inside cut (pocket cut), first drill a lead hole slightly larger than the saw blade. With the saw switched off, insert the blade into the hole until the shoe rests firmly on the material. Do not let the blade touch the material until the saw has been switched on.

It is possible to start an inside cut without drilling a lead hole first — but only when it's absolutely necessary. To do this, rest the front edge of the shoe on the material with the saw tipped backward. Keep the blade out of contact with the material.

Switch on the saw and slowly feed the blade into the material while lowering the back edge of the shoe. When the shoe rests flat on the material and the blade is completely through, proceed with the cut. Any deviation from this procedure can cause the blade to break and injure the operator or workers nearby.

Never try to insert a blade into, or withdraw a blade from, a cut or a lead hole while the motor is running. Never reach under the material being cut.

CHAINSAWS

Each year in Canada, construction workers are injured while using chainsaws. Generally the injuries result from two types of accidents:

1. The operator makes accidental contact with the revolving chain

2. The operator is struck by the object being cut, usually a tree or heavy limb.

Many of these injuries are serious. While the chainsaw is relatively easy to operate, it can be lethal. As with all high-speed cutting tools, it demands the full attention of even the trained and experienced operator.

Requirements

Chainsaws can be powered by electric motors or gasoline engines. Both saws are designed to provide fast cutting action with a minimum of binding in the cut, even though wood may be sap-filled or wet. Both afford about the same performance in terms of horsepower and they are equipped with similar controls and safety devices.

Regulations require that chainsaws used in construction must be equipped with a chain brake. Make sure that the saw is equipped with a chain brake mechanism, and not simply a hand guard, which is similar in appearance.

Regulations also require that chainsaws used in construction must be equipped with "anti-kickback" chains. These chains incorporate design features intended to minimize kickback while maintaining cutting performance

Protective Clothing and Equipment

- Eye protection in the form of plastic goggles is recommended. A faceshield attached to the hard hat will not provide the total eye protection of close-fitting goggles.
- Leather gloves offer a good grip on the saw, protect the hands, and absorb some vibration. Gloves with ballistic nylon reinforcement on the back of the hand are recommended.
- Since most chainsaws develop a high decibel rating (between 95 and 115 dBA depending on age and condition), adequate hearing protection must be worn, especially during prolonged exposure.
- Trousers or chaps with sewn-in ballistic nylon pads provide excellent protection, particularly for the worker who regularly uses a chainsaw.

Kickback

Kickback describes the violent motion of the saw that can result when a rotating chain is unexpectedly interrupted.

The cutting chain's forward movement is halted and energy is transferred to the saw, throwing it back from the cut toward the operator.

The most common and probably most violent kickback occurs when contact is made in the "kickback zone".

Contact in this zone makes the chain bunch up and try to climb out of the track. This most often happens when the saw tip makes contact with something beyond the cutting area such as a tree branch, log, or the ground.

To minimize the risk of kickback:

- use a low-profile safety chain
- run the saw at high rpm when cutting
- sharpen the chain to correct specifications
- set depth gauges to manufacturers' settings
- maintain correct chain tension
- hold the saw securely with both hands
- don't operate the saw when you are tired
- know where the bar tip is at all times
- don't allow the cut to close on the saw
- make sure the chain brake is functioning.

Starting

When starting, hold the saw firmly on the ground or other level support with the chain pointing away from your body and nearby obstructions. Use a quick, sharp motion on the starter pull. Never "drop start" the saw.

This leaves only one hand to control a running saw and has resulted in leg cuts. Use the proper grip.

Site Hazards

- Take extra care when making pocket cuts. Start the cut with the underside of the chain tip, then work the saw down and back to avoid contact with the kickback zone. Consider an alternative such as a sabre saw.
- Be particularly careful to avoid contact with nails, piping, and other metallic objects. This is especially important when making a pocket cut through framing lumber such as a subfloor or when cutting used lumber such as trench shoring, lagging, or blocking timbers.
- Use chainsaws to cut wood only. They are not designed to cut other materials.

When using a chainsaw to trim rafter ends, take the following steps to avoid injury:

- Cut down from the top of the rafter. Don't cut from underneath.
- Use a harness, lanyard, and lifeline to prevent falls or work from a secure scaffold at eaves level.
- The extension cord on an electric chainsaw should be secured on the roof above the operator with enough working slack. This will prevent the weight of a long cord from pulling the operator off balance.
- Keep both hands firmly on the saw.

Maintenance

Well-maintained cutting components are essential for safe operation. A dull or improperly filed chain will increase the risk of kickback.

- Inspect and maintain your saw according to the manufacturer's recommendations regarding chain tension, wear, replacement, etc. Check for excessive chain wear and replace chain when required. Worn chains may break!
- Select the proper size files for sharpening the chain.
- Two files are necessary:
  - a flat file for adjusting depth gauge
  - a round file of uniform diameter for sharpening cutters and maintaining drive links.
- You must choose the correct round file for your chain to avoid damaging the cutters. Consult the owner's manual or the supplier to be sure of file size.
- A round file used in combination with a file holder or a precision filing guide will give the best results.

Adjusting Chain Tension

- Follow the manufacturer's instructions on chain tension. In general, the chain should move easily around the bar by hand without showing noticeable sag at the bottom.
- Be generous with chain lubricating oil. It is almost impossible to use too much. Most late model saws have automatic oilers. But operators must still remember to fill the chain-oil reservoir.

CHOP SAWS

Increasingly, carpenters and other trades are using chop saws to cut various materials. These portable saws offer quick, efficient, and economical cutting.

Unfortunately, like all power equipment, chop saws pose serious hazards for the unwary or untrained operator. Follow Basic Saw Safety and Safety Basics as for other power saws.

- Select the proper abrasive cutting wheel for the material being cut. For metals, use aluminum oxide. For masonry, stone, and concrete, use silica carborundum.
- Do not exceed the recommended rpm printed on the blade label.
- The centre hole on the blade must fit the mandril and be snugly fastened in place with the proper washer and lock nut.

Warning: A loose or off-centre blade can shatter in use.

- Position material to be cut at 90º degrees to the blade. Support the other end to prevent the blade from binding.
- Do not rush cutting. Let the wheel cut without burning or jamming.
- When cutting is complete, let the blade stop before moving material.
- Maintain the saw in good repair with the blade guard in place and working smoothly. Tighten any loose parts and replace any broken or damaged ones.
- Don't try to adjust for length on downward cutting motion. Your hand could slide into the blade while it is spinning.
- With some large chop saws, additional precautions are required because of the tremendous torque the saws can develop.
- Beware of sparks landing on combustible material.

QUICK-CUT SAWS

Hand-held portable circular cut-off saws are commonly known as "quick-cut saws" in construction. They are widely used for cutting concrete, masonry products, sheet metal products (both steel and aluminum), and light steel sections such as angles and channels.

Hazards

Quick-cut saws are high-powered compared to similar tools. Hazards include high-speed blade rotation, blade exposure during operation, and exhaust from the internal combustion engine (the usual power source).

The saws also create clouds of dust when dry-cutting masonry and showers of hot sparks when cutting metal products, especially steel.

These hazards can result in cuts, kickbacks, exposure to carbon monoxide fumes, exposure to dusts (silica from concrete and masonry products in particular), burns, flying particles hitting the eye, and other injuries from flying material when work is not secured for cutting or when blades fly apart.

These hazards can be controlled by:

- Training operators to use quick-cut saws properly and to wear the right protective equipment such as eye, hearing, and respiratory protection as well as face shields and gloves
- Keeping saws in good working condition, equipped with proper blades or disks, and used with all guards in place
- Securing work to keep it from shifting during cutting
- Being cautious around sharp edges left by cuts

Training

Operators should be instructed in the care, maintenance, and operation of quick-cut saws. They should read and understand the operating manual, review the major points, and receive both oral and written instruction.

The operating manual should be available on the job, not only for instruction but for ready reference if something goes wrong with the saw or it must be used for work outside the operator's experience.

Time spent on instruction will reduce accidents and injuries as well as prolong the service life of the saw.

As a minimum the operator should be instructed in:

- care of the saw
- installing disks and blades
- mixing fuel and fuelling the saw
- starting the saw
- supporting and securing work to be cut
- proper cutting stance and grip
- proper cutting techniques for different material
- respiratory protection against dusts
- how to inspect and store abrasive disks.

Care

Quick-cut saws must be serviced and maintained in accordance with the manufacturers' instructions.

Replacement parts should be those recommended by the manufacturer.

Cracked, broken, or worn parts should be replaced before the saw is used again. Guards and air-intakes should be cleaned regularly and often. Abrasive disks should be checked before installation and frequently during use. Correct any excessive blade vibration before trying to make a cut.

In confined areas, make sure that ventilation is adequate. Gasoline-driven saws release carbon monoxide gas — odourless, colourless, and highly toxic.

Starting

Most of the following procedures are for gasoline-powered quick-cut saws:

- Use caution when preparing the oil/gasoline mixture and when fuelling the saw. No smoking or ignition sources should be allowed in the area where fuel is mixed or tanks are filled.
- Fill the tank outdoors in a well-ventilated space at least 3 metres from the area where the saw will be used. Spilled fuel should be wiped off the saw.
- Avoid fuelling the saw on or near formwork. Gasoline spills are a fire hazard. Use a funnel to avoid spills.
- Do not overfill the saw or run it without securing the fuel tank cap. Gasoline seeping from the tank can saturate your clothing and be ignited by sparks thrown off from metal cutting. The only cap to use is one supplied by the manufacturer.
- Check the saw for leaks. Sometimes vibration makes gas lines leak.
- Start the saw in an area clear of people and obstacles. Under no circumstances should anyone be standing in front of the saw as it starts or while it's running.
- Put the saw on a smooth hard surface for starting.
- The guard should be properly set for the type of cut beforehand.
- Assume a solid well-balanced stance. Do not wrap the starter cord around your hand — this can cause injury.
- Set one foot on the rear handle, put one hand on the top handle to lift the blade off the surface, and use the other hand to pull the starter cord. **Warning:** Always shut off saw before fuelling. Keep fuel container well clear of work area. Once the saw is running, release the throttle and make sure the engine drops to idle without the disk or blade moving.
- Run the engine at full throttle and let the disk or blade run freely to make sure it turns on the arbor without wobbling or vibrating.

Support

One of the major hazards with quick-cut saws is failure to support and secure the work to be cut.

The saw is powerful enough to throw material around unless it is securely held and supported. Standing on material to hold it down is not recommended.

For repeated cuts of masonry or metal pieces, a jig is ideal for efficiency and safety. The jig should be designed and built to hold material in place after measurement without further manual contact.

Stance and Grip

The quick-cut saw is a heavy, powerful tool that must be held by hand.

Operators need a secure stance with legs apart for balance and support. The saw should be held at a comfortable, balanced location in front of the operator.

Grip the saw firmly with one hand on each handle. Hold your forward arm straight to keep the saw from kicking back or climbing out of the cut.

Cutting

Although skill in handling the quick-cut saw can only be learned through practice, some safety considerations and operating techniques must always be kept in mind, even by the most experienced operators.

Work should be supported so that the disk or blade will not bind in the cut. Support heavy materials on both sides of the cut so the cut piece will not drop or roll onto the operator's foot. Light materials can generally be allowed to fall. In all cases the cut should be as close as possible to the supporting surface.

Kickback and Pull-In

Kickback can happen extremely fast and with tremendous power. If a segment of the disk or blade contacts the work, the disk or blade starts to climb out of the cut and can throw the saw up and back toward the operator with great force.

For cutting, keep the throttle wide open. Ease the blade down onto the cut line. Don't drop or jam the blade down hard. Move the saw slowly back and forth in the cut.

Hold the saw so that disk or blade is at right angles to the work and use only the cutting edge of the disk or blade. Never use the side of a disk for cutting. A worn disk will almost certainly shatter and may cause severe injury.

Beware of blade run-on. The blade may continue to rotate after the cut and run away with a saw set down too soon.

Don't force the saw to one side of the cut. This will bend the disk or blade and cause it to bind, possibly to break.

Water cooling is recommended for cutting masonry materials. It prolongs disk life and reduces dust exposure.

Keep pressure on the saw reasonably light. Although more pressure may be necessary for hard materials, it can cause an abrasive disk to chip or go "out of round."

This in turn will make the saw vibrate. If lowering the feed pressure does not stop vibration, replace the disk.

Don't carry the saw any distance with the engine running. Stop the engine and carry the saw with the muffler away from you.

To avoid kickback, take the following steps:

- Secure and support the material at a comfortable position for cutting. Make sure that material will not move, shift, or pinch the blade or disk during cutting.
- Keep steady balance and solid footing when making a cut.
- Do not support the work on or against your foot or leg.
- Use both hands to control the saw. Maintain a firm grip with thumb and fingers encircling the handles.
- Never let the upper quarter segment of blade or disk contact the material.
- Run the saw at full throttle.

- Do not cut above chest height.
- When re-entering a cut, do so without causing blade or disk to pinch. Pull-in occurs when the lower part of the disk or blade is stopped suddenly – for instance, by a cut closing up and binding. The saw pitches forward and can pull the operator off balance.

Protective Equipment

In addition to the standard equipment mandatory on construction sites, operators of quick-cut saws should wear snug-fitting clothing, hearing protection, eye and face protection, and heavy-duty leather gloves.

The dry cutting of masonry or concrete products calls for respiratory protection as well. See the chapter on Personal Protective Equipment.

For general dust hazards, a half-mask cartridge respirator with NIOSH-approval for dust, mist, and fumes should provide adequate protection when properly fitted and worn by a clean-shaven person.

Disks and Blades - *Disks and blades are available in three basic types:*

- abrasive disks
- diamond-tipped blades
- carbide-tipped blades.

Use only the disks and blades compatible with the saw and rated for its maximum rpm. Blades or disks may fly apart if their rpm is not matched to saw rpm. If you have any doubts, consult the operating manual or a reputable supplier.

Abrasive Disks —Types and Uses

Type	Uses	Materials
Concrete	All-around use, most economical for cutting concrete and masonry. Water-cooling recommended to increase disk life and reduce dust.	Concrete, stone, masonry products, cast iron, aluminum, copper, brass, cables, hard rubber, plastics
Metal	Primarily for steel, not suited for masonry products. Water-cooling is not recommended with metal abrasive disks	Steel, steel alloys, other hard metals such as cast iron

Diamond Disks and Blades

Diamond disks are normally used with water cooling. They are now available for dry cutting, which may be necessary to avoid staining some masonry products.

When dry-cutting with a diamond blade, let the blade cool for 10-15 seconds every 40-60 seconds. This can be done simply by pulling the saw out of the cut.

Types and Uses

Type	Uses	Materials
Diamond Abrasive Disk	Cuts faster than other abrasive disks and creates less dust. Water-cooling is absolutely necessary to prevent heat build-up that can make disk disintegrate.	Stone, all masonry and concrete products. Not recommended for metal
Dry-Cut Diamond Blade	Fast cuts, lots of dust, very expensive. Let blade cool for 10-15 seconds every 40-60 seconds. Continuous cutting will damage the blade.	Stone, all masonry and concrete products. Not recommended for metal.

Carbide-Tipped Blades

These blades must be used with care. If a carbide-tipped blade encounters material harder than what it is designed to cut, the tips may fly off.

A carbide-tipped blade used with a quick-cut saw must be designed for that purpose. It must also be used only to cut the materials specified by the manufacturer.

Inspection/Installation

- Inspect disks and blades before installing them.
- Make sure that contact surfaces are flat, run true on the arbor, and are free of foreign material.
- Check that flanges are the correct size and not warped or sprung. Check the label to make sure that the disk or blade is approved for use on high-speed quick-cut saws and has a rated rpm suitable to the saw being used. A periodic service check may be necessary to ensure that the rpm still meets the manufacturer's requirement.
- Inspect the disk or blade for damage. Abrasive disks tapped lightly with a piece of wood should ring true. If the sound is dull or flat, the disk is damaged and should be discarded.
- Make sure that diamond or carbide tips are all in place. Do not use diamond or carbide-tipped blades or disks if any tips are missing.
- Do not drop abrasive disks. Discard any disk that has been dropped.
- Use the proper bushing on the arbor so that the disk runs true on the shaft without wobbling or vibrating.
- Discard badly worn disks that are uneven or "out of round."

TABLE SAWS

The table saw most often used in construction is the 10-inch belt-driven tilting arbor saw. The dimension refers to the diameter of the saw blade recommended by the manufacturer.

Although some saws are direct-drive, with the blade mounted right on the motor arbor, most are belt-driven.

Both types are equipped with a fixed table top and an arbor that can be raised, lowered, or tilted to one side for cutting at different depths and angles.

Basket Guards

Basket guards may be fastened to the splitter or hinged to either side of the saw on an L-shaped or S-shaped arm.

Basket guards can protect the operator from sawdust, splinters, and accidental contact with the blade. Keep the basket guard in place for normal operations such as straight and bevel ripping and mitre cutting. When the guard is removed to permit cutting of tenons, finger joints, rabbets, and similar work, use accessories such as feather boards, holding jigs, push sticks, and saw covers.

Some split basket guards have a see-through cover. One side can be moved sideways for a blade tilted to 45 degrees.

One side can be lifted up while the other remains as a protective cover.

Sheet metal baskets fastened to the splitter are less effective because the operator cannot see the saw blade.

Kickback

Kickback occurs when stock binds against the saw blade.

The blade can fire the wood back at the operator with tremendous force, causing major injuries to abdomen, legs, and hands.

- Never stand directly behind the blade when cutting. Stand to one side. See that other workers stand clear as well.
- Make sure the rip fence is aligned for slightly more clearance behind the blade than in front. This will help prevent binding.
- Use a sharp blade with teeth properly set for the wood being cut. A dull or badly gummed blade will cause friction, overheating, and binding.
- Install a splitter to keep the kerf (cut) open behind the blade. Also effective are anti-kickback fingers attached to the splitter.

Splitters

Splitters prevent the kerf from closing directly behind the blade. Ideally, they should be slightly thinner than the saw blade and manufactured from high tensile steel. Splitters are not always needed with carbide-tipped saw blades, whose relatively wide kerf may provide the desirable clearance. A wide kerf alone, however, is often not enough to keep some boards from closing behind the cut and binding against the blade.

In general, it is impossible to predict how a board will behave during ripping. It may remain straight, presenting no problems. On the other hand, the release of internal stresses may make the two ripped portions behind the blade either close up or spread apart.

Disappearing splitters with anti-kickback fingers can be pushed down when in the way of a workpiece and pulled up if necessary after the machine has been shut off.

Roller Stand

Operators risk injury trying to maintain control over long pieces of stock singlehandedly, especially if the stock begins to bind on the blade and kick back.

A roller stand provides the needed support.

Adjust it to a height slightly lower than the saw table to allow for sagging of the material. Be sure to set up the stand so the roller axis is at 90 degrees to the blade.

Otherwise, the roller could pull the stock off to one side and cause binding.

Whatever the design, a support stand should be standard equipment in every carpentry and millwork shop. It can be used as an extension to a workbench, jointer, or bandsaw and is especially important with the table saw.

Extensions

Made of wood or metal, table top extensions installed behind and to both sides of the machine can make the cutting of large sheets of plywood and long stock safer and more efficient.

In most cases a space must be provided between extension and saw top for adjusting the basket guard and allowing scrap to fall clear.

Blades

Table saw blades are basically similar to those for circular saws. The teeth on carbide-tipped, hollow-ground, and taper blades do not need setting.

Blade Adjustment

Proper adjustment of cutting depth holds blade friction to a minimum, removes sawdust from the cut, and results in cool cutting.

Sharp blades with properly set teeth will keep the work from binding and the blade from overheating and kicking back.

The blade should project the depth of one full tooth above the material to be cut. When using carbide-tipped blades, or mitre blades let only half a tooth project above the material.

Blade Speed

The right cutting speed is important. The blade should turn at the correct rpm to yield the recommended cutting speed.

When not in motion, saw blades, especially large blades, are usually not perfectly flat because of internal tensions. At the right operating speeds, however, the blades straighten out as a result of centrifugal force and cut smoothly at full capacity.

Blades running too fast or too slow tend to start wobbling either before or during a cut. If cutting continues, the blade will overheat and may cause kickback, damage the equipment, and injure the operator.

Rip Fence

The rip fence is used mainly to guide the stock and maintain correct width of cut. The fence on small saws is usually clamped down at both the front and back of the table by pushing down a lever or turning a knob. Adjust the fence slightly wider at the back to let the wood spread out behind the cut and reduce the risk of kickback.

Many carpenters add a piece of hardwood to the rip fence

in order to rip thin pieces of wood and make dadoes and rabbets. The auxiliary fence can be set close to the cutters without the risk of contact between the blade and the steel fence.

Pushsticks and Feather Boards

Narrow pieces can be cut safely and efficiently with the help of pushsticks, which should be painted or otherwise marked to prevent loss.

To rip narrow, short pieces, a push block is the right choice. The shoe holds the material down on the table while the heel moves the stock forward and keeps it from kicking back.

Different designs of pushsticks are required for cutting different kinds of stock.

The heel of the pushstick should be deep enough to prevent it from slipping and strong enough to feed the stock through the saw.

You can also use one or two feather boards to rip narrow stock safely. A feather board clamped immediately in front of the saw blade will provide side pressure to the stock without causing binding and kickback. Use a push block to feed stock all the way through.

Operation

- Follow Basic Saw Safety.
- Keep the floor around the saw clear of scrap and sawdust to prevent slipping and tripping.
- Always stop the machine before making adjustments. Before making major adjustments, always disconnect the main power supply.

- Select a sharp blade suitable for the job.
- Use the safety devices such as pushsticks and feather boards recommended in this chapter.
- Make sure nobody stands in line with a revolving blade.
- Don't let anyone or anything distract you when you are operating the saw.
- Whenever possible, keep your fingers folded in a fist rather than extended as you feed work into the saw.
- Never reach around, over, or behind a running blade to control the stock.
- Follow the manufacturer's recommendations in matching the motor size to the saw. Underpowered saws can be unsafe.
- Table saws should be properly grounded. Check the power supply for ground and always use a ground fault circuit interrupter. This is mandatory for saws used outdoors or in wet locations.
- Table saws should be equipped with an on-off switch so power can be shut off quickly in an emergency.
- A magnetic starter switch is preferable to a mechanical toggle because it prevents the saw from starting up again unexpectedly after an interruption in power.
- When purchasing a new table saw, try to get one equipped with an electric brake. The brake stops blade rotation within seconds of the operator turning off the saw. The reduced risk of injury is worth the extra cost.
- Extension cords should be of sufficient wire gauge for the voltage and amperage required by the saw and for the length of the run.

RADIAL ARM SAWS

The motor and blade of the radial arm saw are suspended above the table. Because the motor and blade assembly can be locked in different positions and can travel during the cut, the operator must pay special attention to keeping fingers and hands clear.

Injuries involving radial arm saws tend to be serious. By using appropriate guards and procedures, however, operators can safely use the saw for crosscuts, mitre cuts, ripping, and dadoes.

Set-Up - The saw must be adequately powered for the work.

- The saw should be installed in a well-lit area out of the way of traffic, with enough space to store and handle long lengths of wood. Locating the machine with its back to a wall or partition can help to keep flying pieces from hitting anyone.
- Where possible, mark the floor with yellow warning lines to keep other personnel back from the saw.
- Make sure all safety guards and devices are in place.
- Choose the right blade for the job. A sharp tungsten carbide combination blade is good for both crosscutting and ripping without frequent resharpening.

General Procedures

- Follow Basic Saw Safety.
- If you don't have someone to help with long stock, use a roller stand or extension table to support the work.
- Always return the motor head to the column stop.

- When crosscutting or mitring, keep hands at least six inches away from the blade. Do not adjust length of cut until the motor is back at column.
- Slope the table top back slightly to keep the blade at the column, thereby preventing contact with stock being placed in position.
- Do not allow the blade to cut too quickly when crosscutting or mitring.
- Avoid drawing the blade completely out of the cut. The cut piece, whether large or small, often moves. When the saw is rolled back towards the column, the teeth can grab the piece and shoot it in any direction.
- Do not cut by pushing the saw away from you into the stock. The material can lift up and fly over the fence.

Ripping and Crosscutting

- For regular ripping, turn the motor away from the column to the in-rip position. Feed stock into the saw from the right side.
- To cut wide stock, change the saw to the out-rip position. Feed stock into the saw from the left side. Operators accustomed to in-ripping may find this setup awkward. Remember – the blade must turn up and toward the person feeding the stock.
- Do not force the cut. Allow the blade through the wood at its own pace.

To avoid kickback, take the following precautions:

- Maintain proper alignment of blade with fence.
- Adjust anti-kickback device to ⅛ inch below the surface of stock being fed.
- Use a sharp blade, free of gum deposits and with teeth properly set.
- When binding occurs, stop saw and open kerf with a wedge.
- After completing cut, remove stock from rotating blade to prevent overheating and possible kickback.
- Always push stock all the way through past the blade.
- Do not leave machine with motor running.
- Use a push stick when ripping narrow pieces. Have suitably sized and shaped pushsticks for other jobs as well. See information on pushsticks and feather boards under Table Saws, earlier in this chapter.

Jigs

The control provided by a well-made jig is essential for making irregular cuts safely and accurately.

Keep commonly used jigs on hand. Jigs such as those for making stair and doorframe wedges and tapers are designed to carry stock past the blade with the saw locked in the rip position.

When you're drawing the saw into the stock, clamp or nail jigs to the table to prevent slipping.

Re-Sawing with Blade Horizontal

The rip fence on the radial arm saw is too low for supporting material to be re-sawn on edge. Therefore the material must be laid flat on the table and the motor must be turned so the blade is parallel to the table. The closeness of the arbor requires an auxiliary table top and fence to re-saw thin stock.

Because the kickback fence can't be used and controlling stock is sometimes difficult, re-sawing on the radial arm saw can be hazardous.

If no other equipment is available, rip the stock halfway through, then turn it around and complete the cut.

On the second cut, be sure to push the two halves well past the blade once they have been cut apart. Pushsticks and featherboards clamped to the table can reduce hazards.

Dadoes

A dado head is an essential tool for cutting grooves, rabbets, and dadoes. A groove is cut with the grain; a dado is cut across the grain; and a rabbet is a shoulder cut along the edge of a board.

The most common dado head consists of two outside cutters and several inside chippers between the outside cutters.

Another type is sometimes called a quick-set dado, consisting of four tapered washers and a blade. By rotating the locking washers, the blade will oscillate and cut a groove to the desired width.

Because of their small size, dado heads do not run at the peripheral feed speed on a big radial arm saw. As a result, the blade feeds itself too fast, either stopping the motor or lifting the work and throwing it back. To prevent this, make several light passes, lowering the dado head ⅛ to ¼ inch each time.

Dado heads require guards for safety. Always make sure guards are in place before starting work.

Proper rotation of the teeth is up and toward you.

Other Accessories

Rotary accessories of various types are advertised as turning the radial arm saw into a multifunction machine.

Operators should remember that the saw has its limitations.

Possible problems include the following:

Shaper heads run too slow for safe and smooth work.

Grinding stones may run too fast or slow and are not recommended.

Sanding drums tend to run too fast and may burn the wood.

AIR

Many different types of tools are powered by compressed air. They are fast, powerful, and ideal for repetitive tasks such as the nailing of large areas of roof decking or chipping and breaking concrete. A compressor, powered by a combustion or electric motor, supplies the air for the tools.

Air-powered tools include:

- ☐ jack hammers
- ☐ chipping hammers
- ☐ drills
- ☐ grinders
- ☐ sanders
- ☐ staplers
- ☐ framing nailers
- ☐ wrenches
- ☐ brad nailers
- ☐ winches
- ☐ air nozzles
- ☐ saws
- ☐ buffers
- ☐ impact tools
- ☐ sprayers

- Run combustion engines outside or in a well ventilated area to prevent the build-up of carbon monoxide gas. Always keep a fire extinguisher near flammable liquids.
- When moving compressors to another location, ask for help or use mechanical devices to prevent back injuries.
- Occasionally workers suffer eye injuries when compressed air is used to blow out formwork. Wear safety goggles and respiratory protection.
- Always secure hose connections with wire or safety clips to prevent the hose from whipping except when automatic cut-off couplers are used.
- Make sure hoses are clear of traffic and pose no tripping hazards.
- Replace worn-out absorption pads and springs. Too much vibration of the tool can damage nerves in fingers, hands, and other body parts. This is called "white finger disease" or Raynaud's Syndrome.
- Some tools have a high decibel rating – for instance, jack hammers and impact drills. To prevent hearing loss, always wear hearing protection.
- Never tamper with safety devices.
- Keep hands away from discharge area – on nailers in particular.
- Match the speed rating of saw blades, grinding wheels, cut-off wheels, etc. to tool speed. Too fast or too slow a rotation can damage the wheels, release fragments, and injure workers.
- Never use air to blow dust or dirt out of work clothes. Compressed air can enter the skin and bloodstream with deadly results.
- Turn off the pressure to hoses when the system is not in use.
- Turn off the air pressure when changing pneumatic tools or attachments.
- Never "kink" a hose to stop air flow.

Most air-powered tools need very little maintenance. At the end of the shift, put a teaspoon of oil in the air inlet and run the tool for a second or two to protect against rust.

Dust, moist air, and corrosive fumes can damage the equipment. An inline regulator filter and lubricator will extend tool life.

Before start-up, check the couplings and fittings, blow out the hose to remove moisture and dirt, and clean the nipple before connecting the tool. Set the air pressure according to the manufacturer's specifications and open gradually. Compressed air can be dangerous. Hazards include:

Air embolism-This is the most serious hazard, since it can lead to death. If compressed air from a hose or nozzle enters even a tiny cut on the skin, it can form a bubble in the bloodstream – with possibly fatal results.

Physical damage-Compressed air directed at the body can easily cause injuries – including damage to eyes and ear drums.

Flying particles-Compressed air at only 40 pounds per square inch can accelerate debris to well over 70 miles per hour when it is used to blow off dust, metal shavings, or wood chips. These particles then carry enough force to penetrate the skin.

WARNING: Make sure that air pressure is set at a suitable level for the tool or equipment being used. Before changing or adjusting pneumatic tools, turn off air pressure.

POWDER/EXPLOSIVE ACTUATED TOOLS

Referred to as explosive-actuated or powder-actuated, these tools use a powder charge to fire a fastener into hard materials such as concrete, mild steel, and masonry.

Used improperly, powder-actuated tools pose obvious hazards. The tools should be treated with the same respect as a firearm. Most jurisdictions require that operators be trained before using the tools and carry proof of training on the job.

Hazards

Flying Particles – This is the major hazard. On impact, materials may break up, blow apart, or spall off. This often happens when fasteners are fired too close to a corner of masonry or concrete or when they strike materials such as glazed tile, hollow tile, or thin marble tile.

Ricochets – These usually result when the tool is not held at right angles to the base material, or the fastener hits a particularly hard material such as stone or hardened steel. Always check the base material to ensure that it can safely accept the fastening device.

Noise – Powder-actuated tools create an extreme pulse of sound when fired. Operators and others in the area should wear hearing protection – especially when the tool is operated in a confined space.

Sprains and Strains – These injuries usually result from using the tool repeatedly in awkward, cramped, or unbalanced positions. Operators should try to work from a balanced position on a solid surface.

Explosions – There is always the risk of explosion or fire when the tools are used in atmospheres contaminated by flammable vapour, mist, or dust. The work area must be ventilated – mechanically if necessary.

Blow-Through –When the base material does not offer enough resistance, the fastener may pass completely through and fly out the other side. This is particularly dangerous when fasteners penetrate walls, floors, or ceilings where others may be working. If necessary, areas behind, around, and under material should be kept clear of people.

Protective Equipment

In addition to the standard personal protective equipment required on construction projects (see the Personal Protective Equipment chapter in this manual), the operator of a powder-actuated tool should wear hearing protection, eye protection, and a face shield. Heavy shirts and pants provide some protection against ricochets and flying fragments of material and fasteners.

Tool Types

High-Velocity — High-velocity powder-actuated tools use the expanding gases from the exploding cartridge to propel the fastener. The gases push directly against the fastener. These tools are rarely used in construction, except in special cases to penetrate thick steel or very hard material — they are usually used in military, salvage, or underwater applications. No one should operate high velocity tools without special training.

Low-Velocity — Most powder-actuated tools used in construction are low-velocity. The expanding gases from the exploding cartridge push against a piston which in turn drives the fastener into the base material.

Many different low-velocity tools are available, from single-shot models to semi-automatic models using multiple cartridges in strip or disk holders. Some tools are specific to one size of fastener or type of cartridge. Most can be fitted with various pistons, base plates, spall stops, and protective shields for different jobs.

Pistons

Specialized pistons are available for different fasteners. Such pistons are designed for the fastener and should not be used with other types. Misusing a tool with a specialized piston can result in under- or over-driven fasteners or fasteners leaving the barrel misaligned, leading to ricochets. Some general-purpose tools can take various types of pistons.

Fasteners

Fasteners used with powder-actuated tools are made of special steel to penetrate materials without breaking or bending. Never use any kind of substitute for a properly manufactured fastener.

Generally pins and studs should not be used on hard, brittle, or glazed materials such as cast iron, marble, tiles, and most stone. The fastener will either fail to penetrate and ricochet or the base material will shatter.

Materials whose hardness or ductility is unknown should be tested first. Try to drive a pin into the material with a normal hammer. If the pin point is blunted or fails to penetrate at least 2 mm (1/16"), a powder-actuated tool should not be used.

Fasteners are invariably fitted with a plastic guide device. Its purpose is twofold. When the fastener is inserted into the barrel the guide keeps the fastener from dropping out. It also aligns the fastener inside the barrel so it will penetrate the base material at right angles.

There are two basic types of fasteners – pins and studs.

Pins are fasteners designed to attach one material to another, such as wood to concrete. They resemble nails, but there the similarity stops. Ordinary nails cannot be used as fasteners in powder-actuated tools.

Head diameters for pins are available between 7 mm (¼") and 9 mm (⅜"). Lengths vary from 12 mm (½") to 76 mm (3").Washers of various types and diameters are available for different applications.

Pins should be selected for appropriate length, head size, and application. As a general rule, pins need not be driven into concrete more than 25 mm (1"). Using a longer pin is generally unnecessary and also requires a stronger cartridge.

Follow the manufacturer's directions on length, penetration, and appropriate material. For example, one cut-nail fastener is available for fastening drywall to relatively soft base materials, but is recommended for virtually no other application. Testing may be necessary on some masonry materials that vary widely in hardness and durability.

Studs are fasteners consisting of a shank which is driven into the base material and an exposed portion to which a fitting or other object can be attached. The exposed portion may be threaded for attachments made with a nut.

Studs are also available in an eye-pin configuration for running wire through the eye.

Clip Assemblies - Fastening to the base material is done by a pin, but the pin is attached to a clip assembly configured to secure a uniquely shaped item. Clip assemblies are available, for instance, to hold conduit. One ceiling configuration comes with pre-tied 12 gauge wire.

Cartridges

Manufacturers recommend certain cartridges for certain applications. Because recommendations cannot cover every possibility, testing may be required with unfamiliar base materials.

Cartridges come in .22, .25, and .27 calibre sizes. Larger calibres hold more powder which drives the fastener further – or into harder base materials. In addition, all three calibres are available with different levels of powder charge. For some tools there may be as many as six different powder charges available. Some manufacturers produce tools that use a long-case version of the .22- calibre cartridge. It is critical that operators understand cartridge selection and cartridge identification systems.

COLOUR	NUMBER	CARTRIDGE POWER
Grey	1	Lowest
Brown	2	
Green	3	
Yellow	4	
Red	5	
Purple	6	Highest

Shots may be packaged/loaded as single cartridges, strips of ten in a plastic holder, or a round disk holding ten cartridges. The tool model will determine the calibre and how the tool is to be loaded.

Number identifications are printed on the outside of cartridge packages. Cartridge tips are colour-dipped for identification. Some strip cartridges are held in a plastic strip the same colour as the cartridge tips.

The general rule is to start with the weakest cartridge and increase one cartridge colour/load number at a time to reach the penetration required. Too strong a charge may cause shattering, ricochets, or blow-through. Too weak a cartridge will keep the fastener from seating itself properly.

Tool Power Controls

Many tools feature a "power control" device. This allows an operator to make a tool adjustment so that either all or only part of the available cartridge power is used. Power controls may ultimately let manufacturers market only one cartridge in each calibre.

The goal would be to handle every application which the calibre is capable of performing with one cartridge, power-controlled to the appropriate driving force needed.

Fastening Steel

Low-velocity powder-actuated tools should not be used on hardened steels, tool steels, or spring steels. Where the grade of steel is unknown, test by trying to hammer the fastener in. If the pin is blunted, bent, or fails to enter at least 2 mm (1/16"), do not use a low-velocity powder actuated tool – it's not up to the job.

Don't try to fire a fastener any closer than 13 mm (½") to the free edge of steel. Keep in mind that this applies only to steel. When fastening steel to concrete, you must consider the allowable margin for concrete as well: 63 mm (2½").

When fastening two pieces of thin sheet steel to a base material, hold the sheets together. Gaps caused by bending may lead to ricochets.

Special spall stops or protective shields are required for applications such as fastening sheet metal to masonry or sheet metal to structural steel. Consult the operating manual or the manufacturer to ensure that the right components are being used for the job.

Fastening Concrete and Masonry

Concrete and masonry materials are not always uniform in consistency or hardness. As a result, they may spall, chip, or cause a ricochet when the fastener strikes a spot or layer harder than the rest. Use the spall guard recommended by the manufacturer.

Once material is spalled or left with a ricochet hole, do not fire a second pin any closer than 50 mm (2") to the damaged area. The area may be weakened and spall further or cause a ricochet off its sloped edge.

Pins tend to cause breaks near the edges of concrete and masonry. Don't drive pins closer than 63 mm (2½") to a free edge.

Misfires

With misfired cartridges, follow the procedures stated in the operating manual for the tool you are using. Because of the wide variety of tools available, procedures for misfires may differ.

When such information is not available, take the following steps:

- Continue to hold the tool against the base material for at least 30 seconds. This protects against a delayed discharge of the cartridge.
- Remove the cartridge from the tool. During removal keep the tool pointed safely toward soft material such as wood. Never use any kind of prying device to extract the cartridge from the chamber. If the cartridge is wedged or stuck, tag the tool "DEFECTIVE and LOADED" and lock it in its storage container. Never try to dismantle a tool with a cartridge stuck or wedged in it. Again, tag it "DEFECTIVE and LOADED," lock it away, and call the manufacturer's representative for help.
- Regulations require that a misfired cartridge be placed in a container of water.
- Keep the misfired cartridge separate from unused cartridges and return it to the manufacturer for disposal. Never throw misfired cartridges in the garbage.
- Be cautious. The problem may be a misfired cartridge, but the tool may also be defective. Check the tool for obvious damage, perform function tests, and use the tool only if it operates properly.

General Safeguards

- Workers who pick up a powder-actuated tool must immediately prove to themselves that the tool is not loaded. This action must become instinctive and be carried out before anything else is done with the tool. Even after watching someone else handle the tool before passing it on, make sure that it's not loaded.
- Powder-actuated tools should be used, handled, and stored properly.
- Never put your hand or fingers over the end of the muzzle for any reason, even when the tools are not loaded with fasteners.
- Tools must be inspected and function-tested before work starts. Proper training and the operator's manual will describe how to carry out both of these requirements.
- Operators must be trained on the powder-actuated tools they are using and must wear all the required personal protective equipment.

Fasteners should not be fired through pre-drilled holes for two reasons:

1. Unless the fastener hits the hole accurately, it will probably shatter the edge.
2. The fastener derives its holding power from compressing the material around it. A pre-drilled hole reduces this pressure and therefore the fastener's holding power. (This is why studs and pins driven into steel should penetrate completely through the metal. Otherwise the compressed steel trying to regain its original position can loosen the fastener by pushing against the point. With the tip completely through the metal the same pressure only works to squeeze the pin tighter.)

- Firing explosive-actuated tools from ladders is not recommended. From a ladder it can be difficult to press the tool muzzle against the base material with enough pressure to fire. For tasks overhead or at heights, work from a scaffold or another approved work platform to ensure solid, balanced footing. As an alternative use a manufacturer's pole accessory if the reach is normal ceiling height (8-10 feet). The pole secures the tool and permits firing by the operator standing below.
- Do not leave the tool unattended unless it's locked in a box.
- Load the tool immediately before firing. Don't walk around with the tool loaded.
- Do not use powder-actuated tools in areas where there may be exposure to explosive vapours or gases.

Maintenance

Tools in regular use should be cleaned daily. Tools used intermittently should be cleaned after firing.

All parts of the tool exposed to detonation gases from the cartridge should be cleaned and lightly oiled according to the manufacturer’s instructions. The cartridge magazine port, cartridge chamber, and piston sleeve should be wiped clean but never be oiled.

The tool brush supplied is adequate for most fouling.

Stubborn carbon should be loosened with a manufacturer's spray detergent oil. Tools being checked for immediate use should be wiped dry of oil.

Failure to clean the tool as recommended can lead to corrosion, pitting, fouling, and failure to work properly. Ideally, the tool should be cleaned before being returned to storage.

Tools with a power control adjustment will accumulate additional powder residue from firing–especially when the control is set to restrict the amount of cartridge strength being used. Semi-automatic tools may also accumulate powder residue. These tools need to be cleaned more often.

Sluggish performance may indicate that a tool needs cleaning. Tool action will slow to the point where a competent operator can detect the difference. Most manufacturers recommend major maintenance, inspection, and cleaning every six months. This involves stripping, inspecting, and cleaning parts not covered in daily maintenance.

Storage

Regulations require that both the tool and the cartridges be stored in a locked container with explosive loads of different strengths in separate containers. Cartridges should only be removed from the locked container when they are going to be used immediately.

Regulations

- Any worker using an explosive-actuated tool must be instructed in its safe and proper use.
- Before using the tool, the operator must check to ensure that it is in good working order. This means inspection and function testing.
- Tools firing fasteners at a velocity of more than 90 metres/second must have a protective guard at least 75 mm in diameter, mounted at right angles to the barrel of the tool and centered on the muzzle end of the tool, if practical.

The tool must require two separate actions before it will fire:

1. pressure against the surface of the material
2. action of the trigger.

- Explosive-actuated tools must be stored in a locked container when not in use or when left unattended.
- The tool must not be loaded until ready for immediate use.
- Whether loaded or unloaded, the tool must never be pointed at anyone.
- Cartridges must be marked or labelled for easy identification. Cartridges of different strengths must be stored in separate containers.
- Misfired cartridges must be placed in a container of water and be removed from the project.

HAND TOOLS

Hand Saws

Select the right saw for the job. A 9 point is not meant for crosscutting hardwood. It can jump up and severely cut the worker's hand or thumb.

For this kind of work the right choice is an 11 point (+).When starting a cut, keep your thumb up high to guide the saw and avoid injury.

For cutting softwood, select a 9 point (-). The teeth will remove sawdust easily and keep the saw from binding and bucking.

Ripping requires a ripsaw.

Wood Chisels

Most injuries with this tool can be prevented by keeping the hand that holds the work behind, not in front of, the chisel.

A dull or incorrectly sharpened chisel is difficult to control and tedious to work with.

Chisels not in use or stored in a toolbox should have protective caps.

Wood chisels are tempered to be very hard. The metal is brittle and will shatter easily against hard surfaces.

Never use a chisel for prying.

Repeatedly striking the chisel with the palm of your hand may lead to repetitive strain injury.

With chisels and other struck tools, always wear eye protection. Gloves are recommended to help prevent cuts and bruises.

Cold Chisels

Cold chisels are used to cut or shape soft metals as well as concrete and brick.

In time the struck end will mushroom. This should be ground off. Don't use chisels with mushroomed heads. Fragments can fly off and cause injury.

Axes and Hatchets

In construction, axes are mainly used for making stakes or wedges and splitting or shaping rough timbers.

Unless it has a striking face, don't use the hatchet as a hammer. The head or the wooden handle can crack and break.

Hatchets with striking faces are meant only for driving common nails, not for striking chisels, punches, drills, or other hardened metal tools.

Never use an axe or hatchet as a wedge or chisel and strike it with a hammer.

Most carpenters prefer a hatchet with a solid or tubular steel handle and a hammer head with a slot for pulling nails.

Sledgehammers

Sledgehammers are useful for drifting heavy timbers and installing and dismantling formwork. They can knock heavy panels into place and drive stakes in the ground for bracing.

Sledgehammers can also be used to drive thick tongue-and-groove planking tightly together. Use a block of scrap wood to prevent damage to the planks.

The main hazard is the weight of the head. Once the hammer is in motion it's almost impossible to stop the swing. Serious bruises and broken bones have been caused by sledgehammers off-target and out of control.

Missing the target with the head and hitting the handle instead can weaken the stem. Another swing can send the head flying.

Always check handle and head. Make sure head is secure and tight. Replace damaged handles.

As with any striking or struck tool, always wear eye protection.

Swinging a sledgehammer is hard work. Avoid working to the point of fatigue. Make sure you have the strength to maintain aim and control.

Claw Hammers

These are available in many shapes, weights, and sizes for various purposes. Handles can be wood or steel (solid or tubular). Metal handles are usually covered with shock-absorbing material.

Start with a good quality hammer of medium weight (16 ounces) with a grip suited to the size of your hand.

Rest your arm occasionally to avoid tendinitis. Avoid overexertion in pulling out nails. Use a crow bar or nail puller when necessary.

When nailing, start with one “soft” hit, that is, with fingers holding the nail. Then let go and drive the nail in the rest of the way.

Strike with the hammer face at right angles to the nailhead. Glancing blows can lead to flying nails. Clean the face on sandpaper to remove glue and gum. Don't use nail hammers on concrete, steel chisels, hardened steel-cut nails, or masonry nails.

Discard any hammer with a dented, chipped, or mushroomed striking face or with claws broken, deformed, or nicked inside the nail slot.

Utility Knives

Utility knives cause more cuts than any other sharp-edged cutting tool in construction.

Use knives with retractable blades only.

Always cut away from your body, especially away from your free hand. When you're done with the knife, retract the blade at once. A blade left exposed is dangerous, particularly in a toolbox.

Screwdrivers

Screwdrivers are not intended for prying, scraping, chiselling, scoring, or punching holes.

Always make a pilot hole before driving a screw. Start with one or two “soft” turns, that is, with the fingers of your free hand on the screw. Engage one or two threads, make sure the screw is going in straight, then take your fingers away.

You can put your fingers on the shank to help guide and hold the screwdriver. But the main action is on the handle, which should be large enough to allow enough grip and torque to drive the screw. Power drivers present obvious advantages when screws must be frequently or repeatedly driven.

Hand Planes

Hazards include the risk of crush and scrape injuries when the hand holding the plane strikes the work or objects nearby. Cuts and sliver injuries are also common.

The hand plane requires some strength and elbow grease to use properly. The hazards of overexertion and tendinitis can be aggravated by using a dull iron or too short a plane. Only use a plane suited to the job and keep the iron sharp.

For long surfaces like door edges, use a fore plane 18" long and 2 ⅜" wide or a jointer plane 24" long and 2 ⅝" wide.

For shorter surfaces, use a jack plane 15" long and 2 ⅜" wide or a smoothing plane 10" long and 2 ⅜" wide.

Remember that sharp tools require less effort and reduce the risk of fatigue, overexertion, and back strain.

Work can also be easier with a door jack and supports on your work bench.

Plumb Bobs

The weight of a mercury-filled plumb bob will surprise you. Designed for use in windy conditions, the bob has considerable weight in proportion to its surface area.

The weight and point of the bob can make it dangerous. Ensure that all is clear below when you lower the bob.

Don't let it fall out of your pocket, apron, or tool bag. The same goes for the standard solid bob.

Crow Bars

Any steel bar 25-150 cm long and sharpened at one end is often called a crow bar.

The tools include pry bars, pinch bars, and wrecking bars. Shorter ones usually have a curved claw for pulling nails and a sharp, angled end for prying.

Nail Pulling

Pulling out nails can be easier with a crow bar than a claw hammer.

In some cases, a nail-puller does the job best. The hand holding the claw must be kept well away from the striking handle.

Lifting - Loads levered, lifted, or shifted by bars can land on fingers and toes.

- Make sure to clear the area and maintain control of the load.
- Have enough rollers and blocking ready.
- Never put fingers or toes under the load.

General

- Try to avoid prying, pulling, wedging, or lifting at sharp angles or overhead.
- Wherever possible, keep the bar at right angles to the work.
- Wear eye protection and, where necessary, face protection.

Record of Employee Training-Power Tools

Printed Name	Signature	Trainer Signature	Date

Chapter 9

General Electrical Safety

Dan-Ex Contracting Ltd. employees shall practice safe operating procedures around electrical equipment, lines, or installations. Employees must also use the precautions and procedures below:

- Only trained, qualified, and authorized employees are allowed to make electrical repairs or work on electrical equipment or installations.
- All electrical equipment and systems shall be treated as energized until tested or otherwise proven to be de-energized.
- All energized equipment and installations will be de-energized prior to the commencement of any work. If the equipment or installation must be energized for test or other purposes, special precautions will be taken to protect against the hazards of electric shock.
- All equipment shall be locked out to protect against accidental or inadvertent operation when such operation could cause injury to personnel. Do not attempt to operate any switch, valve, or other energy-isolating device bearing a lock.
- Safety grounds shall always be used where there is a danger of shock from back feeding or other hazards.
- Polyester clothing or other flammable types of clothing shall not be worn near electrical circuits. Cotton clothing is much less likely to ignite from arc blast. Employees working on live circuits shall be provided Nomex or equivalent fire resistant clothing.
- Suitable eye protection must be worn at all times while working on electrical equipment.
- Always exercise caution when energizing electrical equipment or installations. Take steps to protect yourself and other employees from arc blast and exploding equipment in the event of a fault.
- All power tools will be grounded or double insulated. Tools with defective cords or wiring shall not be used.
- Metal jewellery should not be worn around energized circuits.
- Extension and temporary power cords must be heavy duty and grounded. Frayed or defective cords shall not be used.
- Suitable temporary barriers or barricades shall be installed when access to opened enclosures containing exposed energized equipment is not under the control of an authorized person.
- Electrical installations must be protected from accidental contact by enclosures or tight fitting covers.
- GFCI's are required on all power outlets.
- Circuits shall not be overloaded with equipment or extension cords.
- Metal measuring tapes, fish tapes, ropes or other metal devices are prohibited where they may contact energized parts of equipment or circuits.

- All tools, ladders, scaffolding and other equipment or materials capable of conducting electricity shall not be stored or used so close to energized electrical equipment, installations or conductors that they can make electrical contact.
- All vehicles including cranes or similar hoisting devices, backhoes, power shovels or other vehicles shall, when working near overhead powerlines, remain at least 3 metres away.

ELECTRICAL INJURIES

The following will deal mainly with low voltages (below 750 volts). However, the dire consequences of electrical injuries and electrical shock should be reviewed.

There is one key fact to remember: electricity always seeks the easiest path to the ground. This is true, whether the electricity comes from a household lighting circuit, a high power transmission line, or lightning.

Electricity passing through the body can cause irregular beating or quivering of the heart (fibrillation) leading to respiratory failure and cardiac arrest.

If a person touches two energized wires, or an energized wire and the ground, or an object at a different potential at the same time, an electrical circuit will be completed and the person may be injured or killed.

Muscular spasms from electric shock can cause a person to fall, or be thrown, resulting in fractures and other injuries.

Electricity creates other dangers. High energy arcs from short circuits can shatter equipment and send metal fragments flying.

Low energy arcs can cause fires and explosions in atmospheres containing flammable gases, vapours or dusts. Arcs can also generate intense ultraviolet radiation, causing eye injury, even at a distance.

Burns are the most common shock-related injury. Electricity can cause severe burns at points of entry and exit. These burns are frequently more serious than they look, although the entry wound may be small, tissue damage can run all the way through muscle and bone to the point of exit.

Electricity causes three basic types of burn:

Electrical burns - Current flowing through the body generates heat and burns skin, muscle and bone tissue.

Arc or flash burns - An electric arc or explosion can produce temperatures up to 3,000 degrees Celsius (5,400 degrees Fahrenheit) and cause burns to anyone standing nearby. The eyes are particularly susceptible to radiation burns from arcs and flashes.

Thermal contact burns - Accidental contact with the hot surfaces of electrical equipment and conductors can cause burns. Clothing may even be ignited.

The effect of electricity on the body is dependent on the amount of current, the path it takes through the body, and the length of time the body is exposed to it. The higher the current, the less time a human can survive the exposure.

Current passing through the heart or brain is more life threatening than current passing through the fingers.

It takes approximately 1,000 milliamps (1 amp) of current to light a 100 watt light bulb. Table 1 shows the effects you can expect from just a fraction of that current for a few seconds:

AMOUNT OF CURRENT	EFFECT ON A HUMAN
1 milliamp	Can just be felt
5 to 9 milliamps	Increasing pain
10 to12 milliamps	Cannot let go
21 to 50 milliamps	Severe pain, muscular contractions
Above 50 milliamps	May be fatal, destruction of tissue (burning), stop breathing

Job Considerations

Treat all circuits and equipment as alive until they are isolated, tested for potential, grounded, tagged and locked out of service.

Whenever possible, de-energize apparatus before you work on it. Verify this by a potential test at the work location.

Use the proper safety equipment and personal protective devices.

Maintain tools and personal protective and other equipment in a safe condition. Repair or replace, if defective.

Electrical Protection Safety Codes

Most electrical equipment and systems are designed and equipped with protective features and devices that meet the requirements of various pertinent codes.

In British Columbia, the *Safety Standards Act*, *Electrical Safety Regulation,* and the Canadian Standards Association (CSA) apply.

When purchasing electrical appliances, tools or other equipment, always make sure they have CSA certification. The CSA seal ensures electrical safety when the device is used properly.

Insulation

Electricity needs a conductor to carry current to and from the device being powered. The conductors must be installed in such a way to prevent contact with each other, or with other electrically conductive objects.

Insulation prevents contact between electrical conductors and other components. Insulation may be any nonmetallic material that does not conduct electricity (for example, glass, air, rubber, plastic, or porcelain).

Electric tools and equipment are insulated on the inside to prevent contact between components (short circuits) and on the outside to prevent contact with personnel (shock).

When these insulating materials deteriorate with age or are damaged, their effectiveness is substantially reduced. In the case of outside electric wires, constant exposure to sun, wind and rain may deteriorate the insulation to the point where it becomes cracked and broken. Pieces of insulation may fall off leaving the conductor bare, or moisture may enter the cracks in the insulation.

The insulation of extension cords is often damaged through general abuse such as twisting, whipping, stretching the cord, and dropping or piling things on top of it. Extension cords should be replaced when the outer jacket of insulation shows signs of damage.

Fuses and Circuit Breakers

Because the conductors which carry current in an electrical system heat up when excessive current is passed through them, fuses and circuit breakers are installed in the circuits to burn out or trip before the wires become overheated.

The capacity of the fuse or circuit breaker must be matched to the capacity of the wiring and the load which the wires will carry. If higher rated fuses or circuit breakers are used, or if the fuse is by-passed, the wires may become overheated and could generate a fire.

It is important to note that neither fuses nor circuit breakers provide protection from shock. A 15 amp fuse ruptures when 15 amps pass through it. It takes less than 1 amp to electrocute a person. The fuse/circuit breaker is designed to protect the wiring system from overload - not to protect a person from electric shock.

When a fuse ruptures, it is an indication that something is wrong in the electrical system. If the fuse is replaced with a larger one, or shunted with a penny or nail, the problem is not solved and a greater one is created.

More current will be allowed to flow through the fault, increasing the danger of fire. When a fuse ruptures, it should always be replaced with a new one of the same size. If that one ruptures, have the system checked for faults or overload.

There aren't any safety advantages to having circuit breakers instead of fuses. The main difference is that circuit breakers can be reset, while ruptured fuses must be replaced.

If a circuit breaker trips, simply reset it. If a fuse blows, first turn off the main power. Then replace it with a fuse of the correct amp rating. Never replace a fuse with a penny or any other metal object.

Before resetting the circuit breaker or replacing the fuse, all the electrical products used on that circuit should be unplugged, then plugged in one-by-one after the circuit is operating properly. Before touching anything, make sure your hands and the floor are dry.

If breakers trip or fuses rupture repeatedly, it may indicate a problem in your electrical system. Have it checked by an electrician or a person with equivalent qualifications.

Never remove the cover of a plug fuse panel or breaker panel unless you are an electrician or a person with equivalent qualifications.

When a plug fuse panel is installed, time-delay or dual element fuses identified by the letter "D" should be used in circuits for larger tools and equipment. "D" fuses can handle power surges when motors start. Depending upon the situation and circumstances, an electrician or person with equivalent qualifications may be needed to install new breaker panel equipment to handle these power surges.

In industrial applications, fuse boxes or breaker panels may be required to be locked out as part of a standard lockout procedure.

Unqualified personnel requiring power shut-off to a particular piece of equipment should call for an electrician or a person with equivalent qualifications.

In conclusion, do not tamper with fuse boxes or breaker panels and always ensure that manufacturers' recommendations for use and maintenance of their equipment are followed.

Grounding

Current is always seeking a path to ground. Grounding carries current from faulty wiring, tools, or equipment to a point where it can be safely discharged, usually to ground or a conductor connected to ground.

In most electrical systems and equipment, the ground connects the outside metal surfaces of the electrical device through a wire, to the system ground.

Should the case of the device become energized because of a fault, the electric current is safely carried to ground. When the ground pin on a cord cap is broken off or bent out of the way, the safeguard is defeated, as the grounding circuit cannot carry away the current, and the person using the device could conduct that current through their body to ground. Extension cords or supply outlets should be checked before being used.

REMEMBER: Never break off or bend back the ground pin on a three-prong plug to fit a two-pole outlet. Never use a two-prong "cheater" or adapter.

The three-wire cord on tools and equipment must not be replaced by a two-wire cord. These practices are dangerous and, in most jurisdictions, illegal.

Double Insulated Tools

"Double insulated" is a technical term describing a characteristic manufacturing technique of electrical components and tools. It provides electrical protection for the user since the tool's case is made of insulating material. The use of tools constructed in this manner has become common in the industry. Double insulated tools do not have ground wires since the cases of the tools are usually made of a plastic, which is an insulator. External metal parts (drill chucks, saw blades, etc.) are insulated from the electrified parts inside the tool and, under normal conditions, it is almost impossible to contact any electrified part of the tool.

All electric tools are hazardous when damp or wet. However, in double insulated tools the moisture, together with carbon dust, metal dust, etc., can form a conductive path from inside the tool to the surface through cracks or ventilation holes. Since there is no ground wire to carry the current away, the user could receive a shock. All electric tools must be kept dry and should not be used in wet or damp locations unless a ground fault circuit interrupter (GFCI) is used to protect the operator.

Special care must be taken not to use double insulated tools if the case is cracked or broken. Use only high quality electric tools.

Where only ungrounded outlets are available, it is strongly recommended that double insulated tools be used.

Double insulated tools do offer a very real safety feature. When considering new tools, always attempt to purchase tools that are double insulated.

All double insulated tools are clearly identified as double insulated on the tool nameplate along with CSA certification, serial and model numbers, etc.

Ground Fault Circuit Interrupters (GFCIs)

A ground fault circuit interrupter (GFCI) protects against shock. The device measures current going into a tool and coming out. Any discrepancy indicates that electricity is flowing somewhere other than the intended route.

When an electrical device is operating properly, the amount of current going into the device is the same as the amount leaving.

The ground fault circuit interrupter is an electrical protective device which monitors current going in and out of a circuit. As long as the amount going in is the same as the amount coming out, there is no problem. If there is a difference, it means that current is escaping the intended circuit (e.g. through the body of a person to ground). When there is a difference, the GFCI quickly shuts off the current flow.

As the GFCI detects leaking current, it switches off power before serious injury or damage can occur. A difference of only 5 milliamperes (5 thousandths of one ampere) is enough to trip a GFCI. Compared to the 15 amps (15,000 milliamperes) it takes to trip a

household circuit, the GFCI provides excellent protection from electric shock. It is strongly recommended that these devices (GFCIs) be used on construction sites or other areas that are deemed as hazardous.

In fact, the British Columbia Regulations for Construction Projects under the Workers' Compensation Act state that all portable electrical tools, when used outdoors or in wet locations, shall be protected by a ground fault circuit interrupter (GFCI) installed at the receptacle or on the circuit at the panel, unless another means of protection is provided that is acceptable to WorkSafeBC, such as the Assured Grounding Program.

Electric Cords

- Never carry an electric tool by the cord, or disconnect the plug by pulling or jerking on the cord. Such practices can damage the cord and loosen or separate connections.
- Don't use extension cords as permanent wiring. Extension cords are handy devices to temporarily bring power to an area that does not have an outlet. They were never designed to take the place of permanent wiring. Using extension cords as permanent wiring is an indication that your home wiring is not adequate and should be updated.
- Keep cords out of liquids.
- If vehicles must pass over cords, the cords should be put in a conduit or otherwise protected.
- Check cords frequently for damage such as kinks, cuts or cracked, broken outer jackets.
- Any cord that feels more than comfortably warm to the touch should be checked by an electrician or person with equivalent qualifications for overloading.
- Knotting extension cords to tool cords can cause short circuits and shocks. Loop the cords, or use a twist lock plug.
- Place cords so that they will not present a tripping hazard to the operator or other personnel on the job site.
- Make sure that the cord is clear of the tool when operating.
- Undersized cords will cause a drop in line voltage, loss of power and overheating.
- Extension cords should be of sufficient wire gauge for the voltage and amperage specified on the nameplate of the tool and for the length of run.

For example, operating a 10 ampere saw 30 m (100 ft.) from the power source would require a 12-gauge extension cord. At 60 m (200 ft.) a 10-gauge cord would be necessary. Gauges apply over the entire length of the run. Short cords of differing gauges should not be combined to make a longer run. (see table)

Extension Cord Gauges for Electric Tools (based on 120 volt power supply)

Cord Length		**Nameplate Amperes**																			
m	**(ft)**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
8	(25)	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
15	(50)	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	12
23	(75)	14	14	14	14	14	14	14	14	14	14	14	14	12	12	12	12	12	12	12	12
30	(100)	14	14	14	14	14	14	14	14	14	12	12	12	12	12	12	12	12	12	12	12
38	(125)	14	14	14	14	14	14	14	12	12	12	12	12	10	10	10	10	10	10	10	8
45	(150)	14	14	14	14	14	14	12	12	12	12	10	10	10	10	10	10	8	8	8	8
53	(175)	14	14	14	14	14	12	12	12	10	10	10	10	10	10	8	8	8			
60	(200)	14	14	14	14	12	12	12	10	10	10	10	10	8	8	8					
68	(225)	14	14	14	14	12	12	10	10	10	10	8	8	8							
76	(250)	14	14	14	12	12	12	10	10	10	8	8	8								
84	(275)	14	14	14	12	12	10	10	10	8	8	8									
91	(300)	14	14	14	12	12	10	10	10	8	8										
99	(325)	14	14	12	12	10	10	10	8	8											
106	(350)	14	14	12	12	10	10	10	8												

Personal Protective Equipment

As in any work operation, personal protective equipment is very important when working with electrical apparatus.

Foot Protection: Workers who work with electric powered tools and/or energized electrical equipment should wear footwear with soles resistant to electric shocks, as set out in the CSA standard. This footwear is identified with a tag showing the CSA logo and the symbol for the Greek letter "omega".

It is very important to understand that this type of footwear does not offer full protection should electrical contact be made, but only possible backup protection, and then only if the footwear is relatively new, clean and dry. It is also advisable that this footwear have a green triangular patch with a CSA logo indicating it is suitable for construction work.

Eye Protection: Properly fitted, industrial quality eye protection in the form of spectacles and side shields should be worn on the job.

Scratch resistant clear polycarbonate lenses or CX-39 (plastic) lenses with ultraviolet (UV 380 or greater) protection are recommended for all light conditions. Eye protection should meet or exceed CSA standard Z-94.3-92. Cover goggles are recommended for workers drilling overhead, or into concrete, masonry and drywall.

Clothing: Workers should wear clothing which is resistant to ignition and propagation of flame when working on or around energized apparatus. Shirts should have full length sleeves extending to the wrists.

Rubber Gloves: Any time testing or work is performed on energized electrical apparatus up to 750 volts, wear minimum Class 0 rubber gloves with leather protectors. Only rubber gloves that have received initial acceptance tests in accordance with Canadian Standards Association (CSA) specifications must be used.

Rubber gloves must be:

- maintained in the best possible condition at all times,
- never worn inside out or without leather protectors,
- laboratory retested at least every 60 days of in-service use and no test period shall exceed five months combined in-service use and shelf life,
- exchanged any time they become damaged, or the employee to whom they are assigned has reason to doubt their condition,
- air tested, and the rubber gloves and leather protectors visually inspected, immediately prior to use,
- stored in a proper manner when not in use,
- be retested by a recognized testing laboratory.

Hand Tools: Good common sense prevails. For example, never use a screwdriver as a pry bar, the blade may break and send particles of steel flying. Keep tools in good condition and use the right tool for the job. Insulation covered screwdrivers, pliers, wrenches, etc. are a worthwhile consideration for work on live electrical equipment. These may very well prevent a serious electrical flash should an inadvertent move or mistake be made.

Safeguards for Electrical Equipment

Inspections

Inspection is essential to ensure compliance with codes. Initial installation of wiring, by an electrician or a person with equivalent qualifications, and any major additions or renovations should be inspected and cleared by the local electrical authority before use.

In addition, tool cords, extension cords and electrical fittings should be inspected daily for damage. Check extension cords and outlets before using. Damaged equipment must be repaired or replaced before operating any electric tool.

Replacement of Faulty Equipment

Contact points in sealed switches may wear out from use. Broken switches should be repaired by a certified electrician or a person with equivalent qualifications.

When installing switches, receptacles, fixtures, and other equipment, be sure to respect the colour code for wiring. Otherwise, polarity may be reversed with dangerous results. Switches can remain energized when turned off, for instance, and ground fault circuit interrupters may not work properly.

Again, it should be emphasized that only electricians or persons with equivalent qualifications should install electrical equipment.

Using a light bulb with a wattage rating higher than that recommended by the manufacturer could create a shock hazard, or increase the risk of fire. Read the marking on the product or the use and care booklet to determine what wattage light bulb is suitable for the product.

Testers

Testers for proper grounding, voltages and proper polarity should be standard equipment for personnel working with electric tools.

Use testers to ensure that receptacles are functioning properly before plugging in tools or equipment.

Periodically, electrical equipment will have to be repaired or replaced. Normally, this work is done when the equipment has been isolated. To verify isolation, a tester is used. It should be equipped, as should all voltmeters, with fused leads. They provide protection, should the voltmeter itself or the leads be defective.

Only competent personnel should undertake the testing of energized equipment, while using approved personal protective equipment such as Class 0 rubber gloves and leather protectors, with eye protection, etc.

Voltmeters should always be tested on known energized electrical equipment before being used as indicating devices. This will determine whether or not the voltmeter is functioning properly.

NOTE: There are many different types of voltmeters and electrical testing equipment. Some are very sophisticated and used for specific purposes.

It cannot be stressed enough that people using these devices be competent in their use and fully aware of their functions. In the past, misuse of test equipment has resulted in severe electrical flash accidents with subsequent, very serious injuries.

Power Sources

The power source for tools must be the same voltage and current (alternating or direct) called for on the nameplate of the tool. Using higher voltage can cause serious injury to the operator and damage to the tool.

Using lower voltage can also damage the tool motor. Before any electric tool is connected to a power source, the switch on the tool must be in the OFF position.

Before making adjustments or changing attachments, disconnect electric tools and equipment from the power source. Switching off the tool is not enough to prevent accidental startup while you change blades or replace a grinding wheel.

Portable electric generators are often used to power electric tools. Respect these generators as you would any power supply. The shock can be just as deadly.

Maintain Electric Tools and Equipment in Good Condition

Some warnings of electrical hazards are:

- dim or flickering lights,
- arcs,
- sparks,
- sizzling and buzzing sounds,
- odours that smell of burning plastic,
- switch and receptacle plates that are warm to touch,
- cracked or loose plugs and wall plates,
- damaged insulation,
- frequent tripping of circuit breakers, or
- ruptured fuses.

Shocks received from electric tools and equipment, regardless of how minor, require that the equipment be taken out of service immediately and given to a qualified service person for inspection. Slight tingles can be a warning that fatal shocks could occur later if the equipment is not repaired immediately.

Regardless how well electric motors and tools are maintained, they can never be considered as spark proof.

Never use electric tools in areas where there may be exposure to flammable or explosive gases and liquids.

Preventive Maintenance

Preventive maintenance is a system for the inspection, testing and maintenance of equipment to detect and eliminate potential hazards before they cause problems.

Most companies insist that preventive maintenance be part of their ongoing safety program.

In order to do so, an authorized person with the proper qualifications should be made responsible for the program, and all employees using electric tools must know to report to their supervisor any fault or damage which has or may occur during use. Then, unsafe equipment can be immediately repaired.

Warning Signs

Electrical installations and associated hazards should always be identified by warning signs.

These signs warn about permanent hazards such as high voltage cables and switchgear in factories or commercial buildings. They may warn about hazards involved with temporary modification or upgrading work of electrical equipment.

Tags, which are a form of signs, may also warn that electrical equipment has been locked out while someone is working on it. Never remove these warnings.

Never restart any electrical equipment or system until you have personally confirmed that it is safe to do so and the lock has been removed. Tags may be used in conjunction with a lockout system. Where lockout capabilities are not available, a tag may be used to replace the lock.

Always make sure that the proper enclosure barriers are in place to protect workers from open live electrical equipment and that barriers or doors to these enclosures are always kept locked.

Electrical Fires

- Never put water on fires involving live electrical equipment or wiring. Water is a conductor and increases the risk of flash, arc, and electrocution.
- An electrical fire in a confined space can rapidly deplete oxygen and may release toxic fumes. If possible, switch off power.
- Avoid inhaling fumes and vacate the area at once.
- If necessary, breathe through a damp cloth and stay close to the floor.
- Use a Class C fire extinguisher. Intended for electrical fires, this type uses a nonconductive extinguishing agent.
- An ABC or BC fire extinguisher may also be used on an electrical fire.
- Report fires immediately.

NOTE: Wiring or electrical equipment involved in a fire, must be inspected by the electrical utility inspector before being put back in service.

Electrical Lockout

Unauthorized or inadvertent operation of electrical control devices may cause injury to people working on or near the equipment. The following procedure should be observed when isolating and locking out electrical equipment and/or machinery.

All electrical equipment should be clearly identified as to the equipment controlled.

All employees should be familiar with the terms and definitions applicable to the electrical equipment and lockout procedures.

Power Shutoff and Lockout of Equipment

1. The equipment should be removed from service by actuating control devices, such as selector switches, ON/OFF or HAND-OFF-AUTO switches, manual starters, START/STOP push button switches, etc.
2. The disconnection device should be placed in the OFF (open) position, tested for potential, and should be padlocked. When the equipment has been locked out, each person who is to work on the equipment should be protected by personally placing their padlock on the disconnecting device. The key should remain with the person at all times while the lock is in place.
3. When the disconnecting device has been locked in the OFF position, the isolation of the equipment should be proven by activating the isolating switch to ensure that the correct disconnecting device has been opened and that the equipment does not start.
4. A WARNING or DO NOT OPERATE tag should be attached to the padlock. It should include the name of the person placing the padlock.
5. When the work has been completed, each worker should report to the supervisor, then remove the tag and their personal padlock from the disconnecting device.

6. A padlock should only be removed by the person who installed it. The responsibility for its removal should not be delegated, except as outlined in "Control and Use of Padlocks".
7. The final lock should be removed only when all work has been completed and the equipment has been inspected by the supervisor and found to be safe. On removing the padlock and tag, consider the equipment ALIVE, even though the disconnecting device may remain in the OFF (open) position.
8. In computer controlled installations, a dysfunction cover should be placed on the appropriate button or key. Where possible, the computer control should be made inoperable, and the physical lockout should be carried out at the switchgear.
9. Where the local power authority must be involved in the isolation and lockout of a power source (such as a transformer), they should be requested to isolate and de-energize the equipment (apply grounds to the secondary side of the transformer). The name of the person requesting the isolation and the name of the supervisor having authority at the project should be given to the isolating authority.

Multiple Locks and Lockout Bars

- Where several people may be working on the equipment, a "lockout bar" should be used if necessary.
- A WARNING or DO NOT OPERATE tag should be attached to each padlock.

Return of Equipment to Service

- The supervisor should ensure that all isolating switches are in the OFF position. The final lock must then be removed by the person who placed it.
- Where applicable, the local power authority should be contacted and told that the work is completed and that the power may be restored. Permission for the restoration of power to the equipment shall be given by that authority before power is restored. The request for restoration of power can be made by any of the people named on any permit which has been issued.

Control and Use of Padlocks

- Only good quality locks should be used to lock out electrical equipment. DO NOT USE combination type locks.
- When purchased for electrical use, locks should be checked to ensure that two or more locks cannot be operated with the same key, except where a master key system is used.
- Where workers fail to remove their padlocks from the disconnecting device, they may be required to return to the workplace and remove the padlock. If it is not possible for the worker to return to the site, the supervisor may remove it, provided either of the following conditions are met:
  - The worker, whose padlock remains on the disconnect, advises the supervisor that the padlock can be removed with no danger to any person. In such instances, the supervisor should observe the procedure for "Return of Equipment to Service" before removing the padlock.
  - The supervisor makes a personal inspection of the equipment and observes the procedure for "Return of Equipment to Service" and is satisfied that no hazard exists prior to removing the lock.
- Documentation of the occurrence should be placed in a permanent record and contain the following information:

  a. date of occurrence,

b. location of padlock and padlock number,

c. name of person to whom padlock was issued,

d. date and time of removal, and

e. name and signature of supervisor removing padlock.

- When padlock keys are lost, the worker should advise the supervisor, who should immediately issue another padlock to the worker. The worker and the supervisor should immediately go to the disconnecting device and the worker should place the new padlock and a tag on the device. The supervisor should then remove the padlock for which the key was lost.

Personal/Control Lock Systems

Where each worker has a personal padlock, the lock should be numbered, preferably by metal stamping. Painting, decals or self-adhesive numbers should not be used.

Individual Lockout Systems

Where individual locks are not considered necessary, the locks and keys should be retained by the supervisor and should be issued as required. When a lock and key are issued, an entry should be made in a "Lock Record Register" by the supervisor and should show the following information:

a. lock number,

b. date of issue,

c. name of person receiving lock,

d. signature of issuing supervisor,

e. signature of person receiving lock,

f. date of return of lock and key, and

g. signature of person returning lock and key.

No more than two keys should be on hand for any lock used to lock out electrical equipment. Locks and keys should be retained in a locked cabinet under the control of the supervisor and the key to the cabinet lock should be retained by the supervisor AT ALL TIMES.

Master Key Systems

Where a master key system is used, there should be a maximum of two keys for the locks. One key should be in the possession of the person using the locks. The second key should be locked in a separate place. It should be the responsibility of the supervisor to ensure that no additional keys exist and that the integrity of the master key system is maintained.

Control of Static Electricity

Static electricity cannot be prevented, but much can be done to neutralize dangerous accumulations safely by conducting the charges away as fast as they are produced.

Methods include:

Bonding and Grounding: Bonding and grounding apply only to conductive bodies, when properly applied, and can be depended upon to remove electric charges. The terms "bonding" and "grounding" are not interchangeable, each has its own distinct function.

Bonding: The purpose of bonding is to eliminate a "Difference of Potential" between objects insulated by gaskets, caulking compounds, paint, etc. When objects are effectively bonded, the charges flow freely between the objects and there is no gap for the charges to spark across. Bonding does not, therefore, eliminate the static charge, it equalizes the potential difference between the bonded objects.

Grounding: Grounding means bonding of a charged object to another object that has an adequate conductive path to the earth (ie: it drains the static charges away as rapidly as they are produced).

The Electrical Safety Code requires that all metallic conduits be grounded and, therefore, it is acceptable to ground some objects by bonding to the conduit systems, particularly if the equipment to be grounded is powered electrically. It is also achieved by bonding to a grounding electrode or a cold water pipe made of conductive materials such as steel, copper, cast iron, etc., and which provide a return to ground. It follows that water pipes, gas or steam pipes, and dry pipe sprinkler systems must be used for grounding.

Company "Safe Electrical Work Practices" Checklist

- ☐ Are all employees required to report (as soon as practical) any obvious hazard to life or property observed in connection with electrical equipment or lines?
- ☐ Are employees instructed to make preliminary inspections and/or appropriate tests to determine what conditions exist before starting work on electrical equipment or lines?
- ☐ When electrical equipment or lines are to be serviced, maintained, or adjusted, are necessary switches opened, locked out, and tagged?
- ☐ Are portable hand-held electrical tools and equipment grounded or are they of the double-insulated type?
- ☐ Do extension cords have a grounding conductor? Are multiple plug adaptors prohibited?
- ☐ Are ground-fault circuit interrupters installed on each temporary 15, 20, or 30 ampere, 125-volt AC circuit at locations where construction, demolition, modifications, alterations, or excavations are being performed? OR…
- ☐ Do you have an assured grounding conductor program in place?
- ☐ Are all temporary circuits protected by suitable disconnecting switches or plug connectors at the junction with permanent wiring?
- ☐ Is exposed wiring and cords with frayed or deteriorated insulation repaired or replaced promptly?
- ☐ Are flexible cords and cables free of splices or taps?
- ☐ Are clamps or other securing means provided on flexible cords or cables at plugs, receptacles, tools, equipment, and is the cord jacket securely held in place?
- ☐ Are all cords, cable, and raceway connections intact and secure?
- ☐ In wet or damp locations, are electrical tools and equipment appropriate for the use or locations (or otherwise protected)?
- ☐ Are electrical utilities located before digging, drilling, or similar work begins?
- ☐ Is the use of metal measuring tapes, ropes, hand lines, or similar devices with metallic thread woven into the fabric prohibited where these could come into contact with energized parts of equipment or circuit conductors?
- ☐ Is the use of metal ladders prohibited in areas where the ladder or the person using the ladder could come into contact with energized parts of equipment, fixtures, or circuit conductors?

- ☐ Are all disconnecting switches and circuit breakers labelled to indicate their use or equipment served?
- ☐ Are disconnecting means always opened before fuses are replaced?
- ☐ Are all energized parts of electrical circuits and equipment guarded against accidental contact by approved cabinets or enclosures?
- ☐ Is sufficient access and working space provided and maintained around all electrical equipment to permit ready and safe operations and maintenance?
- ☐ Are all unused openings (including conduit knockouts) of electrical enclosures and fittings closed with appropriate covers, plugs, or plates?
- ☐ Are electrical enclosures such as switches, receptacles, and junction boxes provided with tight-fitting covers or plates?
- ☐ Are employees prohibited from working alone on energized lines or equipment over 600 volts?
- ☐ Are employees forbidden (unless properly qualified/certified) from working closer than 3 metres (10 feet) from high-voltage (over 750 volts) lines?
- ☐ Have all underground utilities been located prior to any excavation work?
- ☐ Is all digging within 1.2 metres (four feet) of power lines done by hand?
- ☐ Are power lines de-energized? Has the utility company been consulted before digging?
- ☐ Has the power company been notified if work is to be done in the vicinity of overhead lines?
- ☐ Are live parts of electrical circuits de-energized before an employee works on or near them?
- ☐ Are all exposed energized parts in the temporary power supply protected from possible contact?
- ☐ Are all power-supply circuit disconnects marked according to their functions?
- ☐ Is splicing only allowed on extension cords if they are larger than size 12 and the splicing retains insulation protection equal to the original extension cord?
- ☐ Are all plug connections used with the voltage for which they were designed?
- ☐ Do you always ensure that flexible cords are not immersed in water or exposed to damage from vehicles?
- ☐ Are all junction boxes used in a wet environment waterproof?
- ☐ Are you using a ground fault circuit interrupter or have you established an assured grounding program?

Chapter 10

Lockout and Tagging

Company Policy for Managing the Control of Hazardous Energy

Purpose

Dan-Ex Contracting Ltd. has established this "Lockout" Policy and Procedure" to provide maximum safety protection to our employees whenever they must service or perform maintenance on machinery and equipment.

Scope

These procedures must be used by all employees authorized to service or maintain our equipment to ensure that machines or equipment is completely isolated from all potentially hazardous energy sources. All employees affected in any way by servicing and maintenance activities must also be knowledgeable of lockout/tagout procedures.

Application

These procedures must be followed whenever unexpected energizing, star-up or release of stored energy could cause injury. These procedures do not apply when servicing or maintenance of equipment during normal production operations unless:

1. Guards, or other safety devices, must be removed or bypassed.
2. An employee places him/herself in an area where work on materials, etc., is actually being performed.
3. An employee places him/herself in any area considered dangerous during the normal operating cycle.

Compliance

All supervisors are responsible and accountable for the use of safe lockout/tagout procedures by all employees under their supervision. Compliance with lockout/tagout procedures is mandatory. Non-compliance with these procedures is considered a violation of an employee's condition of employment.

Authorization

Employees who are properly trained and certified on equipment maintenance and lockout/tagout procedures, and approved by the facility manager, are authorized to implement lockout/tagout procedures as appropriate.

Procedures

Preparation for Lockout

Prior to lockout, the authorized employee(s) will review the lockout/tagout procedures for each machine/piece of equipment. As a minimum the following information will be reviewed:

- Types and magnitudes of energy.
- Hazards posed by that energy.
- Methods to effectively control the energy.

Particularly close attention must be given to energies (such as gravity, electrical, high pressure) that can be stored or re-accumulated after shut-down.

Notification

Prior to shutdown all affected employees will be notified to clear their work area and/or any other area that might be hazardous.

Lockout/Tagout

Shutdown

Machinery and equipment will be shut down in an orderly manner using the shutdown checklist procedures on the associated lockout/tagout procedures for each machine/piece of equipment. If more than one authorized employee is involved in shutdown, the maintenance team leader will make sure all assistants have accomplished their tasks and are aware that shutdown will occur.

Isolation

All energy isolation devices will be located and operated to completely de-energize and isolate the equipment. The authorized employee, or team leader will verify operation of each energy isolation device.

Applying Lockout/Tagout Devices

Lockout devices — will be used to secure energy isolating devices unless the machinery or equipment is not capable of being locked out. Only authorized employees will affix lockout/tagout devices. Lockout devices must be able to hold energy isolation devices in a "safe" or "off" position.

Tagout devices — will be used only if machinery or equipment is not capable of being locked out. Tags will clearly state that moving energy isolating devices from the "safe" or "off" position is strictly prohibited. If a tag cannot be affixed to the energy isolating device, it will be located as close as safely possible to the device so that the tag is obvious to anyone attempting to operate the device.

Lockout/Tagout materials and hardware — will be provided by the employer. Each lockout/tagout device will be used only for lockout/tagout.

Stored Energy — Immediately after applying lockout or tagout devices, the authorized employee will ensure all potentially hazardous stored or residual energy is relieved, disconnected, restrained, and otherwise rendered safe.

If stored energy can be re-accumulated, the authorized employee will verify that the energy is isolated until maintenance is complete or the energy no longer exists.

Verification of Isolation — Before starting work on a machine or equipment that is locked or tagged out, the authorized employee will verify that the machinery or equipment is actually isolated and de-energized.

Release from Lockout or Tagout

The authorized employee will follow the procedures below prior to removing lockout or tagout devices and restoring energy:

- ***Equipment —*** Make sure machinery or equipment is properly re-assembled. Inspect machinery or equipment to make sure nonessential items have been removed.
- ***Employees —*** Make sure all employees are safely positioned outside danger zones. Notify affected employees that lockout/tagout devices have been removed and that energy is going to be re-applied.
- ***Removing lockout/tagout devices —*** Only the authorized employee who applied the lockout/tagout device may remove that device. Exception: When the authorized employee is not at the facility and all reasonable efforts have been made to inform the employee that their lockout/tagout device has been removed:

- The owner is authorized and will remove the device following procedures in this section.
- Each owner will be trained in proper lockout/tagout procedures.
- The owner will ensure the authorized employee has this knowledge before he/she resumes work.

Testing/Positioning Machines or Equipment

Whenever lockout/tagout devices are removed to test or position machines and equipment, or their components, the authorized employee will complete the following procedures in the sequence presented:

- Clear the machine or equipment of tools and materials.
- Remove employees from danger zones.
- Remove lockout/tagout devices.
- Energize and proceed with testing or positioning.
- De-energize all systems and re-apply lockout/tagout devices.

Outside Personnel (Contractors, etc.)

- Outside servicing personnel contracted to perform maintenance or other services covered by these lockout/tagout procedures will not begin work until the owner is satisfied that their lockout/tagout procedures are at least equivalent to company procedures.
- The owner will also ensure company employees understand and comply with contracted personnel lockout/tagout procedures.

Shift/Personnel Changes

When a shift change occurs during a lockout/tagout procedure, the following procedures will be followed:

- The on-coming authorized employee(s) will attach lockout/tagout devices and verify complete isolation.
- The on-coming authorized employee(s) will receive a comprehensive briefing on the maintenance being performed from the off-going authorized employee(s).
- The off-going authorized employee(s) will remove their lockout/tagout devices.

Special Procedure: In the event that communication between off-going and on-coming authorized employee(s) is impossible and work is to be done on the equipment/machinery by the on-coming authorized employee(s), then the following procedures must be followed:

- The off-going authorized employee(s) will each check out a "department" lock from the maintenance department and record in the checkout log the status and condition of the equipment in question.
- The off-going authorized employee(s) will attach the "department" lock to the equipment/machinery and remove their personal lock.
- The on-coming authorized employee(s), upon realization the there is a "department" lock in place on the equipment/machinery to be worked on, will go to the maintenance department and read the checkout log, and sign for the appropriate key.
- The on-coming authorized employee(s) will attach their personal lock to the equipment/machinery and remove the "department" lock.

- The on-coming authorized employee(s) will immediately return the "department" lock and key to the maintenance department and sign in the key and lock.

Training

Training in Lockout/Tagout — will be provided to all employees who may be in an area where energy control procedures are used. This training will make sure that the purpose and function of the energy control program are understood and that employees gain the needed knowledge and skills to safely apply, use, and remove energy controls. As a minimum, training will include:

- ***Authorized employees will be able to recognize:*** hazardous energy sources, type and magnitude of energy in the workplace, and methods and means necessary to isolate and control the energy.
- ***Affected employees will be able to recognize:*** purpose and use of the energy control procedures.
- ***All employees will be able to recognize:*** procedures and prohibitions of the energy control program.

Retraining — Employees will be retrained at the following times:

- Initial assignment.
- Change in job assignment.
- Change in machinery or equipment.
- Change in operating procedures.

Inspections

Annual inspection on lockout/tagout procedures will be conducted by an authorized employee other than the one(s) using the control procedure being inspected.

_____ _____

Owner Signature Date

Lockout and Tagging

Lockout and tagging ensures that hazardous energy sources are under the control of each worker. Serious or fatal accidents can occur when people assume that machinery is turned off or made harmless.

Forms of Energy

When most people think of uncontrolled hazardous energy, they think of electricity. But construction crews doing work in industrial or office settings often have to lock out and tag a variety of energy sources. Here are the main types.

- **Electrical**—electrical panels, generators, lighting systems, etc.
- **Mechanical** (the energy of moving parts)—flywheels, blades, fans, conveyor belts, etc.
- **Potential** (stored energy that can be released during work)—suspended loads, compressed air, electrical capacitors, accumulated bulk goods, coiled springs, chemical reactions, changing states (solid—liquid— gas), etc.
- **Hydraulic**—presses, rams, cylinders, cranes, forklifts, etc.
- **Pneumatic**—lines, compression tanks, tools, etc.
- **Thermal**—steam, hot water, fire, etc.
- **Chemical**—flammable materials, corrosive substances, vapours, etc.

Some equipment may involve more than one type of energy, and pose unexpected hazards. For example, a machine may have an electrically operated component with a hydraulic or pneumatic primary power source, or it may become activated on a timed schedule. With some equipment, gravity and momentum can present unexpected hazards.

You must recognize and control conditions such as these. Switches, power sources, controls, interlocks, pneumatics, hydraulics, computer-controlled sources, gravity-operated sources—all of these must be locked out and appropriately tagged by each worker involved.

A written safe work procedure for lockout and tagging is essential. Once implemented and followed, a good procedure ensures that no form of energy can harm anyone during a lockout.

A written procedure helps to ensure that lockout and tagging have been thoroughly and effectively carried out before work begins.

It should include:

- training requirements for workers and supervisors
- quality, type, and colour of locks, scissors, chains, blanks, blinds, and other lockout devices
- method of identifying lock owners
- control of keys for locks
- colour, shape, size, and material for tags
- method of securing tags and information to be included
- communication and authorization procedure for shutting down and starting up machinery and equipment
- record-keeping requirements
- itemized steps to meet lockout objectives.

Planning Steps for Lockout and Tagout

1. Locate Work Area and Identify Equipment, Machinery, or Other System Components to be worked on

Identify the area with references such as floor, room name, elevation, or column number.

Identify the equipment that is the subject of the work.

2. Identify All Energy Sources

Identify all energy sources affecting the equipment or machinery. Identify the various energy forms to be locked out such as electrical, momentum, pneumatic, hydraulic, steam, and gravity.

3. Identify the Parts to Be Locked Out or Isolated

Identify systems that affect, or are affected by, the work being performed. These may include primary, secondary, backup, or emergency systems and interlocked remote equipment.

Review the current system drawings for remote energy sources and, where required, identify and confirm with the client or owner the existence and location of any switches, power sources, controls, interlocks, or other devices necessary to isolate the system.

Remember that equipment may also be affected by:

- time restrictions for completing the work
- time-activated devices

4. Determine Lockout Methods

Confirm that the lockout of all energy sources is possible. Some equipment may have to be kept operational to maintain service to other equipment that cannot be shut down. Take appropriate steps to provide protection for workers while working near operating equipment. Equipment that can be locked out should be locked out by the methods most appropriate to the hazards.

5. Notify All Personnel Affected

Shutting down equipment may affect operations in other locations, incoming shifts, or other trades who may be planning to operate the locked-out system. Before proceeding with the lockout, inform all personnel who will be affected.

At construction sites with a large workforce or at relatively large factories, you may need to have special communication methods and permits or approvals.

6. Shut down Equipment and Machinery

Qualified personnel must shut down the equipment, machinery, or other system components, placing them in a zero-energy state. Trace all systems to locate and lock out energy sources. The main source may be electrical, for instance, but pneumatic and other forms of energy may also be present. Always look for other possible energy sources. All equipment capable of being energized or activated electrically, pneumatically, or hydraulically must be deenergized or de-activated by physically disconnecting or otherwise making the apparatus inoperable.

Always ensure that the client and operators are aware of the plan to shut down and lock out equipment, machinery, or other system components. In some cases, operations personnel or equipment operators may be required to shut down components because of their special qualifications or knowledge of the system.

In determining what needs to be shut down and locked out, consider the different energy sources that may be found in the system.

7. Install Lockout Devices

After the circuit has been de-energized and locked out by the person in charge, each worker involved in the lockout must be protected by placing his or her personal lock on the isolating device.

Remember—even though the disconnect is already locked out, you are not protected until you attach your own personal safety lock.

Each worker must retain his or her key while the lock is in place. Only the worker in charge of the lock should have a key.

Remember . . .

- Merely removing a fuse doesn't constitute lockout. The fuse could be easily replaced. The fuse should be removed and the box locked out.
- The lockout devices attached to one system should not prevent access to the controls and energy-isolating devices of another system.

Locks

Locks should be high-quality pin-type, key-operated, and numbered to identify users.

Multiple locks and lockout bars

When several workers or trades are working on a machine, you can add additional locks by using a lockout bar. You can add any number of locks by inserting another lockout bar into the last hole of the previous bar.

Lockout and Tagging

In-plant procedures specified by the owner or client take precedence over the procedures outlined here, provided there is no contravention of existing codes or laws.

Other lockout devices

- Scissors—have holes for locks and should be made of hardened steel.
- Chains—should be high quality and snug fitting.
- Blocks or cribbing—prevent or restrict movement of parts.
- Blanks or blinds—are solid metal plates inserted at flanged connections to prevent the flow of liquids or gases.
- Pins and clamps—should be of high-quality materials and designed to fit the system.

8. Tagging

Each worker involved in a lockout operation must attach a durable tag to his or her personal lock. The tag must identify the worker's name, the worker's employer, the date and time of lockout, the work area involved, and the reason for the lockout.

A tag in itself offers no guarantee that a machine or system is locked out. It simply provides information.

Signs must be placed on the system indicating that:

- it must not be energized or operated
- guards, locks, temporary ground cables, chains, tags, and other safeguards must not be tampered with or removed until:
  - the work is complete, and
  - each worker has removed his or her personal lock.

A record must be kept of all equipment locked out or otherwise rendered inoperable so that all of these devices can be reactivated once the work is complete.

9. Verify Zero-Energy State

After any power or product remaining in the equipment has been discharged or disconnected by qualified personnel, verify that all personnel are clear of the equipment. Then try, with extreme caution, to start the equipment manually. Look for any movement or functions.

If none are observed, confirm that all energy sources are at a zero-energy state.

Test the system to ensure that all electrical components are de-energized and de-activated, including interlocking and dependent systems that could feed into the system, either mechanically or electrically.

10. Perform the Task - Carry out and complete the work assignment.

11. Communicate That Work Is Complete and All Personnel Are Clear

- Ensure that personnel are clear of the locked-out equipment, machinery, or system.
- Remove only your tags and locks.
- Tell personnel that were originally informed of the lockout that the equipment, machinery, or system is no longer locked out.

12. Restore Power

Return systems to operational status and the switches to power ON. Have qualified personnel restart machinery or equipment.

13. Return Control to Operating Personnel

When all work is completed, the person in charge of the lockout operation should formally return control of the equipment or system to plant personnel.

14. Record Date/Time Lockout Removed and System Restored

This last step is important. It saves valuable information that may be lost if not recorded. Staff involved in the shutdown may not remain at the same jobsite. Owners or operators may require this information to help plan future shutdowns.

Summary

Lockout can ensure the safety of a single mechanic working alone or of hundreds of workers at a jobsite. In either situation, a procedure for safe lockout and tagging must be written, implemented, and followed step by step.

Chapter 11

WHMIS

Dan-Ex Contracting Ltd. shall ensure that all containers are labelled, a current inventory list of all hazardous chemicals/material is maintained, and current Material Safety Data Sheets are available.

Vicki Baker is responsible for updating and maintaining this program and for compiling a current inventory of all chemical/material and updating MSDS as needed. All employees have free access to MSDS.

MSDS are stored in/at ***office & Shop***.

General Information

The management staff of ***Dan-Ex Contracting Ltd.*** is committed to the prevention of incidents, exposures, or happenings that result in injury and/or illness and to comply with all applicable federal and provincial health and safety rules. In order to comply with Occupational Health and Safety (OHS) and the WCA, the following written WHMIS program has been established.

All employees of this Company will participate in the WHMIS Program. A copy of this written program will be available at The Company's main office and on each jobsite for review by any interested employee.

Container Labelling

Vicki Baker is responsible for container labelling procedures, reviewing, and updating. The labelling system to be used is as follows:

Dan-Ex Contracting Ltd.will rely primarily on the use of the manufacturers' labels to meet the labelling requirement of the standard.

- All chemicals on site will be stored in their original container with manufacturers' label attached.
- Workers may dispense chemicals from original containers in small quantities for immediate use by a single employee on a single shift. These secondary containers will be labelled with at least the generic name of the product dispensed (e.g., paint, thinner, etc.). Excess chemical will be returned to the original container at the end of the shift or given for proper handling to The Safety Coordinator.
- ***Vicki Baker*** will ensure that all containers are labelled with the manufacturers' label or equivalent containing the following information:
  - Chemical Name; Manufacturers' Name and Address; and Appropriate hazard warnings such as "Flammable", "Toxic", etc.
- No unmarked containers of any size will be left in the work area unattended.

Hazardous Chemical List & Material Safety Data Sheets

A master list of all the hazardous chemicals used on a job site will be maintained by ***Vicki Baker*** and kept: *(Compile and maintain list using the provided form.)*

Enter Location(s): _____

_____

This list will be available for employee review at any time.

Copies of MSDSs for all hazardous chemicals to which employees of this company may be exposed will be kept:

Enter Location(s): _____
and at each jobsite. MSDSs will be available for employee review at any time.

Anyone purchasing new chemicals must request a copy of the MSDS. The Company Safety Coordinator will ensure that new MSDSs are distributed to the appropriate job sites. If MSDSs are not available or new chemicals in use do not have an MSDS, immediately contact The Company Safety Coordinator.

Employee Information and Training (Document training using provided forms.)

Prior to starting work, each new employee will attend a health and safety orientation and will receive information and training on the following:

- An overview of the WHMIS requirements.
- Chemicals present at their job site.
- Location and availability of the MSDS file and the written WHMIS program.
- Physical hazards and health effects of the hazardous chemicals.
- Methods used to determine the presence or release of hazardous chemicals in the work area.
- Methods to reduce or prevent exposure to these hazardous chemicals including safe work practices and personal protective equipment.
- Steps The COMPANY has taken to reduce or prevent exposure to these chemicals.
- Safety emergency procedures to follow if the employee is exposed to these chemicals.
- How to read labels and review MSDSs to obtain appropriate hazard information.

Prior to introducing a new hazardous chemical into any operational section of ***Dan-Ex Contracting Ltd.***, affected employees will be given updated information and training for new chemical as outlined above.

Hazardous Non-Routine Tasks

Periodically, employees must perform hazardous non-routine tasks. Before starting work on such projects, each affected employee will be given information by their supervisor about hazardous chemicals to which he or she may be exposed during such activity.

This information will include:

- Specific chemical hazards.
- Protective/safety measures employees can take.
- Measures THE COMPANY has taken to reduce the hazards, including ventilation, respirators, presence of another employee, and emergency procedures.

Informing Other Employers

It is the responsibility of ***Vicki Baker*** to insure all employers on the job site exchange the following information:

- Hazardous chemicals which employees may be exposed while on the job site.
- Procedures for obtaining MSDSs from each employer
- Precautions employees should take to lessen the possibility of exposure.
- Location of written WHMIS programs for each company.
- Contact information for the safety coordinator for each company.

Each employer will be responsible for providing necessary hazard information to their affected employees.

The following is a list of all known hazardous chemicals used by our employees. Further information on each chemical may be obtained by reviewing MSDSs located at ***Dan-Ex Contracting Ltd.*** main office and your supervisor's truck.

List of Hazardous Chemicals

Product/Chemical Name	Manufacturer	Location Used

WHMIS Training Acknowledgement

This is to certify that I have been trained and informed about the hazards and precautions associated with the use of hazardous chemicals in my work as required in the ***Dan-Ex Contracting Ltd.*** written WHMIS program.

To confirm my understanding of such training and instructions,

_____ reviewed them with me and he/she indicated his/her satisfaction by checking the box before each of the topics listed below:

- Overview of the requirements contained in the WHMIS Regulation
- Chemicals present in my workplace operations.
- Locations and availability of our written WHMIS program and the MSDSs for the hazardous chemicals.
- Physical and health effects of these hazardous chemicals.
- Methods used to determine the presence or release of hazardous chemicals.
- How to lessen or prevent exposure to these hazardous chemicals through safe work practices and use of personal protective equipment.
- Steps ***Dan-Ex Contracting Ltd.*** has taken to lessen or prevent exposure to chemicals.
- Safety emergency procedures to follow in the event of exposure to chemicals.
- How to read container labels and interpret MSDSs to obtain appropriate hazard information.

_____ _____

Employee's Name Signature Date

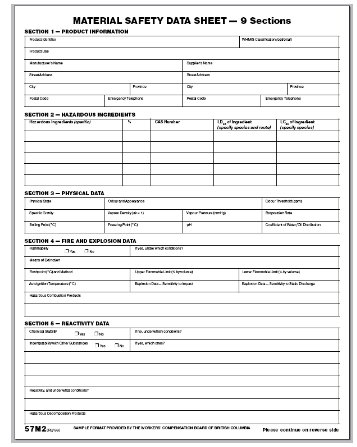
_____ _____

Trainer's Name Signature Date

Note to employee: This form will be made a part of your personnel file. Please read and understand its contents before signing.

Group Training Record for Updates and Refresher Training	
Trainer:	**Date:**
Content of Training:	
Attendees	
Print Name	**Signature**

Understanding Material Safety Data Sheets (MSDS)



It is estimated that many millions of workers are exposed to 650,000 hazardous chemical products in almost a million Canadian workplaces. This poses a serious problem for exposed workers and their employers.

The basic goal of a WHMIS Program is to be sure employers and employees know about work hazards and how to protect themselves. This should help to reduce the incidence of chemical related illnesses and injuries.

Chemicals pose a wide range of health hazards (such as irritation, sensitization, and carcinogenicity) and physical hazards (such as flammability, corrosion, and reactivity). The Workplace Hazardous Materials Information System (WHMIS) is designed to ensure that information about these hazards and associated protective measures are disseminated to workers and employers.

This is accomplished by requiring chemical manufacturers and importers to evaluate the hazards of the chemicals they produce or import, and to provide information about them through labels on shipped containers and more detailed information sheets called material safety data sheets (MSDSs). All employers with hazardous chemicals in their workplaces must prepare and implement a written WHMIS program. Employers must ensure that all containers are labelled, that employees are provided access to MSDSs, and that an effective training program is conducted for all potentially exposed employees.

A vital part of an effective WHMIS Program" is maintaining Material Safety Data Sheets (MSDSs) and insuring employees have the necessary training to understand the terminology contained in MSDSs. The following pages provide brief explanations of terminology that can be used during employee training.

Manufacturers, importers, distributors, and suppliers are required to provide you with Material Safety Data Sheets (MSDSs) for each of their hazardous chemicals. As an employer or contractor, you are required to maintain a file of MSDSs for the hazardous chemicals you use. According to WHMIS, you will be able to determine if a substance is hazardous by referring to the MSDS and the label. The supplier MSDS must be available in French and English at the time of sale or importation. There can be one bilingual document or separate French and English data sheets.

Review the MSDS's you receive for accuracy and completeness, and make sure you have the latest version on file. When an MSDS includes new information or a new compound has been added to it, additional employee training is required.

To ensure proper recordkeeping and maintenance of MSDSs, you should:

1. Make sure any employee who purchases supplies for your company is on the lookout for MSDSs.
2. Include a request for an MSDS and a label that meets the requirements of the WHMIS on all purchase orders.
3. Ask for an MSDS for materials with labels indicating they are hazard unless an MSDS is already on file.
4. To deal with a multi-employer situation, other contractors on the site may be asked to provide hazardous substance information for the chemicals they bring to the site.

While MSDSs will appear in many different formats, they will contain essentially the same information. An MSDS should contain the following information:

SECTION 1 – PRODUCT INFORMATION

1. Product Identifier: The name of the product as it appears on the label. This is often the chemical name of a product but can also be the trade name, common name, code name, or code number.
2. Product Use: The product use(s) intended by the manufacturer or supplier.
3. Manufacturer's name, address, and emergency phone number: The manufacturer of the product. Emergency phone number must be listed if one is available.
4. Supplier's name, address, and emergency phone number: The seller or distributor (which may be the same as the manufacturer).

SECTION 2 – HAZARDOUS INGREDIENTS

1. Hazardous Ingredients: Each hazardous ingredient must be listed by its specific chemical name (not its generic name).
2. Percentages: The percentages, or range of percentages, for each hazardous ingredient.
3. CAS Registry Number: The unique number assigned to each hazardous ingredient by the Chemical Abstract Service Registry.
4. Current LD50 for each hazardous ingredient: A measure of the short-term poisoning potential of a hazardous ingredient. LD50 is the lethal single dose at which 50% of a specified test population dies. Note: LD50s are used for WHMIS classification
5. Current LC50 for each hazardous ingredient: A measure of the short-term poisoning potential of a hazardous ingredient. LC50 is the lethal concentration (by inhalation) at which 50% of a specified test population dies. Note: 4-hour exposures are used for WHMIS classification.

SECTION 3 – PHYSICAL DATA

- Physical State: The physical state of the product (gas, liquid, solid, paste, powder, or gel) at room temperature.
- Odour and Appearance: Odour describes the quality of the odour of the product (e.g. fruity, sharp, almond-like). Appearance describes colour and texture for most products and includes particle size for solids.
- Odour Threshold: The lowest airborne concentration that can be detected by the human sense of smell.
- Vapour Density: The ratio of the weight of a substance compared with water.
- Vapour Pressure: One measure of the ability of a substance to form vapours. The higher the vapour pressure, the more quickly a substance evaporates.
- Evaporation Rate: The ratio of how fast a substance evaporates relative to a known reference standard (usually n-butyl acetate = 1).
- Boiling Point: The temperature at which a liquid changes to a gas (at normal room pressure).
- Freezing Point (melting point: The temperature at which a liquid changes to a solid or a solid to a liquid (at normal room pressure).
- pH: A value that indicates the acidity or alkalinity of a product (usually liquid) pH values between 0 and 7 are considered acidic and pH values between 7 and 14 are considered alkaline (7 is neutral)

- Coefficient of water/oil distribution: A number that indicates how easily a product may be absorbed into the body. A value greater than 1 means a substance may enter the body through the mucous membranes of the eyes, nose, and lungs. A value less than 1 means that the substance may be absorbed by the fatty tissue below the skin.

SECTION 4 – FIRE AND EXPLOSION HAZARD DATA

1. Flammability: Whether a product is classified as flammable or combustible under WHMIS.
2. Means of Extinction: Indicates the range of vapour concentrations, which will explode when an ignition source is present. The "Lower Explosive Limit" (LEL) is the minimum amount of vapour in the air that can be ignited. The "Upper Explosive Limit" (UEL) is the maximum amount of vapour in the air that will sustain fire.
3. Flash Point and Test Method Used: The lowest temperature at which the product will catch fire (or explode) when there is a nearby source of ignition such as a spark or open flame. A flash point is determine either by a "cc" (closed cup) or "oc" (open cup) method.
4. Upper Flammable Limit and Lower Flammable Limit: The highest and lowest concentration of a gas or vapour in air (expressed as a percentage) at which the product will catch fire or explode if near and ignition source such as a spark or open flame. These are also referred to as explosive limits. These concentrations, and all concentrations in between, form the flammable range.
5. Autoignition Temperature: The temperature above which the substance (usually the vapour) may self-ignite without an external flame or spark. Autoignition temperatures are available only for flammable liquids and gases.
6. Hazardous Combustion Products: The hazardous products produced when the substance burns or is exposed to heat.
7. Sensitivity to Mechanical Impact: Whether the product may explode due to physical impact. (e.g. being dropped, bumped, or knocked over).
8. Sensitivity to Static Discharge: Whether the product may explode or catch fire if there is a nearby spark from static electricity.

SECTION 5 – REACTIVITY DATA

1. Chemical Stability: Whether the product is chemically stable when exposed to normal intended use or when placed in extended storage.
2. Incompatible Substances: Other chemical groups (e.g. acids and caustics) that will cause violent reactions when the two products contact each other.
3. Conditions of Reactivity: When hazardous reactions (e.g. vigorous polymerization) may occur.
4. Hazardous Decomposition Products: Hazardous substances produced or released due to aging or reaction with air or moisture. These do not include thermal decomposition products from burning or excess heating.

SECTION 6 – TOXICOLOGICAL PROPERTIES

1. Route(s) of Entry: How the product enters the body during normal use: skin contact, skin absorption, eye contact, inhalation, and/or ingestion.
2. Effects of Acute Exposure: Adverse health effects resulting from short-term exposure to the substance, either as a single exposure or as multiple exposures occurring within a short time, usually 24 hours or less.

3. Effects of Chronic Exposure: Adverse health effects resulting from repeated exposure over a relatively long period of time, anywhere from several days to years.
4. Exposure Limits: The exposure limit for the product, usually the 8-hour time-weighted-average, and the name of the regulatory agency. The legal exposure limits may be different from the ones listed on the MSDS.
5. Irritancy of Product: Whether the product may irritate the skin, eyes, nose, throat, or any other part of the body that it contacts to produce tearing, reddening, swelling, itching, and/or pain. Irritancy is often described as mild, moderate, or severe.
6. Sensitization: Whether the product may cause sensitization. A sensitizer may cause severe allergic reactions with repeated exposure.
7. Carcinogenicity: Whether the product is classified as a human carcinogen by the International Agency for Research on Cancer (IARC) or by the American Conference of Governmental Industrial Hygienists (ACGIH).
8. Reproductive Toxicity: Whether the product may cause reproductive problems.
9. Teratogenicity: Whether the product may cause birth defects in the fetus at exposures that do not cause damage or injury to the mother.
10. Mutagenicity: Whether the product may cause changes to the genetic material (DNA) of living cells.
11. Synergistic Products: Other products that, when combined with exposure to the controlled product, may cause a toxic effect greater than the sum of the effects of the individual materials.

SECTION 7 – PREVENTIVE MEASURES

1. Personal Protective Equipment: Specific personal protective equipment, and specific type of equipment, required to prevent exposure to the product.
2. Specific Engineering Controls: Recommended engineering controls, such as ventilation and process equipment design, to be used with the product.
3. Leak and Spill Procedures: Safe procedures to clean up spill, leaks, and other accidental release of the product.
4. Waste Disposal: Information such as proper waste container design, safe procedures for handling waste, and agencies to contact regarding disposal requirements.
5. Handling Procedures and Equipment: Particular procedures and equipment required to handle the product safely.
6. Storage Requirements: Specific safe storage information such as separation from other incompatibles, shelf life, testing for peroxide formation, and sensitivity to light, temperature, or moisture.
7. Special Shipping Information: Safe Shipping Information such as:
   - Sensitivity to shock and temperature.
   - Product identification number (PIN) or United Nations number (UN number).
   - Transportation of Dangerous Goods (TDG) information (e.g. classification, proper shipping name, and packaging group) may also be included.

SECTION 8 – FIRST AID MEASURES

1. Specific First Aid Measures: Specific First Aid Measures in the event of:
   - Inhalation
   - Ingestion
   - Skin Contact
   - Eye Contact

SECTION 9 – PREPARATION INFORMATION

1. Name and phone number of preparer: Gives the name and phone number of the person or group who prepared the MSDS.

Classification of Controlled Products

A controlled product is a product that falls into one or more of the hazard classes described below. Manufacturers and suppliers classify these products and assign one or more of the appropriate hazard symbols. Employers must educate and train workers to recognize the eight hazard symbols and to know what they mean. The following are only brief descriptions of each of the classes:

Class A - Compressed Gas

This class includes compressed gases, dissolved gases, and gases liquefied by compression or refrigeration. If the pressure in the container is greater than 40 psi, the gas is a Class A product. The cylinder may explode if exposed to heat or to physical shock (when dropped).

Examples include: oxygen and acetylene in cylinders for welding; propane

Class B – Flammable and combustible material

This class includes solids, liquids, and gases capable of catching fire in the presence of a spark or open flame under normal working conditions. Class B has six divisions:

- DIVISION 1: FLAMMABLE GASES – These are compressed gases (Class A) that form flammable mixtures in air. *Examples: butane, propane, hydrogen gas*
- DIVISION 2: FLAMMABLE LIQUIDS – These are liquids that have flash points below 37.8° C. A flash point is the lowest temperature at which the vapours form these liquids will catch fire from nearby sparks or open flames. *Examples: acetone, gasoline, isopropyl alcohol*
- DIVISON 3: COMBUSTIBLE LIQUIDS – These are liquids that have flash points of 37.8° C or more but less than 93.3° C. *Examples: kerosene, mineral spirits, butyl cellosolve*
- DIVISION 4: FLAMMABLE SOLIDS – This is a special group of solids (usually metals) that meet very specific technical criteria such as the ability to cause fire through friction or to ignite and burn so vigorously and persistently that they create a hazard. *Examples: various magnesium alloys, beryllium powder*
- DIVISION 5: FLAMMABLE AEROSOLS – These products are packaged in aerosol containers. Either the aerosolized product itself or the propellant may catch fire. *Examples of flammable propellants: propane, butane, isobutene*

- DIVISON 6: REACTIVE FLAMMABLE MATERIALS – These products react dangerously in one of two ways: either (1) they spontaneously crate heat or catch fire under normal conditions of use or they create heat when in contact with air to the point where they begin to burn, or (2) they emit a flammable gas or spontaneously catch fire when in contact with water or water vapour. *Examples: perchloric acid, hydrogen peroxide, permanganates, compressed oxygen*

Class C – Oxidizing Material

These materials increase the risk of fire if they come in contact with flammable or combustible materials.

Examples: perchloric acid, hydrogen peroxide, permanganates, compressed oxygen

Class D – Poisonous and Infectious Material

Class D has three divisions:

- DIVISION 1: MATERIALS CAUSING IMMEDIATE AND SERIOUS TOXIC EFFECTS – These materials can cause death or immediate injury when a person is exposed to small amounts.

  Examples: sodium cyanide, hydrogen sulphide

- DIVISION 2: MATERIALS CAUSING OTHER TOXIC EFFECTS – These materials can cause life-threatening and serious long-term health problems as well as less severe but immediate reactions in a person who is repeatedly exposed to small amounts. Health problems include immediate skin or eye irritation, allergic sensitization, cancer, serious impairment of specific body organs and systems, and reproductive problems.

  Examples: xylene, asbestos, isocyanates

- DIVISION 3: BIOHAZARDOUS INFECTIOUS MATERIAL – These materials contain harmful micro-organisms that have been classified in Risk Groups 2, 3, and 4 as determined by the World Health Organization (WHO) OR THE medical Research Council of Canada.

  Examples: cultures or diagnostic specimens containing salmonella bacteria or the hepatitis B virus

Class E: - Corrosive Material – This class includes caustic and acid materials that can destroy the skin or eat through metals.

Examples: sodium hydroxide, hydrochloric acid, nitric acid

Class F – Dangerously Reactive Material – These products may self-react dangerously (for example, they may explode) upon standing or when exposed to physical shock or to increased pressure or temperature, or they emit toxic gases when exposed to water.

Examples: plastic monomers such as butadiene; some cyanides

Note: See Sample MSDS on following page

Section 1—Product Information

Product Identifier	WHMIS Classification

Product Use

Manufacturer's name	Supplier's Name
Street Address	Street Address
City / Province	City / Province
Postal Code / Emergency Telephone	Postal Code / Emergency Telephone

Section 2—Hazardous Ingredients/Identity Information

Hazardous Ingredients (Specific)	%	CAS Number	LD_{50} of Ingredient *(specify species and route)*	LC_{50} of Ingredient *(specify species)*

Section 3—Physical Data

Physical State	Appearance and Odour		Odour Threshold (ppm)
Specific Gravity	Vapour Density (AIR = 1)	Vapour Pressure (mmHg)	Evaporation Rate
Vapour Density (AIR = 1)	Freezing Point (°C)	pH	Coefficient of Water/Oil Distribution

Section 4—Fire and Explosion Hazard Data

Flammability ☐ Yes ☐ No	If yes, under which conditions?	
Means of Extinction		
Flash Point (°C) and Method	Upper Flammable Limit (% by volume)	Lower Flammable Limit (% by volume)
Autoignition Temperature (°C)	Explosion Data-Sensitivity to Impact	Explosion Data-Sensitivity to Static Discharge
Hazardous Combustion Products		

Section 5—Reactivity Data

Chemical Stability ☐ Yes ☐ No	If no, under which conditions?
Incompatibility with Other Substances ☐ Yes ☐ No	If yes, which ones?
Reactivity, and under what conditions?	
Hazardous Decomposition Products	

Section 6—Toxicological Properties

Route of Entry	☐ Skin Contact	☐ Skin Absorption	☐ Eye Contact	☐ Inhalation	☐ Ingestion

Effects of Acute Exposure to Product

Effects of Chronic Exposure to Product

Exposure Limits (value, source, date)	Irritancy *(if yes, explain)* ☐ Yes ☐ No
Sensitization *(if yes, explain)* ☐ Yes ☐ No	Carcinogenicity *(if yes, explain)* ☐ Yes ☐ No
Reproductive Toxicity *(if yes, explain)* ☐ Yes ☐ No	Teratogenicity *(if yes, explain)* ☐ Yes ☐ No
Mutagenicity *(if yes, explain)* ☐ Yes ☐ No	Synergistic Products *(if yes, explain)* ☐ Yes ☐ No

Section 7—Preventive Measures

Personal Protective Equipment	☐ Gloves	☐ Respirator	☐ Eye	☐ Footwear	☐ Clothing	☐ Other

If checked, specify type

Engineering Controls *(specify, such as ventilation, enclosed process)*

Leak and Spill Procedure

Waste Disposal

Handling Procedures and Equipment

Storage Requirements

Special Shipping Information

Section 8—First Aid Measures

Inhalation

Ingestion

Skin Contact

Eye Contact

Section 9—Preparation Information

Prepared by (Group, Department, etc.)	Telephone Number	Preparation Date

Chapter 12

Personal Protective Equipment (PPE)

Policy

It is the policy of ***Dan-Ex Contracting Ltd.*** to ensure that all work practices and job hazards are evaluated for potential injury. This evaluation shall determine the appropriate personal protective equipment required for the job.

The following list of personal protective equipment (PPE) is available to all employees and shall be used as required by Federal, Provincial, or Local regulations:

safety glasses & hearing protection.

Employees can request PPE equipment from ***Jay Firman***.

Workers shall adhere to the following:

- Use the correct PPE for each job assignment. If you do not know, ask.
- PPE shall be maintained in good condition and cleaned regularly.
- PPE shall be stored properly when not in use to protect it from damage.
- Damaged or broken PPE must be returned to your foreman for replacement.
- Hard hats must be worn on job sites at all times.
- CSA or ANSI approved safety glasses must be worn when working with power tools, compressed air or gasses, chemicals or any other item that creates an eye injury hazard.
- Face shields with safety glasses are recommended when grinding or working with hazardous chemicals.
- Employees must wear industrial work shoes in the shop and on the job site. The shoes must have complete leather uppers and skid resistant soles and be in good condition. Steel toe protection is recommended.
- Athletic style shoes, tennis shoes, open toe shoes, plastic or vinyl shoes or shoes with decorative accessories are not allowed.
- Hearing protectors must be worn when working with loud equipment such as cut off saws, chain saws, air hammers or grinders.
- Be sure the protective clothing you wear will not hamper or restrict freedom of movement due to improper fit.
- Long pants of heavy-duty material must be worn. No shorts or sweat pants are allowed.
- Do not wear loose, torn or frayed clothing, dangling ties, finger rings, dangling earrings, jewellery items, or long hair unless contained in a hair net, while operating any machine that could cause entanglement.
- If required, wear NIOSH approved respirators when applying adhesives, paint, welding, grinding or working with chemicals. Read the MSDS to find out which types of respirators are required. Facial hair may not be permitted in certain circumstances.

Training

Employees shall be trained to know at least the following:

- When PPE is necessary.
- What PPE is necessary.
- How to properly put on, take off, adjust and wear the PPE.
- The limitations of the PPE.
- Proper care, maintenance, useful life and disposal of PPE.
- Each employee shall be able to demonstrate an understanding of the PPE training as well as the ability to properly wear and use PPE before they are allowed to perform work requiring the use of the PPE.

Additional Training

Additional or retraining of employees include the following circumstances: changes in the workplace or in the type of required PPE that make prior training obsolete.

All training will be documented

Selecting PPE

OHS requires PPE to meet the following CSA or ANSI standards:

- Eye and Face Protection: CSA Standard CAN/CSA-Z94.3-92
- Head Protection: CSA Standard CAN/CSA-Z94.1-92
- Foot Protection: CSA Standard CAN/CSA-Z195-M92
- Gloves shall be selected based upon the tasks to be performed and the performance and construction characteristics of the glove material. For protection against chemicals, glove selection must be based on the chemicals encountered, the chemical resistance and the physical properties of the glove material.

Eye and Face Protection

Employees can be exposed to a large number of hazards that pose danger to their eyes and face. OHS requires employers to ensure that employees have appropriate eye or face protection if they are exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapours, potentially infected material or potentially harmful light radiation.

Many occupational eye injuries occur because workers are not wearing any eye protection while others result from wearing improper or poorly fitting eye protection. Employers must be sure that their employees wear appropriate eye and face protection and that the selected form of protection is appropriate to the work being performed and properly fits each worker exposed to the hazard.

Prescription Lenses

Everyday use of prescription corrective lenses will not provide adequate protection against most occupational eye and face hazards, so employers must make sure that employees with corrective lenses either wear eye protection that incorporates the prescription into the design or wear additional eye protection over their prescription lenses. It is important to ensure that the protective eyewear does not disturb the proper positioning of the prescription lenses so that the employee's vision will not be inhibited or limited. Also, employees who wear contact lenses must wear eye or face PPE when working in hazardous conditions.

Eye Protection for Exposed Workers

OHS suggests that eye protection be routinely considered for use by carpenters, electricians, machinists, mechanics, millwrights, plumbers and pipefitters, sheet metal workers and tinsmiths, assemblers, sanders, grinding machine operators, sawyers, welders, labourers, chemical process operators and handlers, and timber cutting and logging workers. Employers of workers in other job categories should decide whether there is a need for eye and face PPE through a hazard assessment.

Examples of potential eye or face injuries include:

- Dust, dirt, metal or wood chips entering the eye from activities such as chipping, grinding, sawing, hammering, the use of power tools or even strong wind forces.
- Chemical splashes from corrosive substances, hot liquids, solvents or other hazardous solutions.
- Objects swinging into the eye or face, such as tree limbs, chains, tools or ropes.
- Radiant energy from welding, harmful rays from the use of lasers or other radiant light (as well as heat, glare, sparks, splash and flying particles).

Some of the most common types of eye and face protection include:

Class 1 Safety spectacles— These protective eyeglasses have safety frames constructed of metal or plastic and impact-resistant lenses. Side shields are available on some models. CSA Standard Z94.3-99 requires that Class 1 spectacles incorporate side protection.

Class 2 Goggles —There are two types of goggles — eyecup and cover. Both must meet the CSA Z94.3-99 Standard for Class 2 eyewear. These are tight-fitting eye protection that completely cover the eyes, eye sockets and the facial area immediately surrounding the eyes and provide protection from impact, dust and splashes. Some goggles will fit over corrective lenses

Class 3 Welding Helmets —This class provides radiation and impact protection for face and eyes. There are two types of welding helmets available — the stationary plate helmet and the lift-front or flip-up plate helmet. There are also special models incorporating earmuff sound arrestors and air purification systems. Special magnifying lens plates manufactured to fixed powers are available for workers requiring corrective lenses.

Class 4 Welding Hand Shields — Welding hand shields are designed to give radiation and impact protection for the face and eyes. **NOTE:** With welding helmets and hand shields, the user is continually lifting and lowering the visor. To protect the eyes when the visor is lifted, Class 1 spectacles should be worn underneath.

Class 5 Hoods — Non-rigid helmets or hoods come with impact-resistant windows usually made of plastic. An air-supply system may also be incorporated. Hoods may be made of nonrigid material for use in confined spaces and of collapsible construction for convenience in carrying and storing. Hood types include: **5A** with impact-resistant window, **5B** for dust, splash, and abrasive materials protection; **5C** with radiation protection, **5D** for high-heat applications.

Class 6 - Face shields are just what the name implies—a device that includes a transparent window or visor to shield the face and eyes from impact, splash, heat, or glare. With face shields, as with welding helmets and hand shields, the user is continually lifting and lowering the visor. To protect the eyes when the visor is lifted, Class 1 spectacles should be worn underneath. Face shields may also be equipped with an adjustable spark deflector or brow guard that fits on the worker's hard hat. Shaded windows are also available to provide various degrees of glare reduction; however, they do not meet the requirements of CSA Standard Z94.3-99 Industrial Eye and Face

Protectors for ultraviolet and total heat protection and should not be used in situations where any hazard is present from ultraviolet or infra-red radiation. This class includes: **6A** for impact and splash protection, **6B** for radiation protection, **6C** for high-heat applications.

Class 7 - Respirator Face pieces – This class includes: **7A** for impact and splash protection, **7B** for radiation protection, **7C** with loose-fitting hoods or helmets, **7D** with loose-fitting hoods or helmets for radiation protection.

Welding Operations

The intense light associated with welding operations can cause serious and sometimes permanent eye damage if operators do not wear proper eye protection. The intensity of light or radiant energy produced by welding, cutting or brazing operations varies according to a number of factors including the task producing the light, the electrode size and the arc current.

Head Protection

Protecting employees from potential head injuries is a key element of any safety program. A head injury can impair an employee for life or it can be fatal. Wearing a safety helmet or hard hat is one of the easiest ways to protect an employee's head from injury. Hard hats can protect employees from impact and penetration hazards as well as from electrical shock and burn hazards.

Employers must ensure that their employees wear head protection if any of the following apply:

- Objects might fall from above and strike them on the head.
- They might bump their heads against fixed objects, such as pipes or beams.
- There is a possibility of accidental head contact with electrical hazards.

Some examples of occupations in which employees should be required to wear head protection include construction workers, carpenters, electricians, linemen, plumbers and pipefitters, timber and log cutters, and welders, among many others. Whenever there is a danger of objects falling from above, such as working below others who are using tools or working under a conveyor belt, head protection must be worn. Hard hats must be worn with the bill forward to protect employees properly.

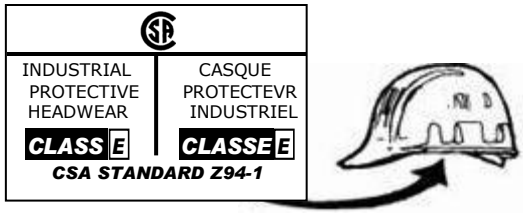
In general, protective helmets or hard hats should do the following:

- Resist penetration by objects.
- Absorb the shock of a blow.
- Be water-resistant and slow burning.
- Have clear instructions explaining proper adjustment and replacement of the suspension and headband. Hard hats must have a hard outer shell and a shock-absorbing lining that incorporates a headband and straps that suspend the shell from 25 to 31.25 mm (1 to 1 1/4 inches) away from the head. This type of design provides shock absorption during an impact and ventilation during normal wear.

Types of Hard Hats

There are many types of hard hats available in the marketplace today. In addition to selecting protective headgear that meets CSA standard requirements, employers should ensure that employees wear hard hats that provide appropriate protection against potential workplace hazards. It is important for employers to understand all potential hazards when making this selection, including electrical hazards. This can be done through a comprehensive hazard analysis and an awareness of the different types of protective headgear available.

CSA label, stamped into the shell, indicating Class E hard hat



Hard hats are divided into three industrial classes:

- Class G hard hats provide impact and penetration resistance along with limited voltage protection (up to 2,200 volts).
- Class E hard hats provide the highest level of protection against electrical hazards, with high-voltage shock and burn protection (up to 20,000 volts). They also provide protection from impact and penetration by flying/falling objects.
- Class C hard hats provide lightweight comfort and impact protection but offer no protection from electrical hazards.

Note: At the present time, the following classes of hard hats are in compliance with the regulation.

Class B – manufactured and tested in accordance with CSA Standard Z94.1-1977

Class B – manufactured and tested in accordance with ANSI Z89.1-1986

Type I, Class E – manufactured and tested in accordance with ANSI Z89.1-1997.

Class E – manufactured and tested in accordance with CSA Standard Z94.1-1992

Type II, Class E – manufactured and tested in accordance with ANSI Z89.1-1997.

Size and Care Considerations

Head protection that is either too large or too small is inappropriate for use, even if it meets all other requirements. Protective headgear must fit appropriately on the body and for the head size of each individual. Most protective headgear comes in a variety of sizes with adjustable headbands to ensure a proper fit (many adjust in 3mm (1/8-inch) increments). A proper fit should allow sufficient clearance between the shell and the suspension system for ventilation and distribution of an impact. The hat should not bind, slip, fall off or irritate the skin.

Some protective headgear allows for the use of various accessories to help employees deal with changing environmental conditions, such as slots for earmuffs, safety glasses, face shields and mounted lights. Optional brims may provide additional protection from the sun and some hats have channels that guide rainwater away from the face. Protective headgear accessories must not compromise the safety elements of the equipment.

Periodic cleaning and inspection will extend the useful life of protective headgear. A daily inspection of the hard hat shell, suspension system and other accessories for holes, cracks, tears or other damage that might compromise the protective value of the hat is essential. Paints, paint thinners and some cleaning agents can weaken the shells of hard hats and may eliminate electrical resistance. Consult the helmet manufacturer for information on the effects of paint and cleaning materials on their hard hats.

Never drill holes, paint or apply labels to protective headgear as this may reduce the integrity of the protection. Do not store protective headgear in direct sunlight, such as on the rear window shelf of a car, since sunlight and extreme heat can damage them.

Helmets with any of the following defects should be immediately replaced:

- Perforation, cracking, or deformity of the brim or shell;
- Indication of exposure of the brim or shell to heat, chemicals or ultraviolet light and other radiation (in addition to a loss of surface gloss, such signs include chalking or flaking). It is a good idea to always replace a hard hat if it sustains an impact, even if damage is not noticeable. Suspension systems are offered as replacement parts and should be replaced when damaged or when excessive wear is noticed. It is not necessary to replace the entire hard hat when deterioration or tears of the suspension systems are noticed.

Foot and Leg Protection

Employees who face possible foot or leg injuries from falling or rolling objects, or from crushing or penetrating materials, should wear protective footwear. Also, employees whose work involves exposure to hot substances or corrosive or poisonous materials must have protective gear to cover exposed body parts, including legs and feet. If an employee's feet may be exposed to electrical hazards, non-conductive footwear should be worn. On the other hand, workplace exposure to static electricity may necessitate the use of conductive footwear.

Situations where an employee should wear foot and/or leg protection include:

- When heavy objects or tools might roll onto or fall on the employee's feet.
- Working with sharp objects such as nails or spikes that could pierce the soles or uppers of ordinary shoes.
- Exposure to molten metal that might splash on feet or legs.
- Working on or around hot, wet or slippery surfaces.
- Working when electrical hazards are present.

Safety footwear must meet CSA or ANSI minimum compression and impact performance standards. Check the product's labelling or consult the manufacturer to make sure the footwear will protect the user from the hazards they face.

Foot and leg protection choices include the following:

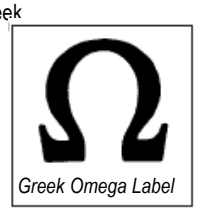
- Leggings protect the lower legs and feet from heat hazards such as molten metal or welding sparks. Safety snaps allow leggings to be removed quickly.
- Metatarsal guards protect the instep area from impact and compression. Made of aluminum, steel, fibre or plastic, these guards may be strapped to the shoes.
- Toe guards fit over the toes of regular shoes to protect the toes from impact and compression hazards. They may be made of steel, aluminum or plastic. Combination foot and shin guards protect the lower legs and feet, and may be used in combination with toe guards when greater protection is needed.
- Safety shoes have impact-resistant toes and heat-resistant soles that protect the feet against hot work surfaces common in roofing, paving and hot metal industries. The metal insoles of some safety shoes protect against puncture wounds. Safety shoes may also be designed to be electrically conductive to prevent the buildup of static electricity in areas with the potential for explosive atmospheres or nonconductive to protect workers from workplace electrical hazards.

Special Purpose Shoes

Electrically conductive shoes provide protection against the buildup of static electricity. Employees working in explosive and hazardous locations such as explosives manufacturing facilities or grain elevators must wear conductive shoes to reduce the risk of static electricity buildup on the body that could produce a spark and cause an explosion or fire. Foot powder should not be used in conjunction with protective conductive footwear because it reduces the conductive ability of the shoes.

Silk, wool and nylon socks can produce static electricity and should not be worn with conductive footwear. Conductive shoes must be removed when the task requiring their use is completed.

A white label with the Greek letter Omega in orange indicates protection against electric shock under dry conditions.



Greek Omega Label

Note: Employees exposed to electrical hazards must never wear conductive shoes.

Electrical hazard, safety-toe shoes are nonconductive and will prevent the wearers' feet from completing an electrical circuit to the ground. These shoes can protect against open circuits of up to 600 volts in dry conditions and should be used in conjunction with other insulating equipment and additional precautions to reduce the risk of a worker becoming a path for hazardous electrical energy. The insulating protection of electrical hazard, safety-toe shoes may be compromised if the shoes become wet, the soles are worn through, metal particles become embedded in the sole or heel, or workers touch conductive, grounded items.

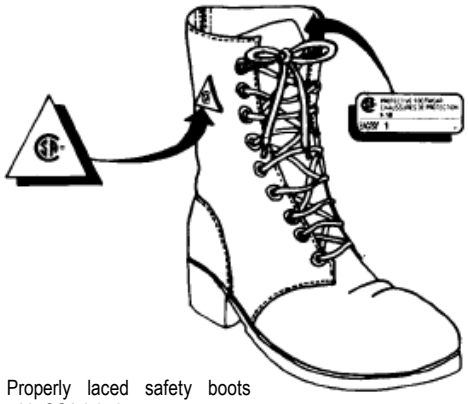
Note: Nonconductive footwear must not be used in explosive or hazardous locations.

Foundry Shoes

In addition to insulating the feet from the extreme heat of molten metal, foundry shoes keep hot metal from lodging in shoe eyelets, tongues or other shoe parts. These snug-fitting leather or leather-substitute shoes have leather or rubber soles and rubber heels. All foundry shoes must have built-in safety toes.

Care of Protective Footwear

As with all protective equipment, safety footwear should be inspected prior to each use. Shoes and leggings should be checked for wear and tear at reasonable intervals. This includes looking for cracks or holes, separation of materials, broken buckles or laces. The soles of shoes should be checked for pieces of metal or other embedded items that could present electrical or tripping hazards.



Properly laced safety boots with CSA labels

Hand and Arm Protection

If a workplace hazard assessment reveals that employees face potential injury to hands and arms that cannot be eliminated through engineering and work practice controls, employers must ensure that employees wear appropriate protection. Potential hazards include skin absorption of harmful substances, chemical or thermal burns, electrical dangers, bruises, abrasions, cuts, punctures, fractures and amputations. Protective equipment includes gloves, finger guards and arm coverings or elbow-length gloves.

Employers should explore all possible engineering and work practice controls to eliminate hazards and use PPE to provide additional protection against hazards that cannot be completely eliminated through other means.

Types of Protective Gloves

There are many types of gloves available today to protect against a wide variety of hazards. The nature of the hazard and the operation involved will affect the selection of gloves. The variety of potential occupational hand injuries makes selecting the right pair of gloves challenging.

It is essential that employees use gloves specifically designed for the hazards and tasks found in their workplace because gloves designed for one function may not protect against a different function even though they may appear to be an appropriate protective device.

Factors that may influence the selection of protective gloves for a workplace:

- Type of chemicals handled.
- Nature of contact (total immersion, splash, etc.).
- Duration of contact.
- Thermal protection.
- Area requiring protection (hand only, forearm, arm).
- Grip requirements (dry, wet, oily).
- Size and comfort.
- Abrasion/resistance requirements.

Gloves made from a wide variety of materials are designed for many types of workplace hazards. In general, gloves fall into four groups:

1. Gloves made of leather, canvas or metal mesh.
2. Fabric and coated fabric gloves.
3. Chemical- and liquid-resistant gloves.
4. Insulating rubber gloves.

Leather, Canvas or Metal Mesh Gloves

Sturdy gloves made from metal mesh, leather, or canvas provide protection against cuts and burns. Leather or canvass gloves also protect against sustained heat. Leather gloves protect against sparks, moderate heat, blows, chips and rough objects.

- Aluminized gloves provide reflective and insulating protection against heat and require an insert made of synthetic materials to protect against heat and cold.
- Aramid fibre gloves protect against heat and cold, are cut- and abrasive-resistant and wear well.
- Synthetic gloves of various materials offer protection against heat and cold are cut- and abrasive-resistant and may withstand some diluted acids. These materials do not stand up against alkalis and solvents.

Fabric and Coated Fabric Gloves

Fabric and coated fabric gloves are made of cotton or other fabric to provide varying degrees of protection.

- Fabric gloves protect against dirt, slivers, chafing and abrasions. They do not provide sufficient protection for use with rough, sharp or heavy materials. Adding a plastic coating will strengthen some fabric gloves.

- Coated fabric gloves are normally made from cotton flannel with napping on one side. By coating the unnapped side with plastic, fabric gloves are transformed into general-purpose hand protection offering slip-resistant qualities.

These gloves are used for tasks ranging from handling bricks and wire to chemical laboratory containers. When selecting gloves to protect against chemical exposure hazards, always check with the manufacturer or review the manufacturer's product literature to determine the gloves' effectiveness against specific workplace chemicals and conditions.

Chemical- and Liquid-Resistant Gloves

Chemical-resistant gloves are made with different kinds of rubber: natural, butyl, neoprene, nitrile and fluorocarbon (viton); or various kinds of plastic: polyvinyl chloride (PVC), polyvinyl alcohol and polyethylene. These materials can be blended or laminated for better performance. As a general rule, the thicker the glove material, the greater the chemical resistance but thick gloves may impair grip and dexterity, having a negative impact on safety.

Some examples of chemical-resistant gloves include:

- Butyl gloves are made of a synthetic rubber and protect against a wide variety of chemicals, such as peroxide, rocket fuels, highly corrosive acids (nitric acid, sulphuric acid, hydrofluoric acid and red-fuming nitric acid), strong bases, alcohols, aldehydes, ketones, esters, and nitro compounds. Butyl gloves also resist oxidation, ozone corrosion and abrasion, and remain flexible at low temperatures. Butyl rubber does not perform well with aliphatic and aromatic hydrocarbons and halogenated solvents.
- Natural (latex) rubber gloves are comfortable to wear, which makes them a popular general-purpose glove. They feature outstanding tensile strength, elasticity and temperature resistance. In addition to resisting abrasions caused by grinding and polishing, these gloves protect workers' hands from most water solutions of acids, alkalis, salts and ketones. Latex gloves have caused allergic reactions in some individuals and may not be appropriate for all employees. Hypoallergenic gloves, glove liners and powderless gloves are possible alternatives for workers who are allergic to latex gloves.
- Neoprene gloves are made of synthetic rubber and offer good pliability, finger dexterity, high density and tear resistance. They protect against hydraulic fluids, gasoline, alcohols, organic acids and alkalis. They generally have chemical and wear resistance properties superior to those made of natural rubber.
- Nitrile gloves are made of a copolymer and provide protection from chlorinated solvents such as trichloroethylene and perchloroethylene. Although intended for jobs requiring dexterity and sensitivity, nitrile gloves stand up to heavy use even after prolonged exposure to substances that cause other gloves to deteriorate. They offer protection when working with oils, greases, acids, caustics and alcohols but are generally not recommended for use with strong oxidizing agents, aromatic solvents, ketones and acetates.

Care of Protective Gloves

Protective gloves should be inspected before each use to ensure that they are not torn, punctured or made ineffective in any way. A visual inspection will help detect cuts or tears but a more thorough inspection by filling the gloves with water and tightly rolling the cuff towards the fingers will help reveal any pinhole leaks. Gloves that are discoloured or stiff may also indicate deficiencies caused by excessive use or degradation from chemical exposure. Any gloves with impaired protective ability should be discarded and replaced. Reuse of chemical-resistant gloves should be evaluated carefully, taking into consideration the absorptive qualities of the gloves. A decision to reuse chemically-

exposed gloves should take into consideration the toxicity of the chemicals involved and factors such as duration of exposure, storage and temperature.

Body Protection

Employees who face possible bodily injury of any kind that cannot be eliminated through engineering, work practice or administrative controls, must wear appropriate body protection while performing their jobs. In addition to cuts and radiation, the following are examples of workplace hazards that could cause bodily injury:

- Temperature extremes.
- Hot splashes from molten metals and other hot liquids.
- Potential impacts from tools, machinery and materials.
- Hazardous chemicals.

There are many varieties of protective clothing available for specific hazards. Employers are required to ensure that their employees wear personal protective equipment only for the parts of the body exposed to possible injury. Examples of body protection include laboratory coats, coveralls, vests, jackets, aprons, surgical gowns and full body suits.

Protective clothing comes in a variety of materials, each effective against particular hazards, such as:

- Paper-like fibre used for disposable suits protects against dust and splashes.
- Treated wool and cotton adapts well to changing temperatures, is comfortable, fire-resistant, and protects against dust, abrasions and irritating surfaces.
- Duck is a closely woven cotton fabric that protects against cuts and bruises when handling heavy, sharp or rough materials.
- Leather is often used to protect against dry heat and flames.
- Rubber, rubberized fabrics, neoprene and plastics protect against certain chemicals and physical hazards. When chemical or physical hazards are present, check with the clothing manufacturer to ensure that the material selected will provide protection against the specific hazard.

Hearing Protection

Determining the need to provide hearing protection for employees can be challenging. Employee exposure to excessive noise depends upon a number of factors, including:

- The loudness of the noise as measured in decibels (dB).
- The duration of each employee's exposure to the noise.
- Whether employees move between work areas with different noise levels.
- Whether noise is generated from one or multiple sources.

Generally, the louder the noise, the shorter the exposure time before hearing protection is required. For instance, employees may be exposed to a noise level of 90 dB for 8 hours per day (unless they experience a Standard Threshold Shift) before hearing protection is required. On the other hand, if the noise level reaches 115 dB hearing protection is required if the anticipated exposure exceeds 15 minutes.

Noises are considered continuous if the interval between occurrences of the maximum noise level is one second or less. Noises not meeting this definition are considered impact or impulse noises (loud momentary explosions of sound) and exposures to this type of noise must not exceed 140 dB.

Examples of situations or tools that may result in impact or impulse noises are powder-actuated nail guns, a punch press or drop hammers.

If engineering and work practice controls do not lower employee exposure to workplace noise to acceptable levels, employees must wear appropriate hearing protection. It is important to understand that hearing protectors reduce only the amount of noise that gets through to the ears. The amount of this reduction is referred to as attenuation, which differs according to the type of hearing protection used and how well it fits. Hearing protectors worn by employees must reduce an employee's noise exposure to within the acceptable limits.

Manufacturers of hearing protection devices must display the device's NRR on the product packaging. If employees are exposed to occupational noise at or above 85 dB averaged over an eight hour period, the employer is required to institute a hearing conservation program.

Some types of hearing protection include:

- Single-use earplugs are made of waxed cotton, foam, silicone rubber or fibreglass wool. They are self-forming and, when properly inserted, they work as well as most molded earplugs.
- Pre-formed or molded earplugs must be individually fitted by a professional and can be disposable or reusable. Reusable plugs should be cleaned after each use.
- Earmuffs require a perfect seal around the ear. Glasses, facial hair, long hair or facial movements such as chewing may reduce the protective value of earmuffs.

OHS requires that employers protect their employees from workplace hazards that can cause injury. Controlling a hazard at its source is the best way to protect employees. Depending on the hazard or workplace conditions, OHS recommends the use of engineering or work practice controls to manage or eliminate hazards to the greatest extent possible. When engineering, work practice and administrative controls are not feasible or do not provide sufficient protection, employers must provide PPE to their employees and ensure its use.

Notes:

Chapter 13

Ladder & Stairway Safety Plan

Glenn Willesen is responsible for the implementation and enforcement of the following safety rules as they apply to ladder & stairway safety.

Dan-Ex Contracting Ltd. shall ensure that each employee has been trained by a competent person in the following areas:

- The nature of all fall hazards in the work area.
- The maximum intended load-carrying capacities of ladders and the correct procedures for erecting, maintaining, and disassembling the fall protection systems to be used.
- The proper construction, use, placement, and care in handling of all stairways and ladders.

Proper Use of Ladders

The following general safety rules shall be utilized:

- Ladders should be set up on a firm level surface. If the base is to rest on soft, un-compacted or rough soil, a mud sill should be used. Portable ladders should be equipped with non-slip bases.
- Ladders should be tied off or otherwise secured to prevent movement.
- When a task must be performed with the worker standing on an extension ladder, the length of the ladder should be such that the worker stands on a rung no higher than the second from the top.
- When climbing up or down, workers should always face the ladder.
- Ladders should not be erected on boxes, carts, tables, scaffold platforms, elevated platforms or on vehicles.
- Ladders shall be set up 30 cm/1 foot out for every 90 cm or 120 cm/3 or 4 feet up.
- Metal ladders, or ladders with wire reinforcements, shall not be used near energized electrical conductors.
- All ladders erected between levels must be securely fastened, extend 90 centimetres (3 feet) above the top landing and afford clear access at top and bottom.
- Ladders with weakened, broken, bent or missing steps, broken or bent side rails, broken, damaged or missing non-slip bases or otherwise defective parts shall not be used and should be tagged and removed from the site.
- Ladders should not be used horizontally as substitutes for scaffold planks, runways or any other service for which they have not been designed.
- Workers on a ladder should not straddle the space between the ladder and another object.
- Three points of contact should always be maintained when climbing up or down a ladder (two feet and one hand or one foot and two hands).

Training

All ***Dan-Ex Contracting Ltd.*** employees required to use ladders shall be trained in their proper use and safety.

- The nature of fall hazards in the work area
- How to correctly use, place, handle, and maintain ladders
- The maximum load-carrying capacities of ladders used
- OHS requirements for the types of ladders that will be used

Working from Ladders

A worker must wear a safety belt or safety harness with the lanyard tied off to either a fixed support or a lifeline whenever the worker is:

- 3 metres (10 feet) or more above the floor; or
- above operating machinery; or
- above hazardous substances or objects

Workers can reduce ladder fall risks by doing the following:

- Frequently inspect & maintain ladders.
- Match tasks to appropriate ladders.
- Set up ladders correctly.
- Climb & descend ladders properly

Rating	***Working Load***
Extra heavy duty (I-A)	136 kg
Heavy duty (I)	113 kg
Medium duty (II)	102 kg
Light duty (III)	91 kg

Using Ladders

At the Beginning of Each Job

- Select the appropriate ladder for your task or job.
- Inspect the ladder before you use it. Make sure it is in sound condition — clean and undamaged.

Placing a Ladder

- Move the ladder near the work you are doing.
- Angle the ladder properly. The base should extend not less than one-fourth the ladder's length. The minimum slope should be 50 degrees.
- Place a solid rest for the rail tops across window openings.
- Protect the base of a tall, occupied ladder if it could be struck by vehicles or pedestrians.

Avoid

- Never place a ladder in front of an unlocked, unguarded door.
- Never place a ladder on boxes, tables, trucks, or other moveable objects.

Securing a Ladder

- Nail or lash a ladder in place if it will be used repeatedly in the same spot.
- Select a ladder that will extend at least 1 metre above the access area it is serving.

Avoid

- Working on ladders in exposed areas during a severe storm or strong wind.
- Working on ladders covered with ice or snow.

- Using a portable ladder if an approved stairway could be used instead.

Ascending and Descending

- Face the ladder at all times.
- Grasp the side rails with both hands; you have a better chance of avoiding a fall if a rung or step fails.
- Raise and lower heavy, awkward loads with a hand line or hoist.
- Attach light, compact tools or materials to the ladder or to yourself.

Avoid

- Sliding down the ladder.
- Climbing when your hands or shoes are slippery.
- Using your hands for carrying items.
- Carrying awkward loads when ascending or descending a ladder.
- Placing tools or materials on a ladder if they could fall off.

Metal Ladders

- Make sure steps and rungs have a skid-resistant surface that minimizes the risk of slipping. ("Skid resistant" means corrugated, knurled, dimpled, or coated with skid-resistant material.)

Avoid

- Using any ladder with conductive side rails near exposed, energized equipment. (Such ladders must be permanently, legibly marked with the words, ***"WARNING — Do Not Use Around Energized Electrical Equipment."***)

Precautions

- Place both feet firmly on the ladder rungs and steps.
- Make sure only one person stands on, or works from, a standard ladder. (Use a scaffold or a second ladder if two or more people are doing the same task.)
- Immediately inspect any ladder that has collapsed, tipped over, or been exposed to oil or grease. Clean and repair the ladder if necessary.
- Remove defective ladders from service. Tag or mark defective ladders with the words: ***"Dangerous, Do Not Use."***
- Make sure an extension ladder extends at least 1 metre above an access landing.
- Keep the area around the top and bottom of a ladder free of debris.
- Keep the load on the ladder (including yourself) below its maximum load capacity.

Do Not

- Do not paint ladders. Paint conceals defects. Use transparent preservatives instead.
- Do not use ladders with broken, patched, oily, or cracked rails, rungs, or steps.
- Do not reach out over the side rails, lean, or turn excessively on a ladder.
- Do not use a ladder as guy, brace, or skid.
- Do not stand or sit on the top two steps of a stepladder.
- Do not use a self-supporting ladder without first opening it up and securing the metal spreader or locking device.
- Do not load a ladder beyond its maximum load capacity.

Transporting Ladders

Some ladders are easier to move than others. Here are a few guidelines to help you protect ladders and the people who use them.

- When you hand-carry a ladder, keep the front end elevated, especially around blind corners, in aisles, and through doorways. You will reduce the chance of striking another person with the front of the ladder.
- When you transport a ladder in a truck or trailer, place it parallel to the bed. Avoid tossing, throwing, or dropping it in the bed.
- If you transport a long ladder on a short truck bed over long distances, support the ladder so it will not sag or bend.
- Drive slowly over rough terrain. Tie the ladder securely to eliminate nicking, gouging, chafing, and road shock.

Storing Ladders

- The storage area should be well ventilated.
- Wood ladders should not be exposed to moisture or excessive heat. Avoid storing ladders near stoves, steam pipes, or radiators.
- Store straight or extension ladders in flat racks or on wall brackets. Make sure there are enough brackets to support the ladder so that it does not sag. If the ladder rails have a lateral curve, the wall brackets should match the curve.
- Store stepladders vertically, in a closed position, to reduce the risk of sagging or twisting. Secure stored ladders so that they will not tip over if they are struck.
- Store ladders, especially wood ladders, promptly after using them. Exposure to moisture and sun will shorten the life of a wood ladder.

Maintaining and Repairing Ladders

Neglected ladders quickly become unsafe ladders. Step bolts slacken, step sockets and other joints work loose, hole sizes increase — eventually the ladder becomes twisted and unstable.

Periodic maintenance extends a ladder's life and saves replacement costs. Maintenance includes regular inspection of the ladder, repairing damage and tightening step bolts and other fastenings.

- Replace lower steps on wooden ladders when one-fourth of the step surface is worn away. Typically, the centre of a step receives the most wear. (Mineral abrasive or other skid-resistant material reduces wear.)
- Do not use cleats to repair rung ladders.
- Do not paint a wood ladder — paint conceals defects.
- Consider stocking repair parts if you use different types of ladders. Typical parts include ladder bolts, related hardware, and lower steps or rungs (which wear out faster than upper steps or rungs).

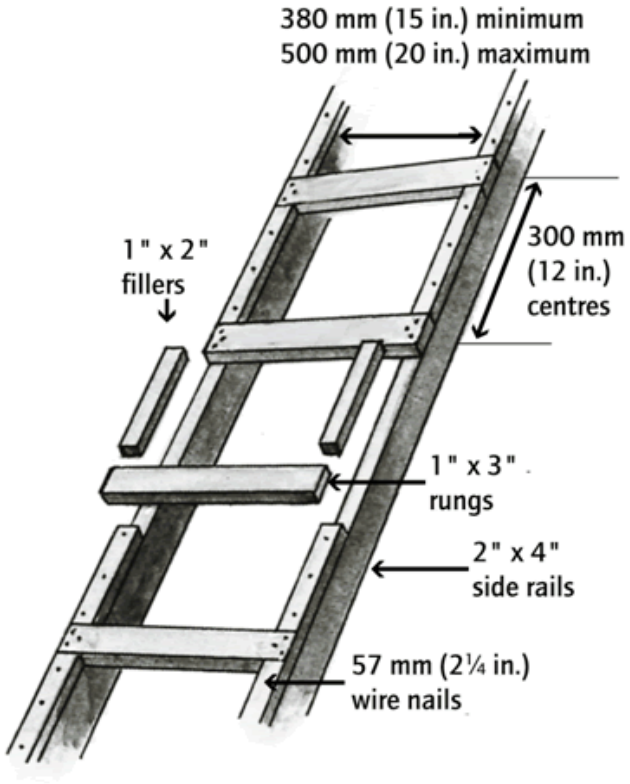
Improving Slip Resistance

Slip-resistant materials are often used on industrial ladder treads. Notable is the anti-slip treatment on metal platform ladders used in file and parts rooms, tool cribs, and frozen-food lockers. The obvious benefit of slip-resistant material is that it reduces fall risks when a worker is climbing or descending.

Job Built Ladder up to 5 m (16 ft.) Long

Design

A portable wooden ladder made at the job site must meet the following minimum requirements.



Side rails

- Side rails must not be longer than 7.3 m (24 ft) and must be at least 38 mm x 89 mm (2 in x 4 in nominal) for lengths up to 5 m (16 ft), and 38 mm x 140 mm (2 in x 6 in nominal) for lengths from 5 m to 7.3 m (16 ft to 24 ft).
- Side rails must not be notched, dapped, tapered or spliced.
- The distance between the inner faces of the side rails must not be less than 38 cm (15 in) nor more than 50 cm (20 in).

Rungs

- Rungs must be at least 19 mm x 64 mm (1 in x 3 in nominal) for ladder lengths up to 5 m (16 ft), and 19 mm x 89 mm (1 in x 4 in nominal) for ladder lengths from 5 m to 7.3 m (16 ft to 24 ft).
- Rungs must be spaced at 30 cm (12 in) centres, and nailed directly onto the smaller surfaces of the side rails, using three 57 mm (2¼ in) wire nails on each end of the 89 mm (4 in) rungs, and two nails on each end of the 64 mm (3 in) rungs.
- The spaces on the side rails between the rungs must be filled with close fitting and well secured filler pieces that are the same thickness as the rungs.
- A double rung ladder must have 3 rails evenly spaced, and be 107 cm to 127 cm (42 in to 50 in) wide, and have continuous rungs which extend the full width of the ladder.

Ladder components and coating

Ladder components made from timber materials must be:

- made from lumber graded Number 2 or better and species to be limited to Douglas fir-larch, hemlock-fir, spruce-pine-fir, or coast Sitka spruce; and graded to National Lumber Grades Authority Standard Grading Rules for Canadian Lumber, or other grading rules acceptable to the board.
- A protective coating applied to a wooden ladder, other than a small amount for identification purposes, must be transparent to allow any defects to be discovered by inspection.

Ladder Inspection Checklist

Y	N	
☐	☐	Are any wooden parts splintered?
☐	☐	Are there any defects in side rails, rungs, or other similar parts?
☐	☐	Are there any missing or broken rungs?
☐	☐	Are there any broken, split, or cracked rails repaired with wire, sheet metal, or other makeshift materials?
☐	☐	Are there any worn, damaged, or missing feet?
☐	☐	Are there any worn, damaged, or unworkable extension ladder locks, pulleys, or other similar fittings?
☐	☐	Is the rope on extension ladders worn, broken, or frayed?
☐	☐	Has the rope on extension ladders been replaced by material inferior to the ladder manufacturer's original rope?
☐	☐	Are the spreader arms on step ladders bent, worn, broken, or otherwise rendered partly or totally ineffective?

If the answer is "YES" to any of the questions on the Inspection Checklist, the ladder should be tagged so that workers will know it is defective and should not be used. It should be taken out of service immediately and placed in a location where it will not be used until repairs are completed.

Safety Requirements for Stairways

Handrails on stairways

Stairs with more than 4 risers must have continuous handrails on

- any open side of the stairway,
- one side of enclosed stairways 112 cm (44 in) or less in width, and
- both sides of enclosed stairways over 112 cm (44 in) wide.
- The top of a handrail must be 76 cm to 92 cm (30 in to 36 in) above the stair tread, measured vertically from the nose of the tread, and the height must not vary on any flight or succession of flights of stairs.
- A handrail on an open side of a stairway must have a midrail located approximately midway between the top of the handrail and the nose of the stair tread.
- A handrail must be able to withstand a load of 1.3 kN (300 lbs) applied vertically or horizontally at any point along the handrail.

Record of Employee Training-Ladder Safety			
Printed Name	**Signature**	**Trainer Signature**	**Date**

Chapter 14

Excavation Procedures

General Policy for Trenching and Excavation

Dan-Ex Contracting Ltd. has adopted the following safety guidelines for safe "Excavation and Trenching" practices.

Mike Mertz is the person responsible for safe excavation procedures. Disciplinary procedures shall be enforced as needed.

Excavating is recognized as one of the most hazardous construction operations. Cave-ins are perhaps the most feared trenching hazard. But other potentially fatal hazards exist, including asphyxiation due to lack of oxygen in a confined space, inhalation of toxic fumes, drowning, etc. Electrocution or explosions can occur when workers contact underground utilities.

The following rules are to be followed at all times by all employees working on, in, or near excavations, as applicable:

- Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.
- Exposure to falling loads. No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped to provide adequate protection for the operator during loading and unloading operations.
- Warning system for mobile equipment. When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.
- Exposure to vehicular traffic. Employees exposed to public vehicular traffic shall be provided with, and shall wear; warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.
- Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.
- Employees are not permitted under loads that are handled by lifting or digging equipment. Employees are not allowed to work in the excavation above other employees unless the lower level employees are adequately protected.

- Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists, or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 1.2 m in depth.
- Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation in accordance with PART 8 British Columbia OHS Regulation.
- When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.
- At least one copy of the design shall be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design shall be made available to compliance officers upon request.
- Guardrails are provided if there are walkways or bridges crossing over an excavation.

Scope and Application of the Policy

This excavation policy applies to all open excavations made in the earth's surface.

- **A trench** is a narrow excavation made below the surface of the ground in which the depth is greater than the width — the width not exceeding 1.5 metres.
- **An excavation** means an excavation less than 3.7 m (12 ft) wide at the bottom, over 1.2 m (4 ft) deep, and of any length.

General Requirements

OHS requires that workers in trenches and excavations be protected, and that Health and Safety programs address the variety of hazards they face. The following hazards cause the most trenching and excavation injuries:

- No Protective System
- Failure to Inspect Trench and Protective Systems
- Unsafe Spoil-Pile Placement
- Unsafe Access/Egress

No Protective System

All excavations are hazardous because they are inherently unstable. If they are restricted spaces they present the additional risks of oxygen depletion, toxic fumes, and water accumulation. If you are not using protective systems or equipment while working in trenches or excavations at your site, you are in danger of suffocating, inhaling toxic materials, fire, drowning, or being crushed by a cave-in.

Methods to Avoid Hazards

Pre-job planning is vital to accident-free trenching; safety cannot be improvised as work progresses. The following concerns must be addressed by a competent worker:

- Evaluate soil conditions and select appropriate protective systems.
- Construct protective systems in accordance with the standard requirements.
- Preplan; contact utilities (gas, electric) to locate underground lines, plan for traffic control if necessary, and determine proximity to structures that could affect choice of protective system.

- Test for low oxygen, hazardous fumes and toxic gases, especially when gasoline engine-driven equipment is running, or the dirt has been contaminated by leaking lines or storage tanks. Insure adequate ventilation or respiratory protection if necessary.
- Provide safe access into and out of the excavation.
- Provide appropriate protections if water accumulation is a problem.
- Inspect the site daily at the start of each shift, following a rainstorm, or after any other hazard-increasing event.
- Keep excavations open the minimum amount of time needed to complete operations.

Failure to Inspect Trench and Protective System

If trenches and excavations at your site are not inspected daily for evidence of possible cave-ins, hazardous atmospheres, failure of protective systems, or other unsafe conditions, you are in danger.

Methods to Avoid Hazards

Inspect excavations:

- Before construction begins.
- Daily before each shift.
- As needed throughout the shift.
- Following rainstorms or other hazard-increasing events (such as a vehicle or other equipment approaching the edge of an excavation).
- Inspections must be conducted by a competent worker who:
- Has training in soil analysis.
- Has training in the use of protective systems.
- Is knowledgeable about the OHS requirements.
- Has authority to immediately eliminate hazards.

Unsafe Spoil-Pile Placement

Excavated materials (spoils) at your site are hazardous if they are set too close to the edge of a trench/excavation. The weight of the spoils can cause a cave-in, or spoils and equipment can roll back on top of workers, causing serious injuries or death.

Methods to Avoid Hazards

Provide protection by one or more of the following:

- Set spoils and equipment at least 60 centimetres (2 ft) back from the excavation.
- Use retaining devices, such as a trench box, which will extend above the top of the trench to prevent equipment and spoils from falling back into the excavation.
- Where the site does not permit a 60 centimetre (2 ft) set back, spoils may need to be temporarily hauled to another location.

Unsafe Access/Egress

To avoid fall injuries during normal entry and exit of a trench or excavation at your job site, ladders, stairways, or ramps are required. In some circumstances, when conditions in a trench or excavation become hazardous, survival may even depend on how quickly you can climb out.

Methods to Avoid Hazards

- Provide stairways, ladders, ramps, or other safe means of egress in all trenches that are 1.2 metres (4 ft) deep or more.
- Position means of egress within 8 lateral metres of workers.
- Structural ramps that are used solely for access or egress from excavations must be designed by a competent worker.
- When two or more components form a ramp or runway, they must be connected to prevent displacement, and be of uniform thickness.
- Cleats or other means of connecting runway components must be attached in a way that would not cause tripping (e.g., to the bottom of the structure).
- Structural ramps used in place of steps must have a non-slip surface.
- Use earthen ramps as a means of egress only if a worker can walk them in an upright position, and only if they have been evaluated by a competent person.

Planning for Safety

Many on-the-job accidents are a direct result of inadequate initial planning. Correcting mistakes in shoring or sloping after work has begun slows the operation, adds to costs, and increases the possibility of an excavation failure (cave-in). Contractors must build safety into pre-bid planning. Developing safety checklists specific to each job will help accomplish this.

The following specific site conditions should be considered before preparing a bid:

- Traffic
- The Water Table
- Soil
- Surface and Groundwater
- Nearness of Structures and their Condition
- Overhead and Underground Utilities

Services such as gas, electrical, telephone, and water lines must be located by the utility before excavation begins.

The contractor responsible for the work must contact the owners of any underground utilities that may be in that location or phone BC One Call. Request locates for all the underground utilities in the area where excavation will be taking place.

The service locate provided by the utility owner should indicate, using labelled stakes, flags, and/or paint marks, the centre line of the underground utility in the vicinity of the proposed excavation.

The excavator should not work outside of the area covered by the locate stakeout information without obtaining an additional stakeout.

Locate stakeout accuracy should be considered to be 1 metre on either side of the surface centre line locate unless the locate instructions specifically indicate other boundary limits.

Where the underground utility cannot be located within the locate stakeout limits, the utility owner should be contacted to assist with the locate.

Mechanical excavation equipment should not be used within the boundary limits of the locate without first digging a hole or holes using the procedure below to determine the underground utility's exact centre line and elevation.

Test holes should, in general, be excavated by one of the following methods:

- machine excavation immediately outside the boundary limits and then hand digging laterally until the underground utility is found; or
- **(i)** hand excavation perpendicular to the centre line of the locate in cuts of at least 1 foot in depth; **(ii)** mechanical equipment can then be used carefully to widen the hand-dug trench to within one foot of the depth of the hand-dug excavation; **(iii)** repeat steps (i) and (ii) until the utility is located; or
- a hydro-excavation system – acceptable to the owner of the utility – which uses high-pressure water to break up the cover material and a vacuum system to remove it can be used to locate the underground utility.
- Centre line locates should be provided and test holes dug where a representative of the utility identifies
  - alignment changes
  - changes in elevation.

Where an underground utility may need support or where it may shift because of disturbance of surrounding soil due to excavation, guidelines for excavation and support should be obtained from the owner of the utility.

When all necessary, specific information about the job site is assembled, the contractor can determine the amount, kind, and cost of the safety equipment needed.

A careful inventory of safety items on hand should be made before deciding what additional material must be acquired. No matter how many trenching, shoring, and backfilling jobs have been done in the past, each job must be approached with great care and preparation.

Before Starting the Job

Before beginning work, employers must provide employees exposed to vehicular traffic with warning vests or other suitable garments marked with or made of reflectorized or high-visibility material and ensure that they wear them. Workers must also be instructed to remove or neutralize surface obstacles that may create hazards.

No employee should operate equipment without being properly trained and alert to potential hazards. In training and in the worksite Health and Safety program, it also is important to include procedures for fast notification and investigation of accidents.

On-the-Job Evaluation

The OHS Regulation requires that a competent worker inspect excavations and adjacent areas at least daily for possible cave-ins, failures of protective systems and equipment, hazardous atmospheres, or other hazardous conditions. If these conditions are encountered, exposed employees must be removed from the hazardous area until neces-sary safety precautions have been taken. Inspections are also required after heavy rains or man-made events such as blasting that may increase the potential for hazards.

Larger and more complex operations should have a full-time safety person who makes recommendations to improve implementation of the safety plan. In smaller operations, the safety person may be part-time and will usually be a supervisor.

Supervisors are the contractor's representatives on the job. They should conduct inspections, investigate accidents, anticipate hazards, and ensure that employees receive on-the-job Health and Safety training. They must also review and strengthen overall Health and Safety precautions to guard against potential hazards, get necessary worker cooperation in safety matters, and report frequently to the contractor.

Managers and supervisors must set the example for safety at the job site. When visiting job sites, all managers must wear prescribed personal protective equipment such as safety shoes, safety glasses, hardhats, and other necessary gear.

Employees must also take an active role in job safety. The contractor and supervisor must make certain that workers have been properly trained in the use and fit of protective gear and equipment, that they are wearing and using the equipment correctly, and that they are using safe work practices.

Cave-Ins and Protective Support Systems

Support systems

Excavation workers are exposed to many hazards, but the chief hazard is cave-ins. Employees must be protected by sloping or benching the sides of the excavation, supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area.

All deep excavations must be protected by a system designed by a professional engineer. Before any sloping, benching, or support system is selected, the excavation soil type must be classified by a competent person.

Designing or selecting a protective system can be complex because of the number of factors involved — soil classification, depth of cut, water content of soil, changes due to weather and climate, or other operations in the vicinity.

The OHS Regulation, however, provides four methods each for sloping and shoring, including the use of shields to provide the required level of protection against cave-ins.

One method of ensuring the Health and Safety of workers in an excavation is to slope the sides to an angle not steeper than 1 H: 3 V (34 degrees measured from the horizontal). These slopes must be excavated to form configurations that are in accordance with those for Type C soil. A slope of this gradation or less is considered safe for any type of soil.

A second design method, which can be applied for both sloping and shoring, involves using tabulated data such as tables and charts approved by a registered professional engineer. The data, its limitations, and the selection criteria must be in writing.

At least one copy of the information that includes the identity of the registered professional engineer who approved the data must be kept at the worksite during construction of the protective system. Upon completion of the system, the data may be stored away from the site, but a copy must be made available, upon request, to OHS.

Contractors may also use a trench box or shield designed or approved by a registered professional engineer or based on tabulated data prepared or approved by such an engineer. Timber, aluminum, or other suitable materials may also be used. OHS permits the use of a trench shield as long as the protection it provides is equal to or greater than the protection that would be provided by the appropriate shoring system.

Employers are free to choose the most practical option for the circumstances. Once an option has been selected, however, that system must meet required performance criteria.

Safety Precautions

OHS requires employers to provide support systems such as shoring, bracing, or underpinning to ensure the stability of nearby structures such as buildings, walls, sidewalks, or pavements.

The Standard also prohibits excavation below the level of the base or footing of any foundation or retaining wall unless a support system such as underpinning is provided, the excavation is in stable rock, or a professional engineer determines that the structure

is far enough away from the excavation that the excavation will not pose a hazard to employees.

Excavations under sidewalks and pavements are also prohibited unless an appropriately designed support system is provided, or another effective method is used.

Installation and Removal of Protective Systems

OHS requires the following procedures for the protection of employees when installing support systems:

- Connect support system members securely
- Install support systems safely
- Never overload support system members
- Install other structural members to carry loads imposed on the support system when temporary removal of individual members is necessary

As soon as work is completed, the excavation should be backfilled as the protective system is dismantled. After the excavation has been cleared, workers should slowly remove the protective system from the bottom up, taking care to release members slowly.

Materials and Equipment

The employer is responsible for the safe condition of materials and equipment used for protective systems. Defective and damaged materials and equipment can result in the failure of a protective system and cause excavation hazards.

To avoid possible failure of a protective system, the employer must ensure that:

- Materials and equipment are free from damage or defect.
- Manufactured materials and equipment are used and maintained consistent with manufacturers' recommendations and in a way that prevents employee exposure to hazards.
- Materials and equipment damaged while in operation are examined by a competent person.

If materials and equipment are not safe for use, they must be removed from service. These materials cannot be returned to service without the evaluation and approval of a registered professional engineer.

Other Hazards

Falls and Equipment

In addition to cave-in hazards and secondary hazards related to cave-ins, workers must be protected from other hazards during excavation-related work. These include exposure to falls, falling loads, and mobile equipment.

To protect employees, OHS requires employers to take the following precautions:

- Keep materials or equipment that might fall or roll into an excavation away from the edge of excavations or use retaining devices, or both.
- Provide warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs, to alert operators of the edge of an excavation. If possible, keep the grade away from the excavation.
- Provide scaling to remove loose rock or soil, or install protective barricades and other equivalent protection to protect employees from falling rock, soil, or materials.

- Prohibit employees from working on faces of sloped or benched excavations at levels above other employees unless employees at lower levels are properly protected from falling, rolling, or sliding material or equipment hazards.
- Prohibit employees under loads handled by lifting or digging equipment. To avoid being struck by any spillage or falling materials, require employees to stand away from a vehicle being loaded or unloaded. Operators may remain inside a vehicle if the cab of the vehicle provides adequate protection from falling loads during loading and unloading operation.

Water Accumulation

Employees shall not be permitted to work in excavations where water has built up or is building. If water removal equipment is used to control or prevent water from accumulating equipment operations must be monitored by a competent person to ensure proper use.

Diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering an excavation and to provide adequate drainage of the area adjacent to the excavation. A competent person must inspect excavations subject to runoffs from heavy rains.

Hazardous Atmospheres

A competent person must test excavations, or excavations where oxygen deficiency or a hazardous atmosphere exists or could reasonably be expected to exist, before employees may enter. If hazardous conditions exist, proper respiratory protection or ventilation must be provided. Controls used to reduce atmospheric contaminants to acceptable levels must be tested regularly.

Where adverse atmospheric conditions may exist or develop in an excavation, the employer must provide and ensure that emergency rescue equipment (e.g., breathing apparatus, a safety harness and line, basket stretcher, etc.) is readily available.

When an employee enters bell-bottom pier holes and similar deep and confined footing excavations, the employee must wear a harness with a lifeline. The lifeline must be securely attached to the harness and must be separate from any line used to handle materials. While the employee wearing the lifeline is in the excavation, an observer must ensure that the lifeline is working properly and maintain communication with the employee.

Access and Egress

Employers must provide safe access and egress to all excavations. When employees are in trench excavations the Standard requires adequate means of entry and exit (ladders, steps, ramps, or other safe means of access and egress) within 8 metres of lateral travel. Structural ramps used for employee access or egress must be designed by a competent person. If the ramps are used by vehicles, they must be designed by a competent person qualified in structural design. Also, structural members used for ramps or runways must be uniform in thickness and joined in a manner to prevent tripping or displacement.

Inspections

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Determination of Soil Type

OHS British Columbia categorizes soil and rock deposits into three types.

Type A "Hard and compact" if it closely exhibits most of the following characteristics:

- is hard in consistency and can be penetrated only with difficulty by a small, sharp object.
- it is very dense.
- it appears to be dry.
- it has no signs of water seepage.
- it is extremely difficult to excavate with hand tools.
- if has not been excavated before.

Type B "Likely to crack or crumble" if it closely exhibits most of the following characteristics:

- it has been excavated before but does not exhibit any of the characteristics of "soft, sandy, or loose" soil.
- it is stiff in consistency and compacted.
- it can be penetrated with moderate difficulty with a small, sharp object.
- it is moderately difficult to excavate with hand tools;
- it has a low to medium natural moisture content and a damp appearance after it is excavated.
- it exhibits signs of surface cracking.
- it exhibits signs of localized water seepage.

Type C "Soft, sandy, or loose" if it closely exhibits most of the following characteristics:

- it is firm to very soft in consistency, loose to very loose.
- it is easy to excavate with hand tools.
- it is solid in appearance but flows or becomes unstable when disturbed.
- it runs easily into a well - defined conical pile when dry.
- it appears to be wet.
- it is granular below the water table, unless water has been removed from it.
- it exerts substantial hydraulic pressure when a support system is used.

Note: If an excavation contains soil of more than one soil type, for the purposes of this Part an employer must operate as if all of it is the soil type with the least stability.

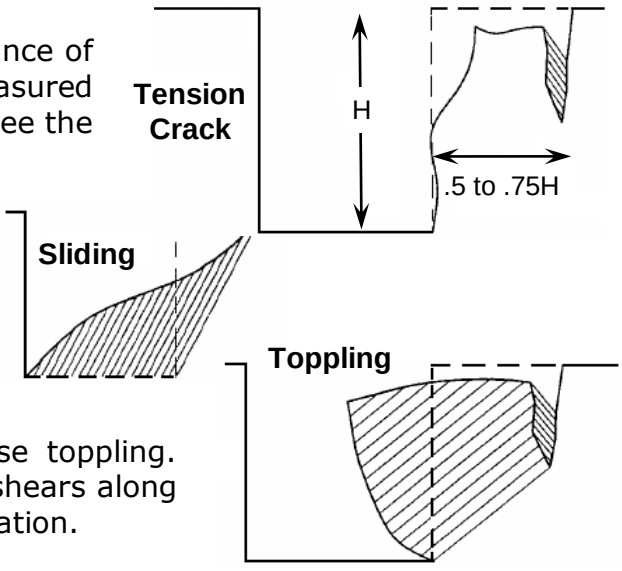
An Overview of Soil Mechanics

The following information is intended to provide options when classifying soil, selecting employee protection methods, and recognition of trenching and shoring hazards and their prevention.

A number of stresses and deformations can occur in an open cut or trench. For example, increases or decreases in moisture content can adversely affect the stability of a trench or excavation. The following diagrams show some of the more frequently identified causes of trench failure.

Tension Cracks

Tension cracks usually form at a horizontal distance of 0.5 to 0.75 times the depth of the trench, measured from the top of the vertical face of the trench. See the drawing for additional details.



Sliding

Sliding or sluffing may occur as a result of tension cracks.

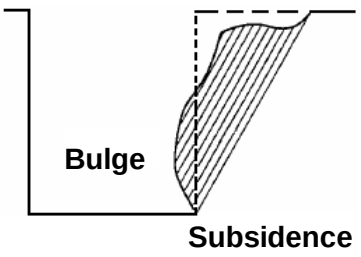
The illustration shows sliding.

Toppling

In addition to sliding, tension cracks can cause toppling. Toppling occurs when the trench's vertical face shears along the tension crack line and topples into the excavation.

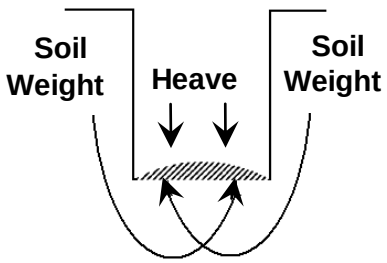
Subsidence and Bulging

An unsupported excavation can create an unbalanced stress in the soil, which, in turn, causes subsidence at the surface and bulging of the vertical face of the trench. If uncorrected, this condition can cause face failure and entrapment of workers in the trench.



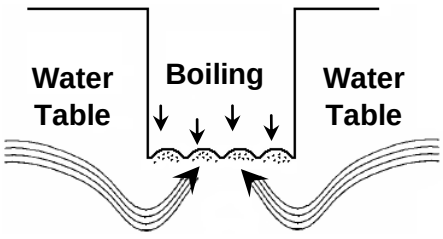
Heaving or Squeezing

Bottom heaving or squeezing is caused by the downward pressure created by the weight of adjoining soil. This pressure causes a bulge in the bottom of the cut, as illustrated in the drawing. Heaving and squeezing can occur even when shoring or shielding has been properly installed.



Boiling

Boiling is evidenced by an upward water flow into the bottom of the cut. A high water table is one of the causes of boiling. Boiling produces a "quick" condition in the bottom of the cut, and can occur even when shoring or trench boxes are used.



Unit Weight of Soils refers to the weight of one unit of a particular soil. The weight of soil varies with type and moisture content. One cubic foot of soil can weigh from 49.5 kg (110 lbs) to 63 kg (140 lbs) or more, and one cubic metre (35.3 cubic feet) of soil can weigh more than 1365 kilograms (3000 pounds).

Test Equipment and Methods for Evaluating Soil Type

Pocket Penetrometer

Penetrometers are direct-reading, spring-operated instruments used to determine the unconfined compressive strength of saturated cohesive soils. Once pushed into the soil, an indicator sleeve displays the reading. The instrument is calibrated in either tons per square foot (tsf) or kilograms per square centimetre. However, penetrometers have error rates in the range of + 20-40%.

Shearvane (Torvane)

To determine the unconfined compressive strength of the soil with a shearvane, the blades of the vane are pressed into a level section of undisturbed soil, and the torsional knob is slowly turned until soil failure occurs. The direct instrument reading must be multiplied by 2 to provide results in tons per square foot or kilograms per square centimetre.

Thumb Penetration Test

The thumb penetration procedure involves an attempt to press the thumb firmly into the soil in question. If the thumb makes an indentation in the soil only with great difficulty, the soil is probably Type A. If the thumb penetrates no further than the length of the thumb nail, it is probably Type B soil, and if the thumb penetrates the full length of the thumb, it is Type C soil. The thumb test is subjective and is therefore the least accurate of the three methods.

Dry Strength Test

Dry soil that crumbles freely or with moderate pressure into individual grains is granular. Dry soil that falls into clumps that subsequently break into smaller clumps (and the smaller clumps can be broken only with difficulty) is probably clay in combination with gravel, sand, or silt. If the soil breaks into clumps that do not break into smaller clumps (and the soil can be broken only with difficulty), the soil is considered unfissured unless there is visual indication of fissuring.

Plasticity or Wet Thread Test

This test is conducted by molding a moist sample of the soil into a ball and attempting to roll it into a thin thread approximately 3 mm in diameter (thick) by 50 mm in length. The soil sample is held by one end. If the sample does not break or tear, the soil is considered cohesive.

Visual Test

A visual test is a qualitative evaluation of conditions around the site. In a visual test, the entire excavation site is observed, including the soil adjacent to the site and the soil being excavated. If the soil remains in clumps, it is cohesive; if it appears to be coarse-grained sand or gravel, it is considered granular. The evaluator also checks for any signs of vibration. During a visual test, the evaluator should check for crack-line openings along the failure zone that would indicate tension cracks, look for existing utilities that indicate that the soil has previously been disturbed, and observe the open side of the excavation for indications of layered geologic structuring.

The evaluator should also look for signs of bulging, boiling, or sluffing, as well as for signs of surface water seeping from the sides of the excavation or from the water table. If there is standing water in the cut, the evaluator should check for "quick" conditions.

In addition, the area adjacent to the excavation should be checked for signs of foundations or other intrusions into the failure zone, and the evaluator should check for surcharging and the spoil distance from the edge of the excavation.

Shoring Types

Shoring is the provision of a support system for trench faces used to prevent movement of soil, underground utilities, roadways, and foundations. Shoring or shielding is used when the location or depth of the cut makes sloping back to the maximum allowable slope impractical. There are two basic types of shoring, timber and aluminum hydraulic.

Shoring systems consist of uprights, walers, crossbraces, and sheathing. The trend today is toward the use of hydraulic shoring, a prefabricated strut and/or wale system manufactured of aluminum or steel. Hydraulic shoring provides a critical safety advantage over timber shoring because workers do not have to enter the trench to install or remove hydraulic shoring. Other advantages of most hydraulic systems are that they:

- Are light enough to be installed by one worker.
- Are gauge-regulated to ensure even distribution of pressure along the trench line.
- Can have their trench faces "preloaded," to use the soil's natural cohesion to prevent movement.
- Can be adapted easily to various trench depths and widths.

All shoring should be installed from the top down and removed from the bottom up. Hydraulic shoring should be checked at least once per shift for leaking hoses and/or cylinders, broken connections, cracked nipples, bent bases, and any other damaged or defective parts.

Pneumatic Shoring

Pneumatic shoring works in a manner similar to hydraulic shoring. The primary difference is that pneumatic shoring uses air pressure in place of hydraulic pressure. A disadvantage to the use of pneumatic shoring is that an air compressor must be on site.

Screw Jacks

Screw jack systems differ from hydraulic and pneumatic systems in that the struts of a screw jack system must be adjusted manually. This creates a hazard because the worker is required to be in the trench in order to adjust the strut. In addition, uniform "preloading" cannot be achieved with screw jacks, and their weight creates handling difficulties.

Single-Cylinder Hydraulic Shores

Shores of this type are generally used in a waler system, as an assist to timber shoring systems, and in shallow trenches where face stability is required.

Underpinning

This process involves stabilizing adjacent structures, foundations, and other intrusions that may have an impact on the excavation. As the term indicates, underpinning is a procedure in which the foundation is physically reinforced. Underpinning should be conducted only under the direction and with the approval of a professional engineer.

Shielding Types

Trench boxes are different from shoring because, instead of shoring up or otherwise supporting the trench face, they are intended primarily to protect workers from cave-ins and similar incidents.

The excavated area between the outside of the trench box and the face of the trench should be as small as possible. The space between the trench boxes and the excavation side are backfilled to prevent lateral movement of the box. Boxes may not be subjected to loads exceeding those which the system was designed to withstand.

Trench boxes are generally used in open areas, but they also may be used in combination with sloping and benching. The box should extend at least 30 centimetres above the surrounding area if there is sloping toward excavation. This can be accomplished by providing a benched area adjacent to the box.

Earth excavation to a depth of 60 centimetres (2 feet) below the shield is permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench and there are no indications while the trench is open of possible loss of soil from behind or below the bottom of the support system.

Conditions of this type require observation on the effects of bulging, heaving, and boiling as well as surcharging, vibration, adjacent structures, etc., on excavating below the bottom of a shield.

Careful visual inspection of the conditions mentioned above is the primary and most prudent approach to hazard identification and control.

Sloping

Sloping the walls is one way to keep a trench from collapsing. The angle of the slope depends on soil conditions.

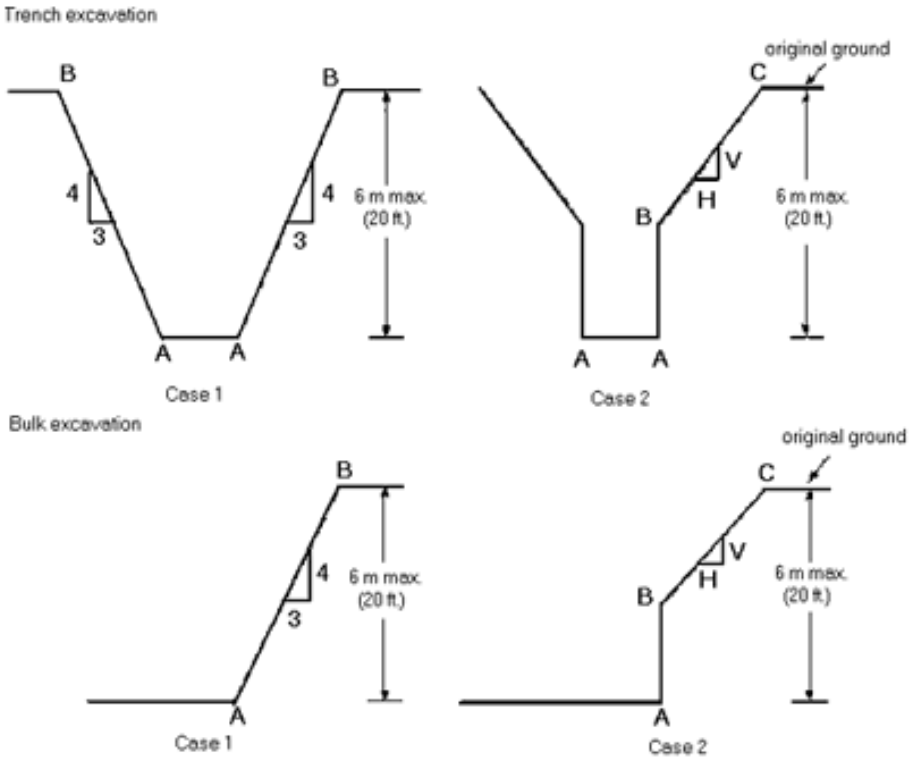
Benching

Before a worker enters any excavation over 1.2 metres (4 ft) in depth or, while in the excavation, approaches closer to the side or bank than a distance equal to the depth of the excavation, the employer must ensure that the excavation sides are sloped or supported as specified by a professional engineer, or that the sides of the excavation are:

a. sloped at angles, dependent on soil conditions, which will ensure stable faces, but in no case may the slope or combination of vertical cut and sloping exceed that shown in Figure 1

b. benched as shown in Figure 2

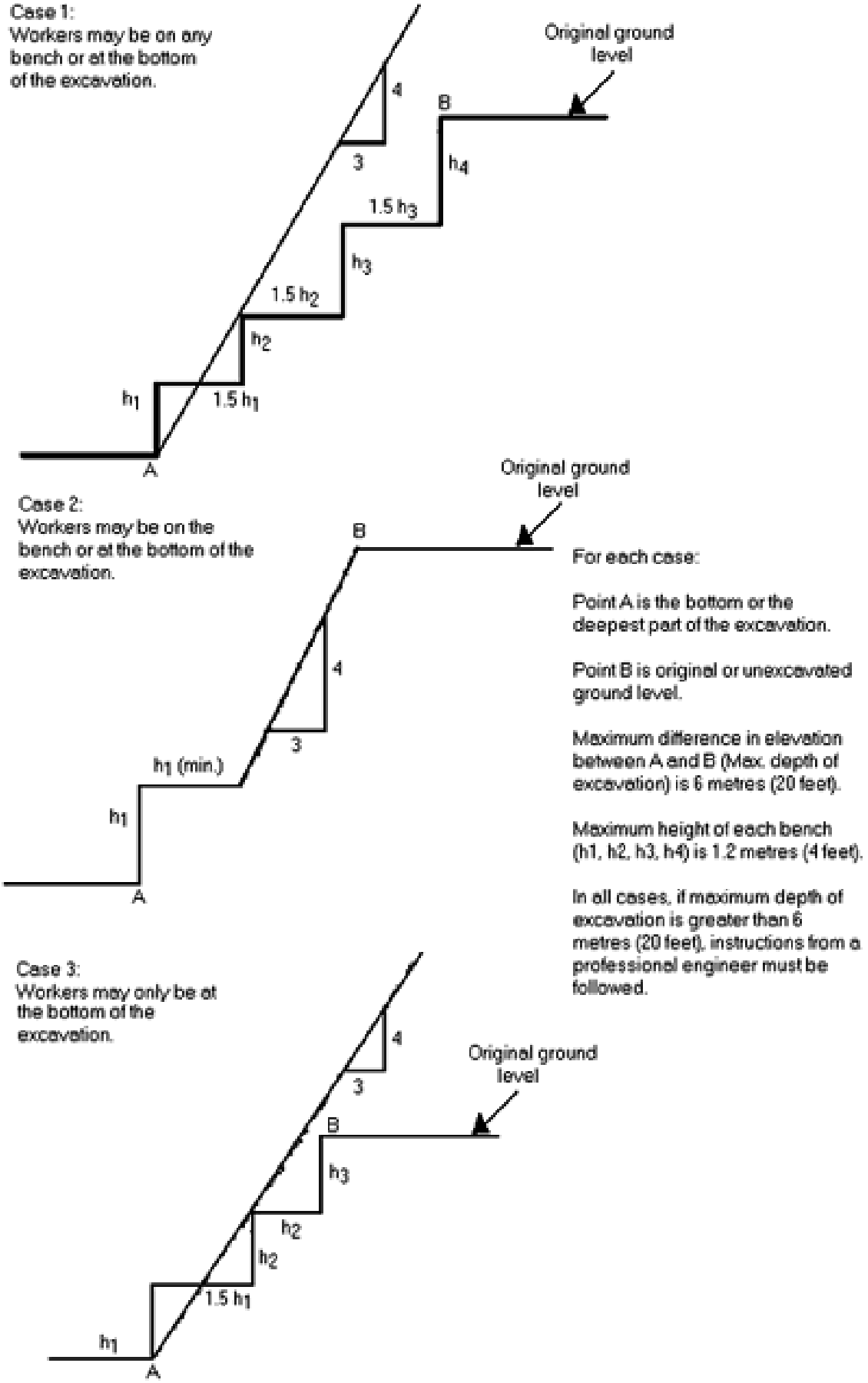
Figure 1: Sloping in lieu of shoring



- Case 1 (trench or bulk excavation) - maximum slope of excavated face, shown as line AB, in hard and solid soil is 3 horizontal to 4 vertical.
- Case 2 (trench or bulk excavation), maximum height of vertical portion, shown as line AB is 1.2 metres (4 feet).
- For Case 2 (trench or bulk excavation), the maximum permissible slope of the excavated face BC for the corresponding height of the lower vertical cut AB is as follows:

Height of line AB		Maximum slope of line BC (in hard and solid soil)
centimetres	feet	
up to 30	up to 1	1 horizontal (H) to 1 vertical (V)
30 to 60	1 to 2	3H to 2V
60 to 90	2 to 3	2H to 1V
90 to 120	3 to 4	3H to 1V

Figure 2: Benching in lieu of shoring



Spoil

Temporary Spoil

Temporary spoil must be placed no closer than 60 centimetres from the surface edge of the excavation, measured from the nearest base of the spoil to the cut. This distance should not be measured from the crown of the spoil deposit. This distance requirement ensures that loose rock or soil from the temporary spoil will not fall on employees in the trench.

Spoil should be placed so that it channels rainwater and other run-off water away from the excavation. Spoil should be placed so that it cannot accidentally run, slide, or fall back into the excavation.

Permanent Spoil

Permanent spoil should be placed some distance from the excavation. Permanent spoil is often created where underpasses are built or utilities are buried.

The improper placement of permanent spoil, i.e., insufficient distance from the working excavation, can cause an excavation to be out of compliance with the horizontal to vertical ratio requirement for a particular excavation. This can usually be determined through visual observation. Permanent spoil can change undisturbed soil to disturbed soil and dramatically alter slope requirements.

Special Health and Safety Considerations

Competent Person

The designated competent worker must have and be able to demonstrate the following:

- Training, experience, and knowledge of:
  - Soil analysis
  - Use of protective systems
  - Requirements of PART 20 of British Columbia OHS Regulations.
- Ability to detect:
  - Conditions that could result in cave-ins
  - Failures in protective systems
  - Hazardous atmospheres
  - Other hazards including those associated with confined spaces
- Authority to take prompt corrective measures to eliminate existing and predictable hazards and to stop work when required.

Surface Crossing of Trenches

Surface crossing of trenches should be discouraged; however, if trenches must be crossed, such crossings are permitted only under the following conditions:

- Vehicle crossings must be designed by and installed under the supervision of a registered professional engineer.
- Walkways or bridges must be provided for foot traffic. These structures shall:
  - Have a safety factor of 4
  - Have a minimum clear width of 50 centimetres.
  - Be fitted with guardrails on both sides
  - Extend a minimum of 60 centimetres past the surface edge of the trench

Ingress and Egress

Access to and exit from the trench require:

- Trenches 1.2 metres (4 feet) or more in depth should be provided with a fixed means of egress.
- Spacing between ladders or other means of egress must be such that a worker will not have to travel more than 8 metres laterally to the nearest means of egress.
- Ladders must be secured and extend a minimum of 1 metre above the landing.
- Metal ladders should be used with caution, particularly when electric utilities are present.

Exposure to Vehicles

Procedures to protect employees from being injured or killed by vehicle traffic include:

- Providing employees with and requiring them to wear warning vests or other suitable garments marked with or made of reflectorized or high-visibility materials.
- Requiring a designated, trained traffic control person along with signs, signals, and barricades when necessary.

Exposure to Falling Loads

Employees must be protected from loads or objects falling from lifting or digging equipment. Procedures designed to ensure their protection include:

- Employees are not permitted to work under raised loads.
- Employees must stand away from equipment that is being loaded or unloaded.
- Equipment operators may stay in their equipment during loading and unloading if the equipment is properly equipped with a cab shield or adequate canopy.

Warning Systems for Mobile Equipment

The following steps should be taken to prevent vehicles from falling into the trench:

- Barricades must be installed where necessary.
- Hand or mechanical signals must be used as required.
- Stop logs must be installed if there is a danger of vehicles falling into the trench.
- Soil should be graded away from the excavation; this will assist in vehicle control and channelling of run-off water.

Hazardous Atmospheres and Confined Spaces

Employees shall not be permitted to work in hazardous and/or toxic atmospheres. Such atmospheres include those with:

- Less than 19.5% or more than 23% oxygen.
- A combustible gas concentration greater than 20% of the lower flammable limit.
- Concentrations of hazardous substances that exceed those specified in the Threshold Limit Values for airborne contaminants established by the ACGIH (American Conference of Governmental Industrial Hygienists).

All operations involving such atmospheres must be conducted in accordance with OHS requirements for occupational health and environmental controls for personal protective equipment and for lifesaving equipment.

Engineering controls (e.g., ventilation) and respiratory protection may be required.

Testing for Atmospheric Contaminants

- Testing should be conducted before employees enter the trench and should be done regularly to ensure that the trench remains safe. The frequency of testing should be increased if equipment is operating in the trench.
- Testing frequency should also be increased if welding, cutting, or burning is done in the trench.

Employees required to wear respiratory protection must be trained, fit-tested, and enrolled in a respiratory protection program.

Some trenches qualify as confined spaces. When this occurs, compliance with the Confined Space regulation is also required.

Emergency Rescue Equipment

Emergency rescue equipment is required when a hazardous atmosphere exists or can reasonably be expected to exist.

Requirements are as follows:

- Respirators must be of the type suitable for the exposure. Employees must be trained in their use and a respirator program must be instituted.
- Attended (at all times) lifelines must be provided when employees enter bell-bottom pier holes, deep confined spaces, or other similar hazards.
- Employees who enter confined spaces must be trained.

Standing Water and Water Accumulation

Methods for controlling standing water and water accumulation must be provided and should consist of the following if employees are permitted to work in the excavation:

- Use of special support or shield systems approved by a registered professional engineer.
- Water removal equipment, i.e., well pointing, used and monitored by a competent person.
- Safety harnesses and lifelines used in conformance with PART 11 OHS BC.
- Surface water diverted away from the trench.
- Employees removed from the trench during rain storms.
- Trenches carefully inspected by a competent person after each rain and before employees are permitted to re-enter the trench.

Inspections

Inspections shall be made by a competent person and should be documented. The following guide specifies the frequency and conditions requiring inspections:

- Daily and before the start of each shift.
- As dictated by the work being done in the trench.
- After every rain storm.
- After other events that could increase hazards, e.g., snowstorm, windstorm, thaw, earthquake, etc.
- When fissures, tension cracks, sloughing, undercutting, water seepage, bulging at the bottom, or other similar conditions occur.
- When there is a change in the size, location, or placement of the spoil pile.

- When there is any indication of change or movement in adjacent structures.

Inquiries for Excavation Operations Daily Site Assessment

- Is the cut, cavity, or depression a "Trench" or an "Excavation"*?*
- Is the cut, cavity, or depression more than 1.2 metres in *DEPTH?*
- Is there "Water" in the cut, cavity, or depression?
- Are there adequate means of "Access" and "Egress"?
- Are there any "Surface Encumbrances"?
- Is there exposure to "Vehicular Traffic"?
- Are "Adjacent Structures" stabilized?
- Does "Mobile Equipment" have a "Warning System"?
- Is a "Competent Person In Charge" of the operation?
- Is "Equipment Operating" in or around the cut, cavity, or depression?
- Are procedures required to monitor, test, and "Control Hazardous Atmospheres"?
- Does a competent person "Determine Soil Type"?
- Was a *SOIL TESTING DEVICE* used to determine soil type?
- Is the "Spoil" placed " 60 centimetres or More from the Edge" of the cut, cavity, or depression?
- Is the "Depth 6 metres or More" for the cut, cavity, or depression?
- Has a "Professional Engineer" approved the procedure if the depth is more than 6 metres?
- Does the procedure require "Benching, Multiple Benching, Shoring, or Shielding"?
- If provided, do "Trench Boxes Extend at Least 30 centimetres Above" the surrounding area if it is sloped toward the excavation?
- If Trench Boxes are used, is the "Depth of the Cut More Than 60 centimetres Below" the bottom of the "Trench Box "?
- Are any "Required Surface Crossings" of the cut, cavity, or depression the "Proper Width" *and "Fitted with Hand Rails"?*
- Are means of "Egress" from the cut, cavity, or depression "No More Than 8 metres from the Work"?
- Is "Emergency Rescue Equipment" required?
- Is there "Documentation" of the "Minimum Daily Excavation Inspection"?

Conclusion

Trenching and excavation work presents serious risks to all workers involved. The greatest risk is that of a cave-in. When cave-ins occur, they are more likely to result in worker fatalities than other excavation-related accidents. Strict compliance with all sections of the standard will prevent or greatly reduce the risk of cave-ins as well as other excavation-related accidents.

DAILY INSPECTION OF TRENCHES & EXCAVATIONS

Company:			
Project:	Date:	Weather:	Soil Type:
Trench Depth:	Length:	Width:	Type of Protective System:
Project Supervisor:			
Assigned **Competent Person**:			
Crew Members:			
Excavation equipment type(s):			
Equipment Operator(s):			

Yes	No	N/A	**Excavation**
☐	☐	☐	Excavations and Protective Systems inspected by Competent Person daily, before start of work.
☐	☐	☐	Competent Person has authority to remove workers from excavation immediately.
☐	☐	☐	Surface encumbrances supported or removed.
☐	☐	☐	Employees protected from loose rock or soil.
☐	☐	☐	Hard hats worn by all employees.
☐	☐	☐	Spoils, materials, and equipment set back a minimum of 60 centimetres from edge of excavation.
☐	☐	☐	Barriers provided at all remote excavations, wells, pits, shafts, etc.
☐	☐	☐	Ingress/egress within excavation provided at 8 metre intervals.
☐	☐	☐	Walkways and bridges over excavations 1.2 metres or more in depth equipped with guardrails.
☐	☐	☐	Warning vests, or other highly visible PPE provided and worn by all employees exposed to vehicular traffic.
☐	☐	☐	Employees prohibited from working or walking under suspended loads.
☐	☐	☐	Employees prohibited from working on faces of sloped or benched excavations above other employees.
☐	☐	☐	Warning system established and used when mobile equipment is operating near edge of excavation.
Yes	No	N/A	**Utilities**
☐	☐	☐	Utility companies contacted and/or utilities located.
☐	☐	☐	Exact location of utilities marked when near excavation.
☐	☐	☐	Underground installations protected, supported, or removed when excavation is open.
Yes	No	N/A	**Wet Conditions**
☐	☐	☐	Precautions taken to protect employees from accumulation of water.
☐	☐	☐	Water removal equipment monitored by Competent Person.
☐	☐	☐	Surface water controlled or diverted.
☐	☐	☐	Inspection made after each rainstorm.
Yes	No	N/A	**Hazardous Atmosphere**
☐	☐	☐	Atmosphere tested when there is a possibility of oxygen deficiency or build-up of hazardous gases.
☐	☐	☐	Oxygen content is between 19.5% and 23%.
☐	☐	☐	Ventilation provided to prevent flammable gas build-up to 20% of lower explosive limit of the gas.
☐	☐	☐	Testing conducted to ensure that atmosphere remains safe.
☐	☐	☐	Emergency Response Equipment readily available where a hazardous atmosphere could or does exist.
☐	☐	☐	Employees trained in the use of Personal Protective and Emergency Response Equipment.
☐	☐	☐	Safety harness and life line individually attended when employees enter deep confined excavation.

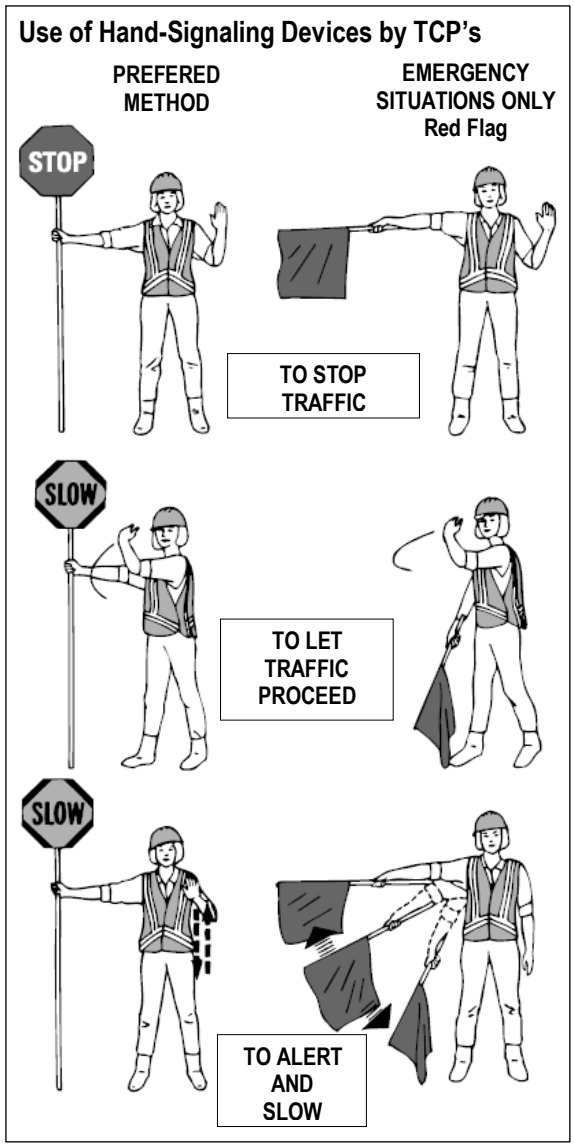
Comments:

Signature of Competent Person: Date:

Many injuries involving heavy equipment do not occur to the operator, but are inflicted on ground personnel working in or around the vicinity of moving machines. Always be aware of the location of personnel working near your machine. Heavy equipment operations frequently require the aid of ground personnel who should be thoroughly familiar with the procedures of your operation and the capabilities of the machine; usual operating procedures should not be changed without first notifying ground personnel. Never assume that your assigned ground workers will watch out for themselves. Always know your ground personnel's location, if they are not visible to you, do not move the machine or any implements! When working in conjunction with ground personnel, never operate equipment at speeds which would necessitate ground personnel to work in a careless manner. Remember, they are depending on your skill and judgment, as are all personnel in your immediate work area.

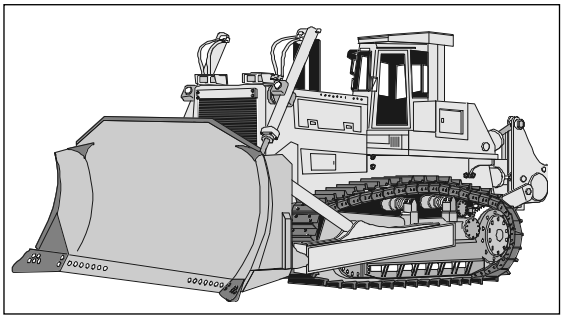
- Read the operators manual and operate the machine only if trained and considered competent to do so.
- Wear appropriate clothing and personal protective equipment for the job. Hearing protection is recommended for operating many types of heavy equipment.
- Do a walk around to make sure the area is clear before moving the machine.
- Do not climb on the machine where hand and foot holds have not been provided. Use a three point climbing technique whenever entering, exiting, or servicing the machine.
- Start machine only while sitting in the operator's seat and all personnel are clear.
- Ensure all controls are in the neutral position before starting the machine.
- Keep tires properly inflated, improper inflation may cause the machine to tip over under load.
- Heavy equipment machines are required to have a seat belt and rollover protection (ROPS). Always use the seat belt. OHS takes the position that seat belts are personal protective equipment, and failure to use them is grounds for a citation.
- Keep the load as low as possible while travelling; always reduce speed when making a turn. Keep speeds low on rough terrain. Bouncing, bucking, or side hopping because of excessive speed may cause loss of control of the machine.
- Check for overhead lines or obstructions before raising any overhead implement.
- Do not allow the tires to spin when picking up or pushing a load.
- Do not walk, work, or allow personnel under any raised part of heavy equipment.
- Do not use heavy equipment for demolition of structures which are taller than the machine without overhead protection sufficient to withstand the debris likely to impact the cab.
- Do not under-cut a bank which is higher than the machine.
- Use extreme caution when approaching or operating near excavations, the weight of the machine or vibration may cause the edges to collapse.
- Dust suppression and control is required where dust seriously limits visibility. Wear breathing protection when needed.
- Pre-wet soil to make loading easier and to aid in dust control.
- Rip tight soil before scraping or excavating to improve speed and efficiency.

- Always load buckets or hoppers down grade to increase the speed of operation, lessen wear on equipment, and reduce the need for a push tractor.
- Do not use heavy equipment as a battering ram.
- In tight turns, make sure the machine has clearance in front and rear if equipped with rear implements.
- Do not place any part of your body under any raised implement at any time unless it is properly blocked.
- Keep operator's compartment free of clutter and all controls free of oil and grease. Personal tools or equipment must be secured.
- All underground utilities in the work area must be located prior to digging. Utility companies must be notified of your intention to excavate within established, or customary, response times. (Check local codes)
- When excavations approach the estimated location of underground utilities, the exact location must be determined and marked.
- Wherever equipment operations encroach on a public thoroughfare, a system of traffic controls must be used.
- Traffic Control Persons (TCP's) or signallers are required at all locations where barricades or warning signs cannot control moving traffic.



- Never use an elevating part of heavy equipment as a man-lift.
- The productivity and safety of heavy equipment operations are increased by using well trained employees, along with properly maintained and serviced equipment. A well laid out worksite and work-plan always improves efficiency and safety on the jobsite.

Introduction



OHS has general requirements which pertain to all mechanized equipment used in construction and industry. Safety guidelines for specific pieces of heavy equipment will be discussed later in this chapter. All earth moving, material handling, and mobile industrial equipment have certain aspects which will necessitate the same safety requirements regardless of the specific intended purpose or configuration of the equipment. Following are OHS's general safety requirements for mechanized vehicle equipment:

General Requirements

- All vehicles must have a service brake system, an emergency brake system, and a parking brake system. These systems may use common components, and must be maintained in operable condition.
- Whenever visibility conditions warrant additional light, all vehicles in use must equipped with at least two headlights and two taillights in operable condition.
- All vehicles, or combination of vehicles, must brake lights in operable condition regardless of light conditions.
- All vehicles must be equipped with an adequate audible warning device at the operator's station (horn) in an operable condition.
- No employer may use any motor vehicle equipment having an obstructed view to the rear unless:
  - The vehicle has a reverse signal audible above surrounding noise level.
  - The vehicle backs up only when an observer signals it is safe to do so.
  - All vehicles with cabs must be equipped with windshields and powered wipers. Cracked and broken glass must be replaced. Vehicles operating in areas or under conditions that cause fogging or frosting of the windshields must be equipped with operable defrosting devices.
- All haulage vehicles, whose pay load is loaded by means of cranes, power shovels, loaders, or similar equipment, must have a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.
- Tools and material shall be secured to prevent movement when transported in the same compartment with employees.
- Vehicles used to transport employees must have seats firmly secured and adequate for the number of employees to be carried.
- Seat belts and anchorages meeting the requirements must be installed in all motor vehicles, and used by the operator.
- Trucks with dump bodies must be equipped with positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being done.
- Operating levers controlling hoisting or dumping devices on haulage bodies must be equipped with a latch or other device which will prevent accidental starting or tripping of the mechanism.
- Trip handles for tailgates of dump trucks shall be so arranged that, in dumping, the operator will be in the clear.
- All rubber-tired motor vehicle equipment manufactured on or after May 1, 1972, must be equipped with fenders.
- Mud flaps may be used in lieu of fenders whenever motor vehicle equipment is not designed for fenders (such as dump trucks where the dump bed forms an effective fender).
- All vehicles in use must be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use:
  - Service Brakes (including any trailer brake connections)
  - Parking System (hand brake)

- Emergency Stopping System (brakes)
- Tires
- Horn
- Steering Mechanism
- Coupling Devices
- Seat Belts
- Operating Controls
- Safety Devices

- All defects shall be corrected before the vehicle is placed in service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, fire extinguishers, etc., where such equipment is necessary.

General Safety Requirements for Earthmoving Equipment

These OHS rules apply to the following types of earthmoving equipment: scrapers, loaders, crawler (track) or wheel tractors, bulldozers, off-highway trucks, graders, agricultural and industrial tractors, and similar equipment. Following are general requirements for earth moving equipment:

Seat Belts

Seat belts must be provided on all equipment listed above, and must meet the requirements of the Society of Automotive Engineers (SAE).

Tractors listed above must have seat belts as required for the operators when seated in the normal seating arrangement for tractor operation, even though back-hoes, breakers, or other similar attachments are used on these machines for excavating or other work.

Access Roadways and Grades

No employer may move or cause to be moved construction equipment or vehicles upon any access roadway or grade unless the access roadway or grade is constructed and maintained to accommodate safely the movement of the equipment and vehicles involved.

Every emergency access ramp and berm used by an employer shall be constructed to restrain and control runaway vehicles.

Brakes

All earthmoving equipment must have a service braking system capable of stopping and holding the equipment fully loaded.

Fenders

Pneumatic-tired earth-moving haulage equipment (trucks, scrapers, tractors, and trailing units) whose maximum speed exceeds 25 kph (15 mph) must be equipped with fenders on all wheels.

Rollover Protective Structures (ROPS)

Rollover protective structures must meet the requirements of minimum performance criteria for rollover protective structures for designated scrapers, loaders, dozers, graders, and crawler tractors.

Audible Alarms

All bidirectional machines, such as rollers, compacters, front-end loaders, bulldozers, and similar equipment, must be equipped with a horn, distinguishable from the surrounding noise level, which can be operated as needed when the machine is moving in either direction. The horn must be maintained in an operating condition.

No employer shall permit earthmoving or compacting equipment which has an obstructed view to the rear to be used in reverse gear unless the equipment has in operation a reverse signal alarm distinguishable from the surrounding noise level or a ground guide signals that it is safe to do so.

Scissor Points

Scissor points on all front-end loaders or articulating equipment, which constitute a hazard to the operator during normal operation, must be guarded.

Lift trucks, Stackers, etc.

Equipment of this type must have the rated capacity clearly posted on the vehicle so as to be clearly visible to the operator. When auxiliary removable counterweights are provided by the manufacturer, corresponding alternate rated capacities also must be clearly shown on the vehicle. These ratings shall not be exceeded.

Modifications or Additions

No modifications or additions which affect the capacity or safe operation of the equipment may be made without the manufacturer's written approval. If such modifications or changes are made, the capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly. In no case shall the original safety factor of the equipment be reduced.

Steering or Spinner Knobs

Steering or spinner knobs must not be attached to the steering wheel unless the steering mechanism is of a type that prevents road reactions from causing the steering wheel to spin. The steering knob must be mounted within the periphery of the wheel.

Operator Training

Safe Operation

The employer must ensure that each heavy equipment operator is competent to operate the equipment safely, as demonstrated by the successful completion of the training and evaluation specified in this section.

Prior to permitting an employee to operate heavy equipment (except for training purposes), the employer must ensure that each operator has successfully completed the training required by this section.

Trainees may operate heavy equipment only:

- Under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence.
- Where such operation does not endanger the trainee or other employees.

Training shall consist of a combination of formal instruction (e.g., lecture, discussion, interactive computer learning, video tape, written material), practical training (demonstrations performed by the trainer and practical exercises performed by the trainee), and evaluation of the operator's performance on the job-site.

All operator training and evaluation shall be conducted by persons who have the knowledge, training, and experience to train heavy equipment operators and evaluate their competence.

Training Program Content

Heavy equipment operators must receive initial training in the following topics, except in topics which the employer can demonstrate are not applicable to safe operation of the equipment in the employer's workplace.

Equipment-Related Topics

- Operating instructions, warnings, and precautions for the types of equipment the operator will be authorized to operate.
- Differences between the equipment and an automobile.
- Equipment controls and instrumentation: where they are located, what they do, and how they work.
- Engine or motor operation.
- Steering and manoeuvring.
- Visibility (including restrictions due to loading).
- Implement and attachment adaptation, operation, and use limitations.
- Equipment capacity.
- Vehicle stability.
- Any equipment inspection and maintenance that the operator will be required to perform.
- Refuelling and/or charging and recharging of batteries.
- Operating limitations.
- Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of equipment that the employee is being trained to operate.

Workplace-Related Topics

- Surface conditions where the equipment will be operated.
- Composition of loads to be carried and load stability.
- Load manoeuvring, loading, and unloading. (Includes trucks, hoppers, etc.)
- Pedestrian traffic in areas where the equipment will be operated.
- Confined areas and other restricted places where equipment will be operated.
- Hazardous (classified) locations where the equipment will be operated.
- Ramps and other sloped surfaces that could affect the vehicle's stability.
- Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause buildup of carbon monoxide or diesel exhaust.
- Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.

Refresher Training and Evaluation

Refresher training, including an evaluation of the effectiveness of that training, must be conducted as required below to ensure that the operator has the knowledge and skills needed to operate the powered industrial truck safely. Refresher training in relevant topics shall be provided to the operator when:

- The operator has been observed to operate the equipment in an unsafe manner.
- The operator has been involved in an accident or near-miss incident.

- The operator has received an evaluation that reveals that the operator is not operating the equipment safely.
- The operator is assigned to operate a different type of equipment.
- A condition on the job-site changes in a manner that could affect safe operation of the equipment.

An evaluation of each powered industrial truck operator's performance shall be conducted at least once every three years.

Avoidance of Duplicative Training

If an operator has previously received training in a topic specified in this section, and such training is appropriate to the equipment and working conditions encountered, additional training in that topic is not required if the operator has been evaluated and found competent to operate the equipment safely.

Certification

The employer shall certify that each operator has been trained and evaluated as required by this section. The certification shall include the name of the operator, the date of the training, the date of the evaluation, and the identity of the person(s) performing the training or evaluation.

Equipment Operations

OHS has listed safety rules for the operation of equipment. These rules are general in nature and are not intended as a comprehensive guide to the safe operations of specific pieces of heavy equipment:

- Equipment shall not be driven up to anyone standing in front of an excavation or a fixed object.
- No person shall be allowed to stand or pass under the elevated portion of any equipment, whether loaded or empty.
- Unauthorized personnel shall not be permitted to ride on heavy equipment. A safe place to ride shall be provided where riding of equipment is authorized.
- The employer shall prohibit arms or legs from being placed between the moving parts of the equipment, or outside the running lines of the vehicle.
- When heavy equipment is left unattended, implements shall be fully lowered, controls shall be neutralized, power shall be shut off, and brakes set. Wheels shall be blocked if the vehicle is parked on an incline.
- Heavy equipment is considered unattended when the operator is 8 metres or more away from the vehicle which remains in his view, or whenever the operator leaves the vehicle and it is not in his view.
- When the equipment operator is dismounted and within 8 metres of the machine still in his view, the implements shall be fully lowered, controls neutralized, and the brakes set to prevent movement.
- A safe distance shall be maintained from the edge of ramps or platforms while on any elevated surface, and from the edge of any excavation.
- Brakes shall be set and wheel blocks shall be in place to prevent movement of trucks, trailers, or railroad cars while loading or unloading. Fixed jacks may be necessary to support a semi-trailer during loading or unloading when the trailer is not coupled to a tractor. The flooring of trucks, trailers, and railroad cars shall be checked for breaks and weakness before they are driven onto.

- There must be sufficient headroom under overhead installations, lights, pipes, sprinkler system, etc. for the safe passage of equipment.
- An overhead guard shall be used as protection against falling objects. It should be noted that an overhead guard is intended to offer protection from the impact of small objects, representative of the job application, but not to withstand the impact of a falling capacity load.
- A load backrest extension shall be used whenever necessary to minimize the possibility of the load or part of it from falling rearward.
- Only approved heavy equipment shall be used in hazardous locations.

Travelling (Roading) Heavy Equipment

- All traffic regulations must be observed, including authorized site speed limits. A safe distance must be maintained approximately three vehicle lengths from the vehicle ahead, and the equipment must be kept under control at all times.
- The right of way shall be yielded to ambulances, fire trucks, or other vehicles in emergency situations.
- Other vehicles travelling in the same direction at intersections, blind spots, or other dangerous locations may not be passed.
- The operator shall be required to slow down and sound the horn at cross intersections of roadways, paths, and other locations where vision is obstructed. If the load being carried obstructs forward view, the operator shall be required to travel with the load trailing (to the rear).
- Railroad tracks must be crossed diagonally wherever possible. Parking closer than 2.4 metres from the centre of railroad tracks is prohibited.
- The operator is required to look in the direction of, and keep a clear view of the path of travel.
- Grades must be ascended or descended slowly.
- When ascending or descending grades in excess of 10 percent, loaded equipment shall be driven with the load upgrade.
- On all grades the load and load carrying implement must be tilted back if applicable, and raised only as far as necessary to clear the road surface.
- Under all travel conditions the equipment must be operated at a speed that will permit it to be brought to a stop in a safe manner.
- Stunt driving and horseplay shall not be permitted.
- The operator shall be required to slow down for wet and slippery surfaces.
- Ramps or bridge plates, shall be properly secured before they are driven over. Ramps or bridge plates shall be driven over carefully and slowly and their rated capacity never exceeded.
- Running over loose objects on the roadway surface shall be avoided.
- While negotiating turns, speed shall be reduced to a safe level by means of turning the hand steering wheel in a smooth, sweeping motion. Except when manoeuvring at a very low speed, the hand steering wheel shall be turned at a moderate, even rate.

Loading

- Only stable or safely arranged loads shall be handled. Caution shall be exercised when handling off-centre loads which cannot be centred. The bucket should be struck to avoid scattering loads before travelling with equipment.
- Only loads within the rated capacity of the equipment shall be handled.
- Long or high (including multiple-tiered) loads which may affect capacity shall be adjusted.
- A load must be securely within the bucket or hopper as far as possible; the bucket must be carefully tilted backward to stabilize the load.
- Extreme care must be used when tilting the load forward or backward when the load is elevated. Tilting forward with the bucket elevated shall be prohibited except to pick up a load. An elevated load shall not be tilted forward except when the load is in a deposit position over a hopper or stack.
- All personnel not within a guarded enclosure must stay clear of loading operations. Drivers of trucks being loaded must remain in the cab, if it is equipped with overhead protection, or remain well clear of the operation.

Servicing and Maintenance of Heavy Equipment

If at any time heavy equipment is found to be in need of repair, defective, or in any way unsafe, the machine shall be taken out of service until it has been restored to safe operating condition.

- Fuel tanks must not be filled while the engine is running.
- Spillage of oil or fuel must be carefully washed away or completely evaporated and the fuel tank cap replaced before restarting engine.
- No equipment shall be operated with a leak in the fuel system until the leak has been repaired.
- Open flames must not be used for checking electrolyte level in storage batteries or gasoline level in fuel tanks.
- All repairs shall be made by authorized personnel.
- No repairs shall be made in Class I, II, and III locations.

Class 1 locations	Class 2 locations	Class 3 locations
Locations in which flammable gases or vapours are, or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.	Locations which are hazardous because of the presence of combustible dust.	Locations where easily ignitable fibres are present but not likely to be in suspension in quantities sufficient to produce ignitable mixtures.

- Those repairs to the fuel and ignition systems of equipment which involve fire hazards shall be conducted only in locations designated for such repairs.
- Equipment in need of repairs to the electrical system shall have the battery disconnected prior to such repairs.
- All parts of any heavy equipment requiring replacement shall be replaced only by parts equivalent as to safety with those used in the original design.

- Equipment shall not be altered so that the relative positions of the various parts are different from what they were when originally received from the manufacturer, nor shall they be altered either by the addition of extra parts not provided by the manufacturer or by the elimination of any parts, except for fuel system conversions.
- Equipment shall be examined before being placed in service, and shall not be placed in service if the examination shows any condition adversely affecting the safety of the vehicle. Inspections shall be made at least daily.
- Where heavy equipment is used on a round-the-clock basis, it shall be examined after each shift. Defects when found shall be immediately reported and corrected.
- Water mufflers must be filled daily or as frequently as is necessary to prevent depletion of the supply of water below 75 percent of the filled capacity. Vehicles with mufflers having screens or other parts that may become clogged shall not be operated while such screens or parts are clogged. Any vehicle that emits hazardous sparks or flames from the exhaust system shall immediately be removed from service and not returned to service until the cause for the emission of such sparks and flames has been eliminated.
- When the temperature of any part of any equipment is found to be in excess of its normal operating temperature, thus creating a hazardous condition, the equipment shall be removed from service and not returned to service until the cause for such overheating has been eliminated.
- Heavy equipment shall be kept in a clean condition, free excess oil, and grease. Non-combustible agents should be used for cleaning equipment. Low flash point (below 38° C) solvents must not be used. High flash point (at or above 38° C) solvents may be used. Precautions regarding toxicity, ventilation, and fire hazard shall be in agreement with the agent or solvent used.
- Heavy equipment originally approved for the use of gasoline for fuel may be converted to liquefied petroleum gas fuel provided the complete conversion results in a vehicle which embodies the features specified for LP or LPS designated equipment. Such conversion equipment shall be approved.
- All equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of the equipment.
- A safety tire rack, cage, or equivalent protection shall be provided and used when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.
- Heavy machinery, equipment, or parts thereof, which are suspended or held aloft by use of slings, hoists, or jacks shall be substantially blocked or cribbed to prevent falling or shifting before employees are permitted to work under or between them. Bulldozer and scraper blades, end-loader buckets, dump bodies, etc., shall be either fully lowered or blocked when being repaired or when not in use. All controls shall be in a neutral position, with motors stopped, and brakes set unless work being performed requires otherwise.
- Whenever the equipment is parked, the parking brake shall be set. Equipment parked on inclines shall have the wheels chocked and the parking brake set.
- The use, care and charging of all batteries shall conform to the following:
  - Ventilation shall be provided to ensure diffusion of the gases from the battery and to prevent the accumulation of an explosive mixture.

- Face shields, aprons, and rubber gloves shall be provided for workers handling acids or batteries.
- Facilities for quick drenching of the eyes and body shall be provided within 7.5 Metres of battery handling areas.
- Facilities shall be provided for flushing and neutralizing spilled electrolyte and for fire protection.

- All cab glass shall be safety glass, or equivalent, that introduces no visible distortion affecting the safe operation of any machine covered by this section.
- All equipment shall comply with the OHS requirements when working or being moved in the vicinity of power lines or energized transmitters.

General Requirements for Site Clearing

- Employees engaged in site clearing shall be protected from hazards of irritant and toxic plants and suitably instructed in the first aid treatment available.
- All equipment used in site clearing operations must be equipped with rollover guards. In addition, rider-operated equipment shall be equipped with an overhead and rear canopy guard meeting the following requirements:
  - The overhead covering on this canopy structure shall be of not less than 3.125 mm steel plate or 6.25 mm woven wire mesh with openings no greater than 2.5 cm, or equivalent.
  - The opening in the rear of the canopy structure shall be covered with not less than 6.25 mm woven wire mesh with openings no greater than 2.5 cm.

Notes:

Chapter 15

Confined Spaces

Policy Statement

Dan-Ex Contracting Ltd. is committed to a safe and healthful workplace for its employees. The purpose of this written program is to identify confined spaces at this workplace and to ensure that all employees will enter, work in, and exit spaces safely.

Employer and Qualified Person Responsibilities

Dan-Ex Contracting Ltd. will do the following to ensure the health and safety of those who work in and around confined spaces.

- Identify all spaces.
- Inform employees of the location and the hazards in spaces.
- Prevent unauthorized persons from entering spaces.
- Train entrants, standby persons, supervisors, and in-house emergency responders.
- Ensure that a qualified person performs a hazard assessment before each time that a worker enters a confined space.
- Provide all necessary equipment for confined space work at no cost to employees, maintain the equipment, and ensure that employees use the equipment properly.
- Inform contractors about the confined space program and coordinate entry operations.

Dan-Ex Contracting Ltd. designates ***Glenn Willesen*** to implement and manage the confined space program:

Duties of Workers and Entrants

- Do not enter or re-enter (if the confined space has been left unoccupied and unattended) the confined space unless testing has been performed.
- Know the hazards that may be faced upon entry.
- Know the route of exposure (e.g., inhalation or skin absorption), signs and symptoms, and long-term effects of exposure.
- Know how to use the equipment (including personal protective equipment and tools) properly.
- Maintain communication with the standby person so that the standby person can monitor your safety and be able to alert workers to evacuate the confined space.
- *Alert the standby person whenever:*
  - you recognize any warning sign or symptom of exposure
  - you see a dangerous condition
  - an alarm is activated.

- Get out of the permit space immediately whenever:
  - a warning system indicating a ventilation failure is activated
  - the standby person gives an evacuation order
  - a worker recognizes any signs or symptoms of exposure
  - a person inside detects a dangerous condition
  - an evacuation alarm is activated.

Duties of Standby person

An standby person must be present whenever a worker enters a confined space. The standby person is not allowed to enter the confined space, unless he or she is replaced by another standby person in accordance with the plan.

The standby person must:

- remain alert outside and near to the entrance
- be in constant communication (visual or speech) with all workers in the confined space
- monitor the safety of workers inside the confined space
- provide assistance as necessary
- be provided with a device for summoning help in case of emergency, and
- initiate an adequate rescue procedure in case of an emergency.

The standby person is not allowed to enter the confined space to perform a rescue even after help has arrived unless he or she is replaced by another standby person in accordance with the plan.

Entry rescue requirements

Only responders designated by ***Dan-Ex Contracting Ltd.*** can enter a confined space during an emergency. Each emergency responder must know how to do the following:

- Use personal protective and rescue equipment.
- Perform assigned rescue duties.
- Perform basic first aid and CPR.

Each rescue team member must practice a confined space rescue at least annually.

Summoning Offsite Responders

Glenn Willesen has made arrangements with the following off-site responder to provide rescue and emergency services:

Name of responder: _____

Phone: _____

Address: _____

Approximate Emergency Response time: _____

Glenn Willesen has informed said responder of the hazards they may encounter if they are summoned.

The Company Safety Coordinator has also provided the rescue service access to confined spaces to develop appropriate rescue plans and practice rescues.

Program Evaluation

Within one year of an entry operation, ***Glenn Willesen*** shall review cancelled entry permits to identify program deficiencies. The review must be sooner if there is reason to believe that the program does not adequately protect employees. Actions to correct deficiencies must be documented and affected employees must be retrained.

Program elements shall include:

- a method of recognizing each confined space
- a method for assessing the hazards to which workers may be exposed
- a method for developing plans for controlling the hazards
- a method for training workers
- an entry permit system setting out measures and procedures to be followed when working in a confined space.

Recognizing a Confined Space

A confined space, except as otherwise determined by the Board, means an area, other than an underground working, that

1. is enclosed or partially enclosed,
2. is not designed or intended for continuous human occupancy,
3. has limited or restricted means for entry or exit that may complicate the provision of first aid, evacuation, rescue or other emergency response service, and is large enough and so configured that a worker could enter to perform assigned work.

Examples of Confined Spaces

- Tanks
- Boilers
- Vessels
- Vats
- Manholes
- Kilns
- Water reservoirs
- Vaults
- Other similar places
- Silos
- Pumping Stations
- Pipelines
- Sewers
- Manure Pits
- Storage Bins
- Double Hulls
- Pits
- Sumps

Not designed and constructed for continuous human occupancy

Confined spaces are not designed or constructed for people to work in them on an ongoing basis. They are usually designed and constructed to store material, transport products, or enclose a process. But occasionally, some work must be done inside the space.

Atmospheric hazards

A hazardous atmosphere is one which contains any of the following:

- an accumulation of flammable, combustible, or explosive agents
- less than 19.5% or more than 23% oxygen, or
- an accumulation of atmospheric contaminants that could result in acute (short-term) health effects which:
  - pose an immediate threat to life, or
  - interfere with a person's ability to escape unaided from a confined space.

Hazard Assessment

Before each time that a worker enters a confined space, a qualified person must perform a written hazard assessment. The name of the qualified person must appear on the assessment and the employer must keep a record of the qualified person's qualifications.

The hazard assessment must take into account:

- the hazards that may exist in the confined space
- the hazards that may develop while work is performed inside the confined space
- general safety hazards in the confined space.

The qualified person must sign and date the assessment and give it to the employer.

If requested, the employer must give copies of the assessment and qualified person's qualifications to:

- the project's joint health and safety committee, or
- the health and safety representative, or
- every worker involved in the confined space entry if the project has no joint health and safety committee or health and safety representative.

Note: If control measures (such as continuous mechanical ventilation) are used to ensure that the concentrations of an atmospheric hazard are controlled or maintained at an appropriate level (but not eliminated) then the space would still be considered a confined space. If, however, measures are implemented to eliminate the possibility that any atmospheric hazards may occur in a space, then the confined space provisions no longer need to apply.

Hazards

Physical Hazards - Physical hazards often present a greater danger inside an enclosed space than they do outside.

Examples:

Noise and vibration - An enclosed environment can amplify noise. Excessive noise can damage hearing and prevent communication. It can affect workers' ability to hear alarms, warning shouts, or orders to evacuate.

Temperature extremes - Ask plant personnel if workers could encounter dangerous temperatures. For example, heat stress can be a hazard when working around boilers, hot pipe or tanks, or structures heated by the sun. Protective clothing can also add to heat stress.

Cramped work spaces - Cramped work spaces restrict movement and can make using tools and equipment difficult and dangerous.

Poor access or exit - Confined space openings are generally small and not well-located. This can make entry and exit difficult and can interfere with rescue.

Rotating or moving equipment - Before entry, identify any moving or rotating equipment (such as conveyors, mixers, augers, etc.) which could become activated by stored pressure, accidental contact, or gravity action. Check with plant personnel on lockout and tagging procedures, and review drawings, plans, and specifications.

Electrical hazards - Any exposed conductors or energized equipment should be identified before entry. The presence of water in confined spaces may pose an additional electrocution hazard where electrical circuits, equipment, and tools are used.

Engulfment due to uncontrolled movement of liquids and solids - Liquids, sludge, fine solids, and other material may not be completely removed from confined spaces and

may present an engulfment or drowning hazard. Use inspection ports and dipsticks, and check with plant personnel to evaluate such hazards.

Slick or wet surfaces - You can be severely injured from a slip or fall on icy, oily, wet, or moist surfaces.

Lighting - Confined spaces generally have poor lighting. You often need temporary lighting. In potentially explosive atmospheres, use lighting designed for such situations.

Atmospheric Hazards

Confined spaces can present three kinds of atmospheric hazards:

- flammable, combustible, or explosive atmosphere
- oxygen-enriched or oxygen-deficient atmosphere
- atmospheric contaminants.

Flammable, Combustible, Or Explosive Atmospheres

Flammable atmospheres are generally caused by:

- Evaporation of flammable liquids (e.g., gasoline)
- By-products of chemical reactions (e.g., decomposition of organic matter to form methane).

Oxygen-Enriched and Oxygen-Deficient Atmospheres

Normal outside air contains about 21% oxygen. If the concentration of oxygen exceeds 23% it is considered "enriched". The primary concern with oxygen-enriched atmospheres is the increased flammability of materials.

Atmospheric Contaminants

The most common atmospheric contaminants in construction include hydrogen sulphide, carbon monoxide, sulphur dioxide, chlorine, and ammonia.

Hydrogen Sulphide (H2S) is a gas generated by the decomposition of garbage and sewage. H2S can be found in sewers, sewage treatment plants, refineries, and pulp mills. It is also found in many oil refineries since most crude oil in Canada has some H2S dissolved in it. H2S is very toxic. A single breath at a concentration of about 500-

700 ppm (parts per million) can be instantly fatal. At very low concentrations, H2S has the characteristic odour of rotten eggs. However, at about 100 ppm it can deaden your sense of smell and create the false impression that no hazard exists.

Carbon Monoxide (CO) is a very common toxic gas. It has no odour or taste and is clear and colourless. Carbon monoxide poisoning can be very subtle and may cause drowsiness and collapse followed by death. The major sources of CO in construction include the internal combustion engines powering saws, scissor lifts, power trowellers, generators, and forklift trucks. Even these relatively small engines produce high levels of CO.

Sulphur Dioxide (SO2) is a very irritating and corrosive gas with a strong sulphur-like odour which can be found in pulp-and-paper mills and oil refineries.

Chlorine (Cl2) is another irritating and highly corrosive gas with a bleach-like odour used as a disinfectant in water and sewage treatment plants and a wide variety of other industrial settings.

Ammonia (NH3) is a fairly common chemical used as a refrigerant and in making fertilizer, synthetic fibres, plastics, and dyes.

Hundreds of other toxic materials may be encountered in factories, chemical plants, and similar industrial settings.

Flammable Products

When using flammable materials in a confined space, take these precautions:

- Provide adequate ventilation.
- Control sparks (use non-sparking tools) and control other potential ignition sources
- Extinguish all pilot lights.
- Use specially protected lighting.
- Have fire extinguishers handy.

Accumulation of Contaminants below Grade

Trenches, manholes, and low-lying areas may become hazardous from leaking gases heavier than air-such as propane-or from gasses such as carbon monoxide seeping through the soil and into the confined space.

Accumulation of Contaminants in Areas Not Classified As Confined Spaces

A variety of spaces can become hazardous because of the products being used or the work being done in them. These areas can be deadly even if they are not classified as confined spaces and even if the confined space provisions of the Construction Regulation do not apply.

Skylights, domes, and ceilings

Work is sometimes required within newly installed skylights where lighter-than-air gases and fumes may accumulate.

Workers should be aware of this hazard. At the first sign of discomfort or disorientation they should leave the area until it has been ventilated.

Workers feeling light-headed or experiencing headaches may be inhaling these pollutants. Drowsiness or disorientation can lead to falls. Again, leave the area until it has been ventilated.

Plan for Controlling Hazards

Once the hazards have been identified in the assessment, a **competent person** must develop a plan to eliminate or control the hazards.

The primary objective of the plan is to eliminate the hazard before entry. If this is not possible, then controls, measures, and procedures must be put in place to ensure that workers are not in danger.

Requirements

1. Duties of workers
2. Coordination document (prepared by the constructor) if workers of more than one contractor enter the same confined space
3. On-site rescue procedures
4. Rescue equipment (inspected by a qualified person) and methods of communication
5. Protective clothing and protective equipment
6. Isolation of energy and control of material movement
7. Standby persons
8. Adequate means of access and egress (entry and exit)
9. Atmospheric testing

10. Adequate procedures for working in the presence of explosive or flammable substances
11. Ventilation and purging.

These mandatory requirements are addressed below:

1. Duties of Workers

- Do not enter or re-enter (if the confined space has been left unoccupied and unattended) the confined space unless testing has been performed.
- Know the hazards that may be faced upon entry.
- Know the route of exposure (e.g., inhalation or skin absorption), signs and symptoms, and long-term effects of exposure.
- Know how to use the equipment (including personal protective equipment and tools) properly.
- Maintain communication with the standby person so that the standby person can monitor your safety and be able to alert workers to evacuate the confined space.
- *Alert the standby person whenever:*
  - you recognize any warning sign or symptom of exposure
  - you see a dangerous condition
  - an alarm is activated.
- Get out of the permit space immediately whenever:
  - a warning system indicating a ventilation failure is activated
  - the standby person gives an evacuation order
  - a worker recognizes any signs or symptoms of exposure
  - a person inside detects a dangerous condition
  - an evacuation alarm is activated.

2. Coordination

When workers of more than one employer perform work in the same confined space, the constructor must coordinate entry operations. The constructor must prepare a coordination document to ensure that the various employers perform their duties in a way that protects the health and safety of all workers entering the confined space.

A copy of the coordination document must be provided to each employer of workers who perform work in the confined space and the project's joint health and safety committee or health and safety representative.

Note: Each employer is responsible for the health and safety of their own workers and for ensuring compliance with the regulation.

3. Rescue Procedures

The confined space plan must include written procedures for safe onsite rescue that can be implemented immediately in case of an emergency. An adequate number of people must be available to carry out the rescue procedures immediately. They must be trained in

- the onsite rescue procedures
- first aid and cardio-pulmonary resuscitation (CPR)
- how to use the rescue equipment necessary to carry out the rescue.

Note: Dialing 911 is not a sufficient rescue response

4. Rescue Equipment

The rescue equipment must be readily available, appropriate for the confined space, and inspected by a qualified person. The qualified person must keep a written record of the inspection. Examples of rescue equipment include harnesses and lifelines, hoist/retrieval systems, respirators, and other personal protective equipment.

NOTE: You must consider the size of the confined space's opening when choosing rescue equipment. There is no point planning for a rescuer to wear a SCBA (self-contained breathing apparatus) unit if it doesn't fit through the opening.

All too often, inadequate or incorrect emergency rescue response results in multiple fatalities.

Even with the best planned and executed entry there is a chance of a sudden change in conditions. The change could be due to factors recognized earlier but for which no "absolute" protection exists, such as the failure of a respirator, the introduction of a new hazard, or collapse from heart attack or illness. In such cases you need a rescue plan that has been practiced and works.

5. Protective Clothing and Personal Protective Equipment

Protective clothing and equipment suitable for one material may not be suitable for others. For example, polyvinyl chloride (PVC) plastic is resistant to most acids, but it can be softened or penetrated by many common solvents such as benzene, toluene, and xylene.

For this reason, a knowledgeable person should assess the protective clothing and equipment needed (e.g., gloves, boots, chemical suits, fire resistant coveralls-as well as hearing, respiratory, eye, and face protection).

Don't forget that if workers need personal protective equipment, they must be trained in its use.

Respiratory protective equipment should be used where ventilation is impractical or inadequate. Certain basic rules apply to the equipment.

First of all, you need to select the proper type of respirator. Oxygen-deficient atmospheres require supplied-air respirators—either airline types with emergency reserves or SCBA (self-contained breathing apparatus).

SCBA note: Because the amount of air supply in standard SCBA cylinders is rated for a specific time period, it is very important to plan your tasks, especially rescues operations, accordingly. Heavy work and stress will increase breathing rates and workers will use up the air in less than the rated time. An alarm sounds when the air supply is low.

In toxic atmospheres, you must use supplied-air respirators if the concentration of the gas or vapour exceeds the level considered to be Immediately Dangerous to Life or Health (IDLH), or if the concentration is unknown.

When the level of toxic gas or vapour is above the exposure limit but below the IDLH level, air-purifying respirators approved by the National Institute of

Occupational Safety and Health (NIOSH) may be used provided the exposure conditions do not exceed the unit's limitations. Someone who is competent in respirator selection must determine the appropriate type of respirator.

Workers required to wear respirators must be instructed how to properly fit and maintain them. For more information on respiratory protection, refer to the chapter on personal

protective equipment in this manual, or the Canadian Standards Association's standard *Z94.4-02, Selection, Use, and Care of Respirators*.

Note: Do not use single-strap dust masks and surgical masks—they are not approved by the National Institute for Occupational Safety and Health (NIOSH). NIOSH is a U.S.-based organization that approves respirators. Workers must be supplied with NIOSH-approved respirators only. All NIOSH-approved respirators have an approval number (always starting with the letters TC) on them.

Make sure your respirator has all the proper parts. Since each manufacturer uses different designs, parts are not interchangeable between brands. Make sure you use the correct parts (cartridges, air cylinders, etc.) for your brand of respirator. Never use cartridges or air cylinders from another manufacturer. They will not fit correctly and will endanger the life of the worker or rescuer.

6. Isolation of Energy and Control Of Material Movement

Equipment that moves in any way (even rotation) must be isolated by

- disconnecting the equipment from its power source and de-energizing the equipment, or
- lockout and tagging. Only workers trained in lockout and tagging should perform such operations. Lockout and tagging should be done even if you use the first option (disconnect and de-energize) to isolate the energy.

For pneumatic or hydraulic equipment, isolate the power source and depressurize the supply lines. Depressurize any components that may still be pressurized after the supply lines have been bled-hydraulic cylinders for example. You must disconnect and drain pipes carrying solids or liquids to or from a confined space, or insert blank flanges.

If the pipe cannot be blanked off or disconnected, the valve may be closed, chained, locked and tagged, provided that this type of control— and its importance— have been explained to all workers in the area. Simply closing valves is not generally acceptable.

You may need blocking to prevent movement caused by gravity for some equipment (e.g., conveyors).

Electrical equipment in the space should be disconnected, tagged and locked out, and grounded when it's practical to do so.

In the case of live electrical work in a confined space, you need to pay special attention to standard procedures. A minor mistake in a manhole can lead to disaster.

Cramped working conditions can make accidental contact with an energized conductor more likely, so you may need nonconductive equipment.

You may need gloves, mats, and other insulating equipment depending upon the type of work. Capacitors or other components which can store a charge should be discharged and/or grounded.

7. Standby person

An standby person must be present whenever a worker enters a confined space. The standby person is not allowed to enter the confined space, unless he or she is replaced by another standby person in accordance with the plan.

The standby person must:

- remain alert outside and near to the entrance
- be in constant communication (visual or speech) with all workers in the confined space
- monitor the safety of workers inside the confined space

- provide assistance as necessary
- be provided with a device for summoning help in case of emergency, and
- initiate an adequate rescue procedure in case of an emergency.

The standby person is not allowed to enter the confined space to perform a rescue even after help has arrived unless he or she is replaced by another standby person in accordance with the plan.

8. Entry and Exit (Access and Egress)

The means of entry and exit can be evaluated before entry by checking drawings, by prior knowledge, or simply by inspection from outside the space.

Confined space openings are generally small and not well located. These small openings must be considered in the rescue plan since they restrict the movement of workers and equipment in and out of confined spaces.

Entry and exit for top-side openings may require ladders.

9. Atmospheric Testing

If the hazard assessment determines that there is an atmospheric hazard in the confined space, you must perform atmospheric testing.

1. The employer must appoint a qualified person to perform adequate tests safely before and during the time a worker is in a confined space to ensure that acceptable atmospheric levels are maintained. The qualified person who will perform the tests must receive training in the operation, calibration, and maintenance of the instruments. Most manufacturers can provide necessary training.
2. If the confined space has been left unoccupied and unattended, you must perform the testing again.
3. The qualified person performing the tests must use properly calibrated and maintained instruments appropriate for the hazards in the confined space.
4. Results of every sample of a test must be recorded on the entry permit. If continuous monitoring is performed, test results must be recorded at adequate intervals.

Gas detection instruments

Gas detection instruments can take many forms- "personal" or "area," single-gas or multiple-gas detectors, detectors with dedicated sensors or those with interchangeable sensors.

If a monitor is worn by the worker it is referred to as "personal monitoring."

Personal monitoring gives information about the concentration of hazardous substances surrounding the worker. It is particularly useful when the worker is moving from place to place within the confined space.

Area sampling is done before entry or re-entry. As much of the confined space area as possible should be tested, including the bottom, mid level, top, and corners.

Single-gas detectors measure only one gas while multi-gas monitors are available with several toxic sensor options and have the flexibility of measuring many gases simultaneously. Most multi-gas monitors include an oxygen sensor, a flammable/combustible gas sensor, and one or two sensors for detecting specific toxic gases. Newer single and multi-gas instruments offer the flexibility of interchangeable sensors. You can change the sensors to suit the application in hand. For example, a single-gas detector used to check hydrogen sulphide levels can be used to monitor carbon monoxide concentrations after you change the sensor.

Key steps to follow when you suspect a dangerous atmosphere

Select the appropriate type of calibrated instruments for the hazards identified in the assessment.

You must understand the characteristics of the work area in order to choose the right instruments. Different types of confined spaces present different kinds of toxic gas hazards. There are hundreds of different toxics gases or vapours. You need a familiarity with the characteristics of the confined space in order to narrow down the possibilities and choose equipment.

You must use a calibrated monitor that is capable of measuring the hazardous atmosphere found in the confined space. For example, if a propane heater is being used inside a confined space, then you need calibrated monitors capable of measuring oxygen levels, carbon monoxide, and combustible gases.

WARNING: Combustible gas detectors should not be used to assess toxic atmospheres. Most combustible gas detectors do not respond to low concentrations of gases. For example, H2S is flammable from 4.3% to 44%. But it is Immediately Dangerous to Life or Health (IDLH) at 100 parts per million (0.01%) and would not be detected at this concentration by most combustible gas detectors. Most other toxic gases that are also flammable are dangerous in concentrations well below the LEL.

You must calibrate, maintain, and use the equipment in accordance with the manufacturer's recommendations. If the meter is not properly calibrated, you cannot rely upon its results. Deaths can occur if the instrument underestimates the atmospheric conditions.

Perform the tests safely

Entry into a confined space must be prohibited before the appropriate tests are performed. Atmospheres should be evaluated remotely (from outside the confined space) before each entry. If possible, an extendable probe should be inserted through an inspection port or other opening before removing large doors or covers.

Make sure that as much of the space as possible is tested, including the bottom, mid-level, top, and corners, so that you don't miss layers or pockets of bad air.

There are some gases that are lighter or heavier than air. Lighter gases, such as methane, will accumulate at the top, while gases heavier than air will sink to floor level. Gases that are the same weight as air, such as carbon monoxide, will be found throughout a confined space.

Check for oxygen content, combustible or explosive gases and vapours, and toxic gases and vapours in that order if you use more than one meter.

First, check for oxygen content. Checking oxygen first is important because you may need adequate oxygen to get a valid result from other tests.

If the oxygen level is adequate, test for explosive atmospheres. Several different calibration gases are available. Methane is used most frequently since it is a common gas found in many places. But you can get devices calibrated for propane, hexane, heptane, or almost any other combustible gas. These devices give a result expressed as a percentage of the lower explosive limit (LEL) for the calibration gas used.

The next thing to check for is the presence of toxic gases and vapour using a calibrated instrument.

If you're using a multi-gas monitor capable of measuring oxygen, combustibles, and toxic gases simultaneously then the order of testing is not as critical.

All three types of dangerous atmospheres must be evaluated before entry. Users of gas detectors must be qualified persons. They must also receive training in the operation, calibration, and maintenance of the devices.

Most manufacturers can provide necessary training.

You may need to monitor the atmosphere continuously

Continuous monitoring in a confined space is required while hot work is being performed in a potentially flammable or explosive atmosphere or where the flammable or explosive atmosphere has been rendered inert by adding an inert gas. It should also be considered when conditions in the confined space change rapidly.

If continuous monitoring is performed then test results must be recorded at regular intervals.

Most confined space instruments have data-logging capabilities. Data-logging is useful for compliance and record-keeping purposes. If an accident or unusual event happens, data-logging may be useful for demonstrating due diligence.

Interpret the results

There may be other gases present in the confined space that interfere with the reading for the gas you are trying to measure. Such gases are referred to as "interfering gases." They can lead to misinterpretation of the monitoring results.

Note: Know the limitations of your specific equipment. Consult the manufacturer's instructions for proper use. Temperature, humidity, and interfering gases can all affect the performance of gas monitors.

If the atmosphere meets acceptable exposure limits (see table) the confined space may be entered. If the atmosphere does not meet acceptable limits, you need to implement controls before anyone can enter.

Acceptable Atmospheric Levels	
Explosive or flammable gas or vapour	**< 25%** of its lower explosive limit: inspection work can be performed. **< 10%** of its lower explosive limit: cold work can be performed. (Cold work is work which does not involve: – welding and cutting – the use of tools or equipment which can produce a spark – other sources of ignition.) **< 5%** of its lower explosive limit: hot work can be performed.
Oxygen content	At least 19.5% but not more than 23% by volume.
Exposure to atmospheric contaminants	Exposures to atmospheric contaminants must not exceed what is reasonable in the circumstances. The exposure limits in the regulation on Control of Exposure to Biological or Chemical Agents and the Designated Substance Regulations* are generally considered reasonable for protecting workers.

If measurements are within acceptable exposure limits but are approaching hazardous levels, the qualified person's decision to proceed should be based on an assessment of the source of the problem, the likelihood of change, and the conditions at the scene. In doubtful cases, it is best to implement the appropriate controls discussed in the following section.

Recording the results

The test results must be recorded on the work entry permit. The records must be kept by the constructor or employer for at least one year after the project is finished.

- Never trust your senses to determine whether the atmosphere in a confined space is safe.
- You cannot see or smell many toxic gases and vapours.

- You cannot determine by your senses the level of oxygen present.
- Know which gases or vapours may be present in the confined space and test for them.

10. Combustible, Explosive, or Flammable Atmospheres

No worker is allowed to enter a confined space if airborne combustible dust or mist is present in a concentration sufficient for explosion. If an explosive or flammable atmosphere is detected, you can perform only certain types of work. The conditions for each type of work are specified below the following definitions.

Hot work means activities that could produce a source of ignition such as a spark or open flame. Examples of hot work include welding, cutting, grinding, and using non-explosion-proof electrical equipment.

Cold work means activities that cannot produce a source of ignition.

Between 0% and 5% of the LEL, you can perform hot work. The following conditions must also be met:

- The oxygen content must be maintained below 23%
- The atmosphere must be continuously monitored.
- The entry permit must include adequate provisions for hot work, and it must specify the appropriate measures to be taken.
- An alarm and exit procedure must be in place to provide adequate warning and allow safe escape if the atmospheric concentration exceeds 5% of the LEL or if the oxygen content exceeds 23%.

Between 0% and 10% of the LEL, you can perform cold work.

Between 0% and 25% of the LEL, you can perform inspection work.

Alternatively, work may be carried out in the confined space if the combustible, explosive or flammable atmosphere is rendered inert by an inert gas (such as nitrogen, argon, helium, or carbon dioxide).

Inerting is the process of replacing the potentially combustible atmosphere in a confined space with a non-combustible gas such as nitrogen, argon, helium, or carbon dioxide.

The atmosphere must be monitored continuously to ensure it remains inert. The worker in the confined space must use adequate respiratory equipment as well as adequate equipment to help people outside the confined space locate and rescue the worker if a problem occurs.

The inert gas will replace all of the oxygen as well as the combustible gases in the confined space.

Workers entering the confined space should use NIOSH-approved air-supplied respirators. After work is completed, the confined space must be properly ventilated, and a qualified person must test the confined space to see if it is safe.

11. Ventilation/Purging

This is the most effective method of control. The space can be purged of dangerous atmospheres by blowing enough fresh air in, and/or by removing (or suction-venting) the bad air and allowing clean air in. Studies have shown that the best results are obtained by blowing fresh air into a space close to the bottom. Check the efficiency of ventilation by re-testing the atmosphere with the gas detection equipment before entry.

When ventilation is used to improve the air in a confined space, ensure that the toxic or flammable gases or vapours removed from the space do not pose a risk to other workers. "Exhaust air" should not be discharged into another work area.

If you use mechanical ventilation to maintain acceptable atmospheric levels by providing a continuous supply of fresh air, you must have a warning system (i.e., an alarm) and exit procedure in case there is a ventilation failure. The alarm should be activated by a pressure switch at the fan rather than by electrical failure. This ensures that the alarm is activated if the fan belt fails.

In cases where the concentration of explosive gas or vapour is higher than the UEL, ventilation will bring the concentration down into the "Explosive Range."

This is one reason why you should use only "explosion-proof" fans.

These may be specially designed fans powered by electricity or compressed air. Some pneumatic air movers may also be suitable.

For manholes, you can use portable fans. These usually provide around 750-1,000 cubic feet of air per minute. A typical manhole 10 feet deep and 5 feet wide contains 196 cubic feet. Blowing in 750 cubic feet per minute should provide an air change every 15 seconds and easily dilute or displace most dangerous atmospheres.

Fans capable of moving 5,000 cubic feet per minute are available for use in larger tanks and vessels.

This type of ventilation may not be adequate in situations where additional toxic or explosive gases or vapours may be generated (e.g., during cleaning and resurfacing tanks or by disturbing sludge and scale).

In the case of welding or other work which generates a localized source of toxic gas, fume, or vapour, an exhaust ventilator can be used to draw out and discharge the hazard in an open area.

Options must be evaluated by someone who understands the risks of the work being done.

Worker Training

Workers must be trained before they enter a confined space. The training must include:

- recognizing the hazards (including potential hazards) in the confined space
- safe work practices, including the use of all equipment such as ventilation equipment, air monitors, and personal protective equipment.

It is strongly recommended that:

- the employer use an evaluation procedure (a test) to ensure that workers have acquired the knowledge necessary to safely perform their duties
- inexperienced workers team up with experienced workers.

You must review the content of the training at least annually, and whenever there is a change in circumstances such as a change in an industrial process.

If the review indicates that the training is not adequate, you must provide additional training.

You must keep a record of the names of trainers, trainees, as well as the date of training. If the project's joint health and safety committee or health and safety representative wants a copy of the record, you must provide one.

Entry Permits

Permits are valuable tools for planning, evaluating, and controlling confined space entries.

A permit involves a formal system of procedures and is issued by the employer before any worker enters the confined space. A competent person must verify that the permit issued complies with the plan before every shift.

The duration of an entry permit must not exceed the time required to complete the task. Entry permits should be understood by everyone involved in the job and must be readily available to every person entering the confined space.

At the very least, the entry permit must include:

- the location and description of the confined space
- a description of the work
- a description of the hazards and the corresponding controls
- the time period for which the entry permit applies
- the name of the standby person
- a record of each worker who enters and leaves
- a list of the equipment required for entry and rescue, and verification that the equipment is in good working order
- the results of the atmospheric testing
- additional procedures and control measures if hot work is to be done

The entry permit may also include:

- a record of the hazard assessment
- the hazard control plan
- the training records.

Unauthorized entry

The constructor must ensure that each entrance to the confined space is secured against unauthorized entry and/or has adequate barricades or signs warning against unauthorized entry.

Record Keeping

The employers must keep records of every

- plan
- assessment
- coordination document
- training
- entry permit
- record of rescue equipment inspection
- record of tests

The records must be kept for at least **one year** after the project is finished, and they must be available for inspection.

Pre-Entry Training

Only trained and qualified employees will be authorized as entrants, standby persons, qualified persons, or in-house emergency responders. Training will ensure that they have the understanding, knowledge, and skills to perform their duties safely. Workers must receive training:

- Before their duties are assigned or changed.
- When their work presents a hazard for which they have not been trained.
- When they do not follow entry procedures.

The table below certifies the following employees have received pre-entry training.

EMPLOYEE NAME	***TYPE OF TRAINING***	***TRAINER'S SIGNATURE***	***DATE***

Name of Space *(permit expires at end of shift)*		
Date of Entry	Time Entry Begins	
Date Expires	Time Permit Expires	
Name of Standby Person	Time Start	Time Stop
Name of Standby Person	Time Start	Time Stop

ATMOSPHERE ☐ **High hazard** ☐ **Moderate hazard** ☐ **Low hazard**

Location/designation of space		
Describe space		
Describe work to be done		
Signature of person supervising this confined space entry	Date	Time Valid
Signature of person supervising this confined space entry	Date	Time Valid

Entry Permit must be completed, signed, and posted at the primary entrance when any of the following occurs:

- Lockout is required prior to entry
- Blanking or blinding is required to isolate the space prior to entry
- The space has piping coming into it that cannot be blanked or blinded
- There is risk of entrapment or of being buried/drowned
- Air quality would prevent self-rescue if ventilation or other equipment failed
- Mechanical ventilation is not provided
- Ventilation cannot keep contaminants below permissible concentrations

Ventilation

CHOICE #1 (for any HIGH or MODERATE atmospheric hazard)	Ventilation required to maintain 20 air changes per hour (show cfm and name of ventilator)
CHOICE #2 (used for LOW hazard atmospheres only)	Only natural ventilation used as means of providing ventilation?

If Yes to Choice #2 then:

- Space must be over 64 ft^3 per occupant and
- Space must be a LOW hazard and
- Continuous monitoring must be in place and
- Air flow in space must be continuously measured

Note: minimum ventilation required for any space is 50 cfm per person. Ventilation must be adequate to provide good clean respirable air to workers inside the space. Providing 20 ac/hr will maximize mixing and will generally provide a good supply of air. Place ventilator hose close to the area where workers are working. Long ducts, ducts with interior roughness, tight bends and numerous bends all increase resistance and decrease air flow.

Name of Space *(permit expires at end of shift)*

GAS TEST - MONITORING

	Testing must be done for:	**Contaminant - Reading from the Monitor**				
		Oxygen (min 19.5% - max 23 %)	**Flammables/ Explosive** (max 10% of LEL)	**Carbon Monoxide** (max: 8-hr avg 25 ppm)	**Hydrogen sulfide** (ceiling limit 10 ppm)	**Other** (i.e., Cl_2 max 8-hr avg 0.5 ppm) Check hazard assessment
Init		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	Not required
	Pre-purge reading (ensure air travelling through hose has enough time to reach sensors)					
	Time					
	Post-purge reading					
	Time					
	Time					
	Time					
	Time					
	Time					
	Time					
	Time					
	Time					

CONTINUOUS MONITOR TEST RESULTS are written accurately:

Date of calibration	Name of tester(s)

(Depending on use, the monitor may need calibration on a weekly or daily basis.)

Note:

- No entry allowed if: Flammables greater than 20% of lower explosive limit (LEL)
- No entry without high hazard precautions if: oxygen level is less than 19.5% or greater than 23% or hydrogen sulphide greater than 5 ppm, or carbon monoxide greater than 12 ppm, or flammables greater than 10% LEL, or risk of entrapment, or being buried/drowned, or confined space is an extension of an excavation (with potential for off-gassing of contaminated soil)
- Monitoring must be continuous. Standby person must enter gas test results once every four hours or any time the space has been vacated for more than 20 minutes.
- If initial test results indicate contaminants or lack of oxygen, purging is required. If 20 ac/hour is provided with good mixing inside the space and no additional contaminates are being generated, then purge time is 15 minutes. If airflow is less than 20 air changes per hour into the space, purge time must be increased accordingly (example-only 10 ac/hr, then 30 minutes required for purge).

Name of Space *(permit expires at end of shift)*

Signature of Standby person

I certify that my sole duty at this worksite in the time period specified on the front of this permit is standby person. I will be documenting the continuous monitor readings and ensuring the check-in/check-out sheet is completed as well as the duties required of me as standby person.

Standby person's signature	Standby person's signature

ENTRY/EXIT CHECKLIST

Legend: Standby person to write an "/" each time the named worker enters the confined space (/) and write an "\" each time the named worker exits (\) forming an "X" for a completed entry/exit (X).

Name of Worker	Status															

Personal Protective Equipment that must be worn

☐ Hard hats	☐ Eye Protection	☐ Footwear
☐ Gloves	☐ Respiratory Protection	☐ Full body harness

Consider the following:

1. Small access point (restricts access)
2. Sloped floor (risk of slipping)
3. Material placement (restricts access)
4. Equipment placement (restricts access)
5. Equipment in space (requires lockout)
6. Internal baffles (restricts access)
7. Heights or depths (risk of falling)
8. Near power lines (risk of electrocution)
9. Stacking or bridging of materials (risk of engulfment or being buried)
10. Presence of pinch points (risk of being caught between)
11. Upstream fluids (risk of drowning)
    11a. Upstream solids (risk of engulfment
12. Slippery flooring (risk of slipping)
13. Laser measurement devices are present (risk of eye injury)
14. Dust in space (irritation or restricted vision)
15. Power tools (risk of electrocution - GFCI required
16. Hot work being done (risk of fire)
17. Use of irritant or corrosive chemicals
18. Rusting substances using up oxygen
19. Internal baffles restricting ventilation
20. Equipment placement restricting ventilation
21. Below grade potential for gases to sink into space
22. Near contaminant sources that may affect atmosphere
    22a. Risk of upstream gases (risk of being overcome)
23. Near spill sources that may require coordination with other agencies
24. Radiation - isotope measuring devices
25. Flammable dust - non-flammable dust
26. Temperature extremes - too hot, too cold
    26a. Use of steam to clean (risk of inhalation of mists)
27. Compressed gas
28. Excessive noise
29. Hot work or use of chemicals causing exposure above limit
30. Materials being used to clean the space are toxic (risk of being overcome or becoming ill)
31. Contaminants existing inside the space that cannot be cleaned or purged prior to entry

Name of space *(permit expires at end of shift)*

CONTROL MEASURES (see considerations on page 3. List below)

TO GET HELP in an EMERGENCY

PHONE: **RADIO**:

Be prepared to give exact location and circumstances to dispatch.

DO NOT ENTER SPACE TO RENDER ASSISTANCE (unless you are trained to do so, and another qualified standby person is stationed at the entranceway). Your job is to get help, not to provide any rescue service unless you have been specifically trained as a rescue worker.

Chapter 16

Driver Safety Policy

Policy

The success and the safety of Company employees depends on the mutual cooperation of each employee who has been entrusted with the responsibility of driving a company vehicle, or their own vehicle, while conducting company business.

In order to reduce vehicle accidents and limit liability because of driver negligence, our Company has adopted a Driver Safety Program.

Procedure

The procedures set forth in the Driver Safety Program will be the guidelines for management adherence to this policy.

Responsibility

The supervisors at ***Dan-Ex Contracting Ltd.*** have the primary responsibility for management of the Driver Safety Program.

Glenn Willesen will appoint a responsible representative to report all driver information requested by our insurance broker.

Monitoring

Glenn Willesen is also responsible for the records of the Driver Safety Program. Duties will include, but are not limited to:

- Be responsible for monitoring the driving record of those persons who operate the company vehicles or their own "personal" vehicle while on company business.
- Monitor the Driver's Safety Program and report to management any suggestions for improvement or needed changes.
- Monitor the maintenance policy of fleet vehicles so that they are kept in safe condition
- Review each vehicle accident report or infraction with management.
- Monitor renewals of insurance records.

Motor Vehicle Safety

The safety of employees at ***Dan-Ex Contracting Ltd.*** is of utmost importance. The selection of employees who will be required to drive full or part-time will be done with care. Drivers of company vehicles can be considered qualified when they meet the following criteria:

- Possess a valid driver's licence of the proper class.
- A review of driving record shows that they do not pose an unreasonable risk.

Driver Training

All employees driving company owned vehicles for ***Dan-Ex Contracting Ltd.*** will be trained in safe operation of assigned vehicle.

- Defensive driving
- Split-second decision making
- Backing-up rules
- Safe distances
- Intersection driving
- Poor condition driving in dust storms, rain, etc.

Preventive Maintenance

Establishment of a preventive maintenance program for all COMPANY vehicles is essential. Record jackets will be maintained on all vehicles so that a log can be maintained on all planned maintenance, as well as repairs made from noted defects.

Vehicle Inspection

Each vehicle or piece of equipment shall be inspected on a daily basis by the operator before and after operation. Each operator is responsible for the safe condition of the equipment. Any vehicle having steering, brake, or other safety problems is not to be operated until repairs have been made by a mechanic. Any other unsafe conditions are to be reported to the operator's supervisor as soon as possible.

Vehicle Operation

All COMPANY vehicles and equipment are to be operated in a safe manner and operators will adhere to all applicable laws. The operator is fully and totally responsible for the safe operation of the equipment. The operator shall report any accidents, or damage, to the Vehicle Operations Supervisor.

Drivers

Drivers of vehicles that are owned, rented or leased by The Company will be required to follow defensive driving techniques and practices. The basic defensive driving practice is to plan ahead and do everything that one can reasonably do to prevent an accident. This is to include the use of seat belts.

The following guidelines will be followed:

Drivers for our Company must possess a valid driver's licence in order to operate any company vehicle or their own personal vehicle on company business. The duties of drivers will be reviewed. The requirement will be noted by the employee's supervisor or personnel staff at the time of hire.

The driver should be physically and mentally capable of driving the vehicle he/she is assigned to drive, whether the vehicle is a car, van, or truck.

Pre-operation of Vehicles

Prior to the assignment of any vehicle to any employee or prior to allowing an employee to drive "Their Own Personal Vehicle" on company business, the following minimum standards will be implemented and records maintained to ensure that the driver is qualified to drive the vehicle and minimize the risk of liability to our Company.

Initial Assignment

Verification and recording of date any type of driver's licence held and renewal date noted. A review of the driver's province Motor Vehicle Record for the most recent three-year period to include the following:

- Review of the accident report history showing the dates and types of accident regardless who was at fault.
- Review of the traffic violations for the last three years, with evaluation of acceptable driving records according to Company guidelines.
- Confirmation of personal insurance for those driving their personal vehicle while on company business.
- Physical examinations when required by the province for the driving of specified vehicles or by funding and licensing contract.
- The driver with a major conviction shall be immediately suspended from driving any company vehicle or their personal vehicle on company business.
- Driving a company vehicle while under the influence of drugs or alcohol will subject the employee to disciplinary action up to and including dismissal.

Annual Review

Once each year, a request for current licence information will be sent to each Company employee. Employees who drive a company vehicle, or if they request mileage reimbursement for driving their personal vehicle on company business, will have their personal driving record reviewed. It will be the responsibility of the employee to respond in a timely manner. Failure to respond to the request for information by personal vehicle drivers may result in the delay of mileage reimbursements.

A review of each driver's file and record will be made annually and will include all of the criteria above as appropriate for each employee. This will not preclude request of driver's records for review by **Glenn Willesen** as deemed necessary.

Note: Police shall be called to investigate all vehicle accidents for ***Dan-Ex Contracting Ltd.***. It is vehicle operator's immediate supervisor's responsibility ensure that all facts are obtained with respect to the driver. Under no circumstances should any employee make any statement relative to liability or draw any conclusions as to the facts asserted at the scene. The occurrence of a vehicle accident may or may not be the fault of the employee. It is important to investigate and determine the cause of the accident and any necessary corrective action that may taken by the employee's immediate supervisor.

Questions to Help Determine if a Vehicle Accident was Preventable

One basic question in determining preventability is: "Did our employee take every reasonable precaution to avoid the auto accident?" If "No," our driver was not driving defensively therefore, the accident should be judged "preventable." Please note that legal liability or any citations should never influence the decision of determining preventability of an accident. See following page.

Answer the following questions which adhere to the given situation(s):

Intersection Accidents

Y	N	
☐	☐	Did our employee approach the intersection at a controlled speed that was reasonable for conditions?
☐	☐	Was our driver prepared to stop before entering the intersection regardless of right of way?
☐	☐	Did our driver avoid entering an intersection on the amber signal?
☐	☐	Did our driver avoid overtaking or passing at the intersection?
☐	☐	At a blind corner, did our driver approach slowly, with a foot on the brake pedal?
☐	☐	Did our driver make certain all other drivers were stopping for a traffic light or stop sign?
☐	☐	Was our driver alert for the turns of other vehicles?
☐	☐	Did our driver signal his/her change in direction well in advance?
☐	☐	Did our driver allow oncoming traffic to clear before making a left turn?
☐	☐	Did our driver turn from the proper lane?

We Were Hit by another Vehicle While Stopped or Parked

☐	☐	Did our driver properly signal his/her intention to stop?
☐	☐	Did our driver avoid coming to a sudden stop?
☐	☐	Was our driver parked on the proper side of the road?

We Pulled from Parked Position

☐	☐	Did our driver look to the front and rear for approaching traffic immediately before pulling out?
☐	☐	Did our driver look back, rather than depending upon the rear vision mirrors?
☐	☐	Did our driver signal before pulling away from the curb?
☐	☐	Did our driver start out only when an action would not require traffic to change its speed or direction in order to avoid our vehicle?
☐	☐	Did our driver continue to glance back while pulling out?

We hit the other vehicle in the rear

☐	☐	Did our driver adjust speed to the conditions of the road, visibility and traffic?
☐	☐	Was our driver maintaining a safe following distance for conditions?
☐	☐	If a vehicle pulled in front of our vehicle, did our driver drop back and re-establish the proper following distance?
☐	☐	Did our driver approach the green traffic light cautiously, expecting the driver ahead to stop suddenly on a signal change?
☐	☐	Did our driver look ahead of the vehicle in front for possible emergencies?

We Were Backing

☐	☐	Was it necessary to back?
☐	☐	Did our driver have to park so close to the vehicle or obstacle ahead that backing was necessary when leaving the parking space?
☐	☐	If our driver could not see where to back:
☐	☐	Did the driver try to get someone as a guide?
☐	☐	Did the driver walk around the vehicle before getting in?
☐	☐	Did the driver back immediately after walking around?
☐	☐	If applicable, did the driver use the cone policy correctly?
☐	☐	Did the driver use the horn while backing?
☐	☐	Did the driver look to the rear without depending on the rear vision mirrors?
☐	☐	Did the driver back slowly?

We Skidded

☐	☐	Did our driver travel at a speed safe for the conditions of weather and road?
☐	☐	Was our driver keeping a safe following distance?
☐	☐	Was our driver alert for loose gravel, sand, ruts, etc.

Pedestrians

☐	☐	Did our driver tap the horn to alert pedestrians of our vehicle approach?
☐	☐	Did our driver pass through congested section anticipating that pedestrians might step in front of the car?
☐	☐	Did our driver keep as much clearance between our vehicle and parked cars as conditions permitted?
☐	☐	Did our driver interpret the pedestrian's next action or intention?
☐	☐	Did our driver check the location of pedestrians before staring at a green signal?
☐	☐	Did our driver give all pedestrians right of way?
☐	☐	Did our driver refrain from passing a stopped school bus?
☐	☐	Was our driver alert for signs of children who might run into the path (balls rolling into street, etc.)?

Preventing Collision with a Vehicle Ahead

An extremely frequent and costly accident is the collision with the vehicle ahead. There are five steps that can be taken that will help you avoid being involved in a collision with the vehicle ahead:

Be Alert — Watch for signs from the driver or drivers ahead as to what they intend to do. Are their turn signals on? Are their brake lights lit?

Drive Ahead of the Situation — Look beyond the vehicle ahead to see situations that may force him to act quickly and thereby become a threat to you.

Stay Back — Allow plenty of following distance. Allow one car length (using your own vehicle as a measure) for every 15-16 km (10 miles) of speed and allow even more distance in adverse weather or road conditions.

Stopping Ability — This is the distance necessary to bring your vehicle to a stop that depends on a number of factors. The first is "driver reaction time". This is the time it takes for the driver to see the need to stop, take his foot from the accelerator to the brake pedal and begin to apply the brake. "Driver reaction distance" is based on an average driver reaction time of ¾ of a second for a typical driver under normal driving conditions. The distance travelled during the reaction time of ¾ of a second will depend upon the speed of the vehicle.

The second ingredient involves "braking distance". This is the distance travelled from the time the brake is applied until the vehicle is brought to a stop. This distance will also vary based on the speed of the vehicle. The type and condition of the pavement surface will also affect the braking distance, the type and condition of tires, and the condition of the brakes.

Begin to Stop Sooner — Slow down and touch your brakes the instant you see a hazard developing. The situation may require you to stop. Failure to do this is known as "delayed braking" – a serious flaw in good defensive driving techniques. A defensive driver should not have to make a true "panic" stop more than once a year. Stopping ability can be expressed as a formula:

REACTION DISTANCE + BRAKING DISTANCE = TOTAL STOPPING DISTANCE

Remember, moving at 88.5 kilometres (55 mph) produces a travel distance of 24.3 metres (81 feet) for each second of delay.

How to Avoid Backing Accidents

Backing can be a "dangerous manoeuvre". Because of the hazards of backing, the defensive driver avoids backing whenever possible by planning an alternative manoeuvre or choosing another route.

The defensive driver does not back out of parking lots, driveways, or alleys when he can avoid it. Instead, he drives in and turns around so he comes out front first. When this is not possible, he backs in so that he can drive forwards to come out. He knows it is safer to back out of traffic into a quiet area than to back into a heavy traffic stream.

When backing is unavoidable, follow these rules:

- **"Size up the situation"** thoroughly and completely, even if you have to get out of your vehicle to do so. Then start backing promptly before the backing situation changes.
- **Back slowly.**
- **Check both sides as you back**. Check your mirrors often during the backing movement.

- **Do not depend entirely** on your mirrors to judge distance to the rear. Mirrors help you to spot pedestrians who may unexpectedly move into the path of your backing vehicle, but mirrors can be deceiving in estimating or measuring distances and clearances.

Avoid a Collision with a Following Vehicle

There are measures you can take to avoid being hit from behind:

- **Signal Your Intentions —** Use your directional signals and your brake lights.
- **Stop smoothly —** if you follow the rule for avoiding a collision with a vehicle ahead, you will also reduce the chances for a collision of the vehicle following.
- **Keep Clear of Tailgaters —** Do not let a tailgater rile you. Just slow down. Increase the following distance between your vehicle and the vehicle ahead, so you do not have to brake suddenly if a tailgater hits you.

Avoid a Rear-End Collision When Stopped

- ***Keep a foot*** on the brake pedal to activate lights.
- ***Stay at least*** 1.8 metres (6 feet) away from any stopped car ahead to avoid the "domino", multi-collision chain reaction effect.
- ***Keep your lights*** on at dusk or in the rain or other poor visibility conditions.

The Technique of Passing

Any passing manoeuvre often entails risk. The following twelve points will help to reduce that risk:

1. Decide if the Pass manoeuvre is necessary.
2. Make certain there is a safe following distance between you and the vehicle ahead.
3. Check the traffic ahead if you are moving in the oncoming traffic lane. If your vehicle and the oncoming vehicle are both travelling at 88 km (55 miles) per hour, you are closing the gap between you at the rate of 48.3 metres (161 feet) per second. Since it takes 10 seconds to complete the task, the oncoming car should be at least ½ kilometre (1/3 mile) away.
4. Check the traffic behind you before changing lanes. First check your mirrors and then your blind spot.
5. Signal with your left turn signal before you change lanes.
6. Move into the left lane.
7. Accelerate as you move alongside the vehicle you are passing.
8. Signal the vehicle you are passing by tapping your horn or flashing your lights if you deem this necessary – especially at night.
9. Signal your intention to return to the right lane by the use of directional signal.
10. Return to the right lane when you can see all of the passed vehicle(s) in the right rear-view mirror.
11. Do not forget to cancel your directional signal.
12. Resume your proper cruising speed as soon as you have completed your passing manoeuvre.

Driving Emergencies

Brakes Fail — If there is any resistance, pump the pedal. You may be able to work up enough pressure to help somewhat.

Most vehicles are equipped with a dual brake system. If one system fails, the back-up system should work. If pumping the brake pedal does not help, coast in "drive" gear and use the parking or hand brake.

If you want to slow faster, shift to lower gears which will permit engine compression to help you slow your vehicle. Use your horn or lights to warn other drivers and pedestrians that you are in trouble and out of control.

Skid — If the rear of the vehicle starts to slide, take your foot off the gas at once. Your first instinct may be to turn hard away from the direction of skid. Do not! That will really spin you.

Turn your wheels in the same direction of the skid – but be careful, do not over-steer. You will be able to feel when the vehicle regains rolling action, and then straighten the wheel.

"Never hit the brakes as a side skid correction". For fast stopping with the least chance of causing a side skid, pump your brakes hard with a rapid jabbing and releasing pressure on the brake pedal. Disc brakes require slower pumping.

Blow-Out — Keep a firm and steady grip on the steering wheel and do not over-steer to correct swerve or pull.

If a front tire fails, there will be a strong pull to the side of the blow-out. A rear blow-out tends to cause weaving of the rear end. Do not slam on the brakes. Brake smoothly - but easily.

Day or night, set out flares or other warning devices such as reflectors and turn on your light flashers.

Stopping on the Freeway — On a freeway with paved shoulders, signal and pull off the road at near traffic speed, then slow down. Do not obscure your taillights by standing or working behind your vehicle. Day or night, place a flare or reflector warning device about 4.5 metres (15 feet) behind the vehicle and another at about 90 metres (300 feet) further back.

Seat Belts

Seat belts have been provided for your safety. They should be worn and properly adjusted at all times when your vehicle is in motion.

Accident Reporting

When reporting a vehicle accident involving other vehicles and persons, be certain that you have all pertinent information regarding other vehicles or equipment, any persons involved, and specific circumstances of the mishap.

Become familiar with the COMPANY reporting form and procedures. Know where to obtain copies of the form and keep them in your assigned vehicle at all times.

Accident Scene:

- Secure the scene to prevent other accidents from occurring.
- Place warning cones, flashers, reflectors or flares to protect the scene.
- Report injuries to emergency response services.

Accident Data:

- Date, time and location of the accident – list streets and known landmarks.
- Describe in detail what & how it happened - use a diagram to illustrate the scene.
- Road surface, weather and light conditions.
- Names, addresses and telephone numbers of parties involved.
- Determine who was injured, extent of injury and report their role in the accident.
- If injured persons on scene, where were they taken and by what means of transportation (drove self, by friend, by ambulance).
- Names, addresses and telephone numbers of witnesses and their statements.
- Licence numbers of vehicles and description of the damage.
- Name and badge number of responding police officer, if available.
- Take pictures of the accident scene, paying attention to injured persons and property damage. Take picture close up as well as far away that indicate cross streets, background landmarks that can document the accident location.
- In accidents not involving other vehicles or people, record the information outlined in your accident report kit and submit it to your fleet supervisor.

Accident Review

Determining Preventability

When a driver reports an accident, a COMPANY accident review committee must determine whether the accident was preventable by the driver involved. The board should consist of the vice president of operations, the fleet supervisor, the company safety director and any other person deemed necessary. Once preventability is determined, the committee should decide the disciplinary actions to be assigned to the driver involved.

Preventable Accidents

A preventable accident is any occurrence involving an owned or operated vehicle that results in property damage and/or personal injury. This applies regardless of who was injured, what property was damaged, to what extent or where it occurred, and whether or not the driver in question failed to do everything possible to prevent it. The following paragraphs are offered as a guide in determining the preventability of these accidents.

Guidelines to Determining the Preventability of Accidents

Accidents involve so many different factors that it is impossible to set hard and fast rules to classify them as preventable or non-preventable. The accident review board will make this determination. In making these decisions, the board will answer the question "What standard of safe driving performance do we expect from our drivers in this company?" Drivers respect a strict interpretation of the rules so long as the company takes the time and effort to ensure that these interpretations are made consistently and fairly.

Intersections

It is the responsibility of all drivers to approach, enter, and cross intersections prepared to avoid accidents that might occur through the action of other drivers. Complex traffic movement, blind intersections, or failure of the other driver to conform to law or traffic control devices will not automatically discharge an accident as "non-preventable".

Intersection accidents are preventable even though the driver has not violated traffic regulations. The vehicle operator's failure to take precautionary measures prior to entering intersections is a factor to be studied in making a decision.

When a driver crosses an intersection and the obvious actions of the other driver indicate possible involvement, either by reason of excess speed, crossing a lane in turning, or coming from behind a blind spot, the decision should still be a preventable accident.

Practically any backing accident is preventable. A driver is not relieved of the responsibility to back safely, even when a spotter is involved in the manoeuvre. The spotter cannot control the movement of the vehicle; therefore, a driver must make sure all backing zones are clear.

Front-End Collisions

Regardless of the abrupt or unexpected stop of the vehicle ahead, your driver can prevent accidents of this nature by maintaining a safe following distance, knowing the conditions of the road and the load. This includes being prepared for possible obstructions on the roadway, either in plain or hidden view. Overdriving headlights at night is a common cause of front-end collisions. Night speed should not be greater than that which will permit the vehicle to come to a stop within the distance illuminated by the vehicle's headlights.

Rear-End Collisions

Investigation will often disclose that a driver risked being struck from behind by failing to maintain a margin of safety in his/her own following distances or making abrupt lane changes. Rear-end collisions preceded by a rollback, an abrupt stop at an intersection, when a traffic signal changes, or when your driver fails to signal a turn or slow down gradually should be charged as preventable.

Passing

Failure to pass another vehicle safely indicates faulty judgment and possibly failure to follow the important factors a driver must implement before attempting to pass. Unusual actions of the driver being passed or of oncoming traffic might appear to exonerate a driver involved in a passing accident; however, the entire passing manoeuvre is voluntary and your driver is responsible for a safe pass.

Being Passed

Sideswipes and cut-offs involving a driver while being passed are preventable when the driver fails to yield to the passing vehicle by slowing down or moving to the right where possible.

Lane Encroachment

A safe driver is rarely a victim of entrapment by another driver when changing lanes. Similarly, entrapment in merging traffic is an indication of unwillingness to yield to other vehicles or to wait for a break in traffic. Blind spots are not valid excuses for lane encroachment accidents.

Drivers must make extra allowances to protect themselves in areas of limited sight distances. Squeeze plays causing involvement with parked cars, pillars, and other road structures can be prevented by dropping back when it is apparent that the other driver is forcing the issue or contesting space on the road.

Grade Crossings

Preventing collisions with rail track vehicles, such as trains, occurring at grade crossings, in traffic, or on private property is the responsibility of the driver. When a vehicle is parked across a rail siding, the driver must first determine if it is safe and permissible. He/she must stand by in case conditions change by the movement of railcars. Common grade crossing accidents occur on county/country roads that lack crossing indicators, barriers and flashing lights. At these crossings, it is important for the driver to have clear sight, up and down the tracks in both directions, prior to crossing.

Oncoming Vehicles

It is important to check the action of the driver when involved in a head-on or sideswipe accident with a vehicle approaching from the opposite directions. Exact location of the vehicles, prior to and at the point of impact, must be fully clarified during the accident review process. Even though an opposing vehicle enters a driver's traffic lane, it may be possible for your driver to avoid the collision. Your driver can take actions to make their presence known such as flashing lights or sounding the horn.

Turning

Turning movements require the most exacting care by a professional driver. Squeeze plays on left or right turns involving other vehicles or pedestrians are the responsibility of the driver making the turn. Failure to signal, to properly position the vehicle for the turn, to check the rear-view mirrors, to check pedestrian lanes or to take other defensive actions should be considered during the accident review.

You may find that your driver failed to take precautionary actions from indicators given by the other driver immediately preceding the incident. U-turns by your driver that result in a collision are considered preventable accidents.

Passenger Accidents

Passenger accidents in any type of vehicle are preventable when they are caused by the faulty operation of the vehicle. Even though the incident did not involve a collision, it must be considered preventable when your driver stops, turns, or accelerates abruptly, resulting in an injury to a passenger. Emergency actions taken by your driver to avoid a collision should be reviewed to determine that the action would/did eliminate a vehicle collision. In such cases, injury to the passenger would be considered non-preventable.

Pedestrians

Traffic regulations and court decisions generally favour the pedestrian hit by a vehicle. Unusual route of a pedestrian at mid-block or from between parked vehicles does not necessarily relieve the driver from accident preventability. Whether speed limits are posted or the area is placarded with warning signs, speed too fast for conditions may be involved as contributing factors.

Weather

Adverse weather conditions are not a valid excuse for being involved in an accident. Rain, snow, fog, or icy pavements have never caused an accident. These conditions increase the hazards but do not cause accidents. Failure to adjust driving habits to prevailing weather conditions or to "call it a day" when necessary, should be cause for deciding such accidents are preventable. Failure to use safety devices, such as snow chains when required, contributes to accident preventability.

Alleys, Driveways, and Entrances

Accidents involving traffic originating from alleys, driveways, entrances, and other special intersecting roadways should be carefully analyzed to determine what the driver might have done to avoid the accident. Failure to slow down, sound the horn, look for hazards, or yield to others can be considered reasons to call an accident preventable.

Fixed Objects

Collisions with fixed objects are preventable. They usually involve failure to check clearances to the side and overhead. The driver is responsible to be on the lookout for such obstacles, to proceed slowly in unfamiliar locations, and use ground-guides if necessary.

Parking

Unconventional parking locations, including double parking, failure to put out warning devices, etc. generally constitute evidence for judging an accident preventable.

Rollaway accidents from parked positions normally are considered preventable. This includes unauthorized entry into an unlocked and unattended vehicle, failure to properly block wheels, turn them to the curb, or otherwise secure the vehicle from movement.

Mechanical Failure

Any accident caused by mechanical failure that reasonably could have been detected by the driver, should be considered preventable. It is the driver's responsibility to report unsafe vehicle conditions for repairs and make sure the vehicle is in safe operating condition at all times. When mechanical difficulties occur unexpectedly during a trip, the driver is responsible to report this condition to the company, seeking advice for emergency service. Failure to take precautionary action that results in an accident should be considered a preventable accident. An accident caused by mechanical failure that results from abusive driving should be considered preventable.

Pulling Away from Curbs/Parking

Particular attention should be paid to driver's actions when leaving a parking space or position. Many drivers do not take sufficient time to check for clearances in all directions. This type of accident is considered preventable.

Your company's driver training program should be divided into several levels:

1. Initial Training — new employee indoctrination.
2. Refresher Training — updates on routes, cargo, equipment, and regulations.
3. Remedial Training — used when there is a problem of substandard performance.

Your company's driver training program should include the following areas:

- Company rules and policies
- Equipment familiarization
- Routes and schedules
- Defensive driving techniques
- Government regulations
- Cargo handling
- Emergency procedures and warning devices
- Specific concerns or loss patterns

There are two approaches to training: classroom and in-vehicle. Classroom training can be accomplished using either a one-on-one or group approach. This method is useful for company rules, government regulations, routes and schedules, accident and emergency procedures, basic cargo handling methods, and basic defensive driving techniques. In-vehicle training is most effective for equipment familiarization, vehicle inspections, cargo handling and defensive driving. In-vehicle training provides one of the best methods of giving practical instruction to a driver under closely controlled conditions.

Driver Selection:

- Does a definite program for driver selection exist?
- Is it as good as it should be and is it adhered to, or is it mostly on paper and frequently forgotten when busy or short of drivers?

Driver Training:

- Is there a definite training program or is it on a "hit or miss" basis?
- Is the driver's past record checked carefully to determine whether reported experience and knowledge are factual?
- Does the program provide for retraining as necessary when unsatisfactory performance or accidents are identified?

Driver Supervision:

- Are supervisory responsibilities adequately handled, or is there overlapping and occasional friction?
- Are there areas where no one is clearly responsible?
- Can relations with drivers be improved?
- Can routing and scheduling procedures be improved for greater efficiency of operation and greater safety?

Company Driver Safety Audit

Driver Qualification

Y	N	N/A	
☐	☐	☐	Job Analysis
☐	☐	☐	Physical Qualifications
☐	☐	☐	Recruiting System
☐	☐	☐	Driver Qualification Files
☐	☐	☐	Application Form
☐	☐	☐	Interview
☐	☐	☐	Reference Check
☐	☐	☐	Road Test
☐	☐	☐	Motor Vehicle Record Review

Driver Training & Motivation

☐	☐	☐	Initial Training Program
☐	☐	☐	Company Rules and Policies
☐	☐	☐	Equipment Familiarization
☐	☐	☐	Routes and Schedules
☐	☐	☐	Emergency Procedures
☐	☐	☐	Accident Reporting
☐	☐	☐	Defensive Driving Techniques
☐	☐	☐	Regulations
☐	☐	☐	Cargo Handling / Securement
☐	☐	☐	Ongoing Training Program
☐	☐	☐	Incentive Program

Driver Supervision

☐	☐	☐	Vehicle Location Check
☐	☐	☐	Trip Recorder Checks
☐	☐	☐	Road Observation System
☐	☐	☐	Logs Checked

Applicant Road Test

Driver's Name: _____

Motor Vehicle Operator's Licence No. _____

Type of Licence: _____ Issuing Province: _____

Type of Vehicle: _____

Instructions to Examiner: Place a check mark in the appropriate box

Pre-Trip Inspection

Y	N	N/A	
☐	☐	☐	Checks general condition of vehicle
☐	☐	☐	Checks for proper operation of parking and service brake systems
☐	☐	☐	Checks steering mechanism
☐	☐	☐	Checks all lighting devices and reflectors
☐	☐	☐	Checks condition of tires
☐	☐	☐	Checks horn and windshield wipers
☐	☐	☐	Checks and adjusts rear view mirrors
☐	☐	☐	Checks emergency equipment

Placing Vehicle in Operation

☐	☐	☐	Uses seat belt
☐	☐	☐	Starts vehicle properly
☐	☐	☐	Checks air pressure in brake system
☐	☐	☐	Shifts gears properly
☐	☐	☐	Checks traffic conditions
☐	☐	☐	Does not allow vehicle to roll while stopped
☐	☐	☐	Drives with both hands on wheel
☐	☐	☐	Steers smoothly
☐	☐	☐	Maintains proper speed for conditions, within speed limit

Coupling and Uncoupling Combination Unit

☐	☐	☐	Checks that fifth wheel jaws are open
☐	☐	☐	Lines up properly with the trailer
☐	☐	☐	Connects brake and electrical lines
☐	☐	☐	Charges trailer brakes
☐	☐	☐	Backs slowly
☐	☐	☐	Visually checks for proper coupling of fifth wheel
☐	☐	☐	Assures that fifth wheel handle is in locked position
☐	☐	☐	Raises landing gear and removes wheel chocks
☐	☐	☐	Applies trailer brakes and gently tries to pull away from trailer

Backing and Parking

Y	N	N/A	
☐	☐	☐	Stops in correct position
☐	☐	☐	Avoids backing from blindside
☐	☐	☐	Gets out of vehicle and checks entire area, including overhead, before backing
☐	☐	☐	Uses mirrors properly

Intersections

☐	☐	☐	Prepares to stop vehicle if necessary, even if traffic signal is green
☐	☐	☐	Checks in all directions for traffic conditions
☐	☐	☐	Stops vehicle in proper location when required
☐	☐	☐	Does not allow vehicle to roll when stopped

Turning

☐	☐	☐	Makes sure vehicle is in proper lane for turn
☐	☐	☐	Signals intention to turn well in advance
☐	☐	☐	Approaches at proper speed
☐	☐	☐	Checks traffic conditions and turns only when intersection is clear
☐	☐	☐	Keeps vehicle in proper lane during turn
☐	☐	☐	Does not shift gears during turn

Railroad Crossing

☐	☐	☐	Checks in all directions when approaching crossing
☐	☐	☐	Comes to complete stop when necessary or required by law
☐	☐	☐	Stops at a safe distance when necessary
☐	☐	☐	Does not shift gears when crossing tracks

Passing

☐	☐	☐	Only passes in safe location, where legally allowed
☐	☐	☐	Checks ahead and behind to make sure passing room is adequate
☐	☐	☐	Warns vehicle ahead of intention to pass
☐	☐	☐	Uses directional signals properly
☐	☐	☐	Leaves sufficient space before cutting back into lane
☐	☐	☐	Does not exceed speed limit

REMARKS:

QUALIFIED: ☐ YES ☐ NO

Examiner's Name (please print) Title

Signature of Examiner Date

Motor Vehicle Accident Report

Company:

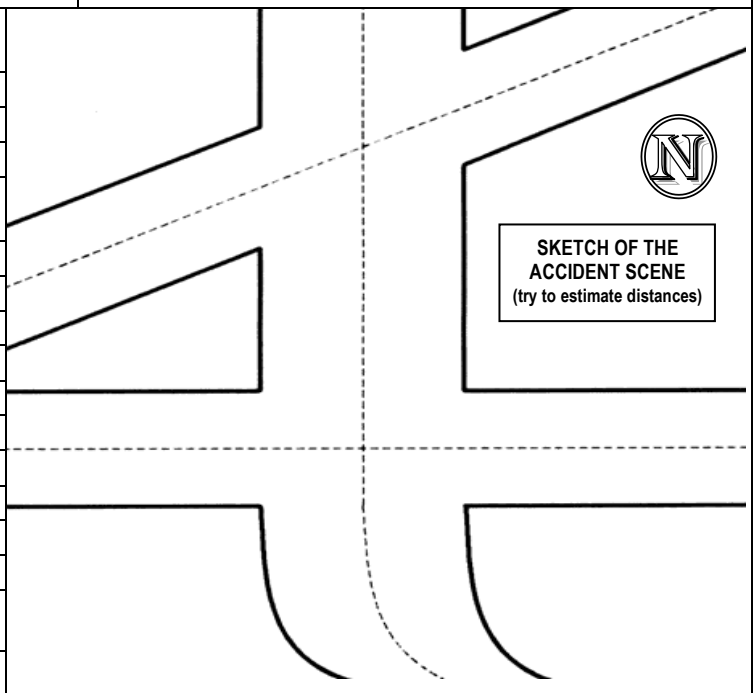
AFTER AN ACCIDENT: **1** Stay Calm **2** If the vehicles are drivable and it is safe to do so, move them safely out of traffic **3** Apply first aid (if properly trained) **4** Call police, and if necessary, ambulance **5** Take brief notes

Vehicle Driver Name	Other Vehicle Driver Name
Address	Address
Phone Driver Licence #	Phone Driver Licence #
Vehicle Type	Other Vehicle Type
Vehicle licence Plate #	Vehicle licence Plate #
Owner's Name	Owner's Name
Address	Address
Vehicle Insurance Co. Name	Other Vehicle Insurance Co. Name
Name Policy is Under Policy #	Name Policy is Under Policy #

Passenger Info	Passenger Info	Passenger Info	Passenger Info

Accident Details

Date of Accident	Explain how the accident happened
Time of Accident ☐ am ☐ pm	
Street	
City	
Province	
Approx Speed: Your KPH: Other KPH:	Describe your vehicle's damage
Describe any Injuries	
	Describe other vehicle's damage

Investigating Officer Name	
Phone Badge No.	
Police Department	
Investigating Officer Name	
Phone Badge No.	
Police Department	
Witness Info	
Witness Info	
Report Completed By	
Signature	

Chapter 17

Lift Truck Safety Policy

Policy Statement

Dan-Ex Contracting Ltd. shall ensure that each forklift operator is competent to operate the equipment safely, as demonstrated by the successful completion of the training and evaluation specified in OHS Regulations and the CSA Standard.

Operator Training for Safe Forklift Operation

Prior to permitting an employee to operate a forklift (except for training purposes), ***Glenn Willesen*** shall ensure that each operator has successfully completed the training required.

CSA Recommendation for Classroom times and Practical Sessions

Because people learn at different rates; a single recommendation for training time is not necessarily adequate for all situations. The times suggested reflect the best compromise recommended by the technical committee.

Note: Regardless of the recommended training time guidelines, the information as required by the CSA Standard must be conveyed to the trainee. The form in which this information is to be delivered may be left to the discretion of the instructor.

Classroom theory

Classroom theory sessions, require 8 hours (one full working day) for high lifts (i.e., greater than 30 centimetres (12 inches)) and 4 hours for low lifts or ground transports. In addition, time should be applied for each truck type to be used, as well as for each attachment to be used.

Note: These recommended times are based on:

- traditional instructing methods (i.e., instructor driven lesson with explanation, reinforcement, and verification of understanding);
- no language and/or literacy restrictions; and
- an adequate learning environment (e.g., classroom facility with adequate lighting, temperature, etc.).

Practical training

All practical training detailed in the CSA Standard, including instruction, testing, and evaluation, should be performed on an individual basis (i.e., one-on-one), as follows:

- Eight hours of hands-on training is required for all new trainees of high lift trucks.
- Four hours of hands-on training is required for all new trainees of low lift or ground transport trucks.

Trainees reporting previous experience in lift truck operation, as determined and/or verified by the user, should be subjected to 2 hours for overview, instruction, testing, and evaluation. Additional training time may be necessary based upon this evaluation.

Training Program Implementation

Trainees may operate a powered industrial truck only:

- Under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence.
- Where such operation does not endanger the trainee or other employees.

Training shall consist of a combination of formal instruction (e.g., lecture, discussion, interactive computer learning, video tape, written material), practical training (demonstrations performed by the trainer and practical exercises performed by the trainee), and evaluation of the operator's performance in the workplace.

All operator training and evaluation shall be conducted by Competent (qualified) persons.

Training Program Content

Forklift operators for this Company shall receive initial training in the following topics.

Forklift-Related Topics:

- Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate.
- Truck controls and instrumentation: where located, what they do, how they work.
- Engine or motor operation.
- Vehicle capacity.
- Vehicle stability.
- Steering and manoeuvring.
- Visibility (including restrictions due to loading).
- Fork and attachment adaptation, operation, and use limitations.
- Vehicle inspection and maintenance the operator will be required to perform.
- Refuelling and/or charging and recharging of batteries.
- Operating limitations.
- Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of vehicle that the employee is being trained to operate.

Workplace-Related Topics:

- Surface conditions where the vehicle will be operated.
- Composition of loads to be carried and load stability.
- Load manipulation, stacking, and unstacking.
- Pedestrian traffic in areas where the vehicle will be operated.
- Narrow aisles and other restricted places where the vehicle will be operated.
- Hazardous (classified) locations where the vehicle will be operated.
- Ramps and other sloped surfaces that could affect the vehicle's stability.
- Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause buildup of carbon monoxide or diesel exhaust.
- Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.

Refresher Training and Evaluation

Refresher training, including an evaluation of the effectiveness of that training, shall be conducted as required to ensure that the operator has the knowledge and skills needed to operate the forklift safely.

Refresher training in relevant topics shall be provided to the operator when:

- The operator has been observed to operate the vehicle in an unsafe manner.
- The operator has been involved in an accident or near-miss incident.
- The operator has received an evaluation that reveals that the operator is not operating the truck safely.
- The operator is assigned to drive a different type of truck.
- A condition in the workplace changes in a manner that could affect safe operation of the truck.

An evaluation of each powered industrial truck operator's performance shall be conducted at least once every two years.

Certification

This Company shall certify that each operator has been trained and evaluated as required by OHS Regulations and the CSA Standard for Lift Trucks. The certification shall include the name of the operator, the date of the training, the date of the evaluation, and the identity of the person(s) performing the training or evaluation.

Introduction

Forklifts, also known as powered industrial trucks, are used in numerous work settings, primarily to move materials. Each year in Canada, dozens of workers are killed and many thousands are seriously injured in forklift-related incidents.

The three most common forklift-related fatalities involve forklift overturns, workers on foot being struck by forklifts, and workers falling from forklifts. Forklift overturns are the leading cause of fatalities involving forklifts; they represent about 25% of all forklift-related deaths. The case studies indicate that the forklift, the workplace environment, and actions of the operator can all contribute to fatal incidents involving forklifts. In addition, these fatalities indicate that many workers and employers are not using or may be unaware of safety procedures and the proper use of forklifts to reduce the risk of injury and death.

Reducing the risk of forklift incidents requires a safe work environment, a safe forklift, comprehensive worker training, safe work practices, and systematic traffic management.

CCOHS recommends that employers and workers comply with OHS regulations and consensus standards, maintain equipment, and follow the safety measures outlined in this section to prevent injury when operating or working near forklifts.

General Forklift Stability

The stability of a vehicle is a critical factor in safe operation of powered industrial trucks (forklifts). Determining the stability of a forklift is simple once a few basic principles are understood. There are many factors that contribute to a vehicle's stability: the vehicle's wheelbase, track, and height; the load's weight distribution; and the vehicle's counterweight location (if the vehicle is so equipped). The "stability triangle," used in most stability discussions, demonstrates stability simply.

Basic Principles

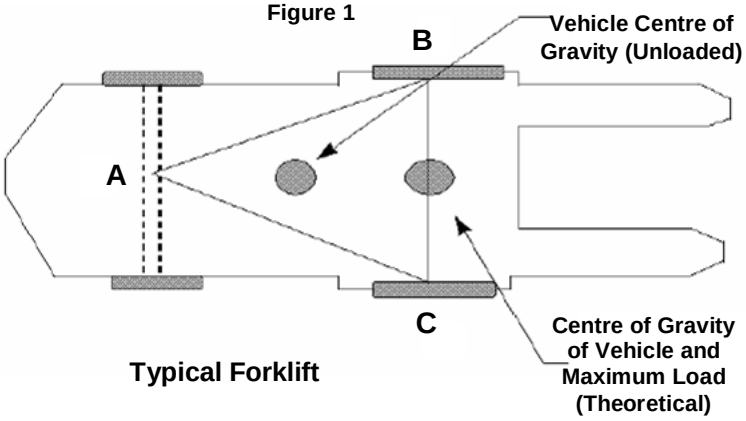
Whether an object is stable depends on the objects weight or momentum at one end of a system being greater than, equal to, or smaller than the objects weight or momentum at the system's other end. This principle can be seen in the way a see-saw or teeter-totter works: that is, if the product of the load and distance from the fulcrum (moment) is equal to the force at the devices other end, the device is balanced and it will not move. However, if there is a greater force at one end of the device, the device will try to move downward at the end with the greater force.

The longitudinal stability of a counterbalanced forklift depends on the vehicle's weight and the load's weight. In other words, if the mathematic product of the load weight, (the distance from the front wheels, the approximate point at which the vehicle would tip forward) to the load's centre of gravity times the load's weight is less than the vehicle's weight, the system is balanced and will not tip forward. However, if the load's weight and momentum is greater than the vehicle's weight, the greater load-moment will force the truck to tip forward.

The Stability Triangle:

Almost all counterbalanced powered industrial trucks have a three point suspension system, that is, the vehicle is supported at three points. The truck's steer axle is attached to the truck by a pivot pin in the axle's centre. When the points are connected with imaginary lines, this three-point support forms a triangle called the stability triangle. See Figure 1.

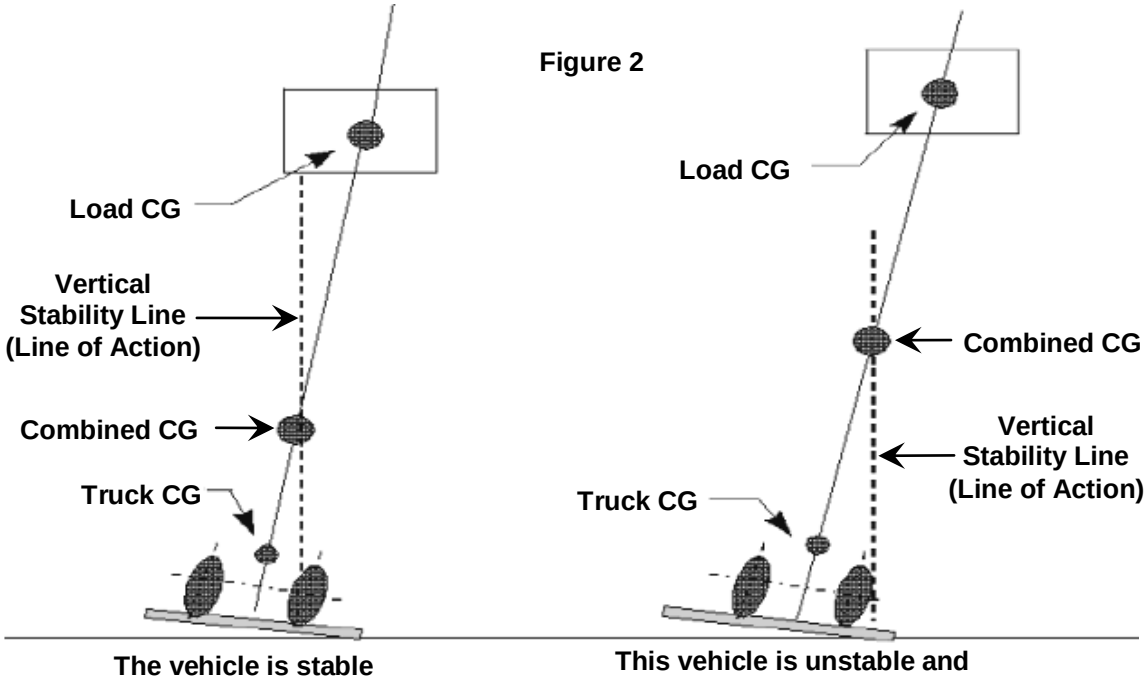
Figure 1



Typical Forklift

When the vehicle's line of action, or load centre, falls within the stability triangle, the vehicle is stable and will not tip over. However, when the vehicle's line of action or the vehicle/load combination falls outside the stability triangle, the vehicle is unstable and may tip over. See Figure 2.

Figure 2



The vehicle is stable

This vehicle is unstable and will continue to tip over

Longitudinal Stability

The axis of rotation when a truck tips forward is the front wheels' points of contact with the pavement. When a forklift tips forward, the truck will rotate about this line. When a truck is stable, the vehicle-moment must exceed the load-moment. As long as the vehicle-moment is equal to or exceeds the load-moment, the vehicle will not tip over. On the other hand, if the load moment slightly exceeds the vehicle-moment, the truck will begin to tip forward, thereby causing the rear to lose contact with the floor or ground and resulting in loss of steering control. If the load-moment greatly exceeds the vehicle moment, the truck will tip forward.

To determine the maximum safe load-moment, the truck manufacturer normally rates the truck at a maximum load at a given distance from the front face of the forks. The specified distance from the front face of the forks to the line of action of the load is commonly called the load centre. Because larger trucks normally handle loads that are physically larger, these vehicles have greater load centres. Trucks with a capacity of 13,635 kg or less are normally rated at a given load weight at a 60 cm load centre. Trucks with a capacity greater than 13,635 kg are normally rated at a given load weight at a 90 cm or 120 cm load centre.

To safely operate the vehicle, the operator should always check the data plate to determine the maximum allowable weight at the rated load centre.

Although the true load-moment distance is measured from the front wheels, this distance is greater than the distance from the front face of the forks. Calculating the maximum allowable load-moment, using the load-centre distance always provides a lower load-moment than the truck was designed to handle. When handling unusual loads, such as those that are larger than 120 cm long (the centre of gravity is greater than 60 cm) or that have an offset centre of gravity, etc., a maximum allowable load-moment should be calculated and used to determine whether a load can be safely handled.

Lateral Stability

The vehicle's lateral stability is determined by the line of action's position (a vertical line that passes through the combined vehicle's and load's centre of gravity) relative to the stability triangle. When the vehicle is not loaded, the truck's centre of gravity location is the only factor to be considered in determining the truck's stability. As long as the line of action of the combined vehicle's and loads centre of gravity falls within the stability triangle, the truck is stable and will not tip over. However, if the line of action falls outside the stability triangle, the truck is not stable and may tip over. Refer to Figure 2.

Factors that affect the vehicle's lateral stability include the load's placement on the truck, the height of the load above the surface on which the vehicle is operating, and the vehicle's degree of lean.

Dynamic Stability

Up to this point, the stability of a forklift has been discussed without considering the dynamic forces that result when the vehicle and load are put into motion. The weight's transfer and the resultant shift in the centre of gravity due to the dynamic forces created when the machine is moving, braking, cornering, lifting, tilting, and lowering loads, etc., are important stability considerations.

When determining whether a load can be safely handled, the operator should exercise extra caution when handling loads that cause the vehicle to approach its maximum design characteristics. For example, if an operator must handle a maximum load, the load should be carried at the lowest position possible, the truck should be accelerated slowly and evenly, and the forks should be tilted forward cautiously. However, no precise rules can be formulated to cover all of these eventualities.

Daily Checklist for Forklifts

The OHS regulation for forklift training requires that an employer provide training to truck operators on a variety of topics. Among these topics are vehicle inspection and maintenance that the operator will be required to perform. Each type of forklift is unique and checklists pertinent to each type of vehicle should be modified accordingly. It is recommended that the manufacturer's instructions on vehicle maintenance and owner's and operator's responsibilities also be consulted. The OHS regulation and CSA Standard for powered industrial trucks should be evaluated to ensure compliance.

Develop a Forklift Operator Training Program

Before you begin developing your operator training program you should become familiar with the OHS regulation and CSA Standard for powered industrial trucks (Forklifts) and any operator's manual pertinent to the equipment you have in your workplace.

Identify your Operators

First, you need to determine the employees that will be required to operate forklifts in your workplace. If an employee has other duties, but sometimes operates a forklift, training must be provided.

Identify the Types of Forklifts You Have in Your Workplace

There are many different types of powered industrial trucks. Typically, these types of vehicles are known as forklift or lift trucks. Some types of trucks are not capable of being ridden by the operator. These are also covered by the CSA Standard and training is required. Some trucks are fitted with attachments purchased from the manufacturer. The use of these attachments may affect the manner in which the truck is handled; therefore, training on the use of the attachment would also be required. If your employees will be expected to operate several different types of forklifts, then training is required on the unique handling characteristics of the vehicles.

Methods of Training

Once you have identified your forklift operators and types of trucks you have in your workplace, you should determine the methods of training you will use.

Training must consist of a combination of formal instruction and practical training. Using both methods is the only way to ensure that the trainee receives and comprehends the instruction and uses the information to safely operate a forklift. Note that the formal training need not take place in a classroom. Discussions can consist of the trainer talking to the trainee and explaining the training material, either in the workplace or in another location. The training must, however, include an explanatory element as well as a practical element.

Formal instruction may include lectures, conferences, classroom discussions, demonstrations, and written or oral tests. To enhance the training and make it more understandable to the employee, employers and other trainers may use movies, slides, computers, video tapes and other visual presentations.

Using visual aids has several advantages, including:

- The employees being trained remain more attentive, thereby increasing the training's effectiveness.
- The trainer can use visual presentations to ensure that the necessary information is covered during the training.
- Graphical presentations make better use of the training time by decreasing the need for the instructor to carry on long discussions about the instructional material.
- Trainees have greater retention of information learned from graphical presentations.

While some employees can learn instructional material while seated in a classroom, other employees may learn best by observing an operation (demonstration) and/or by personally performing an operation (practical exercise). In most cases, a combination of different training methods provides the best training in the least amount of time.

Once you have selected the method of training, then the content of the training program must be considered to include all pertinent training items.

Training Program Content

Because each type (make and model) of forklift has different operating characteristics, limitations, and other unique features, a good employee training program for forklift operators should be based upon the type of vehicles that the employee will be trained and authorized to operate. The training should also emphasize the workplace's features that will affect how the vehicle must be operated. Finally, the training should include the general safety rules applicable to operating any powered industrial truck.

General Forklift Operator Training Program

All operators at ***Dan-Ex Contracting Ltd.*** shall familiarize themselves with these characteristics of the forklift(s) they will operate:

- Controls and instrumentation: location, what they do, and how they work.
- Engine or motor operation.
- Steering and manoeuvring.
- Visibility.
- Fork and/or attachment adaptation, operation, and limitations of their use.
- Vehicle capacity.
- Vehicle stability.
- Vehicle inspection and maintenance the operator will be required to perform.
- Refuelling or charging and recharging batteries.
- Operating limitations. All forklifts should be equipped with Operator's Manuals and Safety Manuals. If the manuals are missing, contact an equipment dealer or the manufacturer directly for more copies.

The Operating Environment

Before operating any forklift, learn as much about the work area as possible. Walk around the worksite and inspect the surface(s) over which your will be expected to travel. Be aware of:

☐ Slippery Surfaces	☐ Obstructed Vision	☐ Moving equipment
☐ Rocks	☐ Restricted Clearances	☐ Scattered materials
☐ Holes	☐ Speed Considerations	☐ Pedestrian traffic
☐ Overhead Hazards	☐ Confined Areas	☐ Deep mud
☐ Slopes	☐ Underground Utilities	☐ Oil spills
☐ Deep Ditches	☐ Powerlines	☐ Water Hazards

OHS Requirements

After the training program has been completed, ***Glenn Willesen*** will evaluate the trainee's knowledge and skills and determine that the employee is competent to operate the truck safely.

Employee Evaluation

When the employee completes the training exercises and prior to operating the truck, an evaluation of the employee must be performed. This evaluation will determine the adequacy of training and the ability of the employee to perform truck operations safely in the workplace. The OHS regulation also requires that an evaluation of the operator's performance be conducted at least once every three years and after refresher training.

Company management will then complete a certification of training record containing the name of the operator, the date of the training, the date of the evaluation, and the identity of the person(s) performing the training or evaluation.

Refresher Training

During the course of forklift operations, the supervisor may observe the employee performing an unsafe act, such as riding with the load too high or travelling at an unsafe speed. The person making the correction will point out the incorrect manner of operation of the truck or other unsafe act being conducted, tell the employee how to do the operation correctly, and then ensure the employee does the operation correctly. When there have been multiple on-the-spot corrections, company management may decide to conduct a more structured retraining program which would include the following information:

- Common unsafe situations encountered in the workplace.
- Unsafe operating methods observed or known to be used.
- The need for constant attentiveness to the vehicle, the workplace conditions, and the manner in which the vehicle is operated.

The preceding subject areas need to be taught so that the trainee receives all the information needed for safe vehicle operation. Specific details may be found in the vehicle manufacturers' literature, the national consensus standards, and the OHS regulations relating to forklift operator training.

Forklift Operator Training Program Outline

- Introduction - Overview of the Program
  - The goal is to provide a training program based on the trainee's prior knowledge, the types of vehicles used in the workplace, and the hazards of the workplace.
  - The course will utilize video, group discussion and hands-on practice. Each operator must obtain the knowledge and skills needed to do their job correctly and safely.
- Forklift Types, Features, and Physics
  - Operators will familiarize themselves with basic types and functions of forklifts.
  - Develop an understanding of the information shown on a data plate.
  - Understand the critical forklift measurements that affect safety.
  - Understand the forces that cause a tip-over, and the forklift design considerations and safety ratings that help prevent them including the "stability triangle."

- Inspecting the Vehicle
  - Understand the purpose and importance of pre-operational checkouts.
  - Have a basic understanding of areas covered during a pre-operational checkout.
  - Be familiar with a checklist for pre-operational checkouts, and what to do if a problem is discovered.
- Driving the Truck
  - Understand the elements of safe movement of a forklift.
  - Understand the differences between an automobile and a forklift.
  - Recognize the safety hazards associated with operating a forklift.
- Load Handling
  - Understand the elements of load lifting safety.
  - Understand the safe operating procedures for raising and lowering loads in confined/restricted areas.
- Refuelling Gas, Diesel, and LP Forklifts
  - Discuss LP and its properties.
  - Understand elements and procedures of refuelling internal combustion vehicles.
  - Describe tank components: service valve, surge valve, relief valve, etc.
  - Discuss related safety issues.
- Battery and Charging
  - Understand elements and procedures of safely changing and charging batteries.
  - Discuss filling procedures and maintenance.
  - Discuss related safety issues.
- Safety Concerns
  - Review/reinforce potential of serious injury.
  - Review/reinforce safety procedures at your workplace/facility.
- Specific Truck and Workplace Training/Hands-On
  - Review features of specific powered industrial trucks to be operated.
  - Review operating procedures of specific powered industrial trucks to be operated.
  - Review safety concerns of specific powered industrial trucks to be operated.
  - Review workplace conditions and safety concerns of areas where powered industrial trucks will be operated.
  - Practice actual operation of specific powered industrial trucks to be operated and specific workplace conditions where powered industrial trucks will be operated.
  - Demonstrate proficiency performing the forklift operator duties specific to the trainee's position and workplace conditions.

Dan-Ex Contracting Ltd. will issue a Certification of Completion of the Course upon successful completion of the training course.

Training Objectives For Competent Operators		
Procedure	**Tasks to be Assessed**	**Final Outcomes for Operator Competence**
General Operation	Pre-operational Check (circle check)	Before operating a lift truck, a competent operator: ▪ carries out a visual inspection of the truck and its attachments to ensure that all are in good operating condition, using a checklist provided by the employer ▪ follows recommended procedures for daily inspections of oil and water levels
	Start Up	▪ uses the correct mounting procedure ▪ assumes the appropriate driving position ▪ ensures transmission/directional control lever in "Neutral" ▪ ensures parking brakes applied ▪ activates start button/ switch ▪ ensures warning system operating
	Starting, Stopping and Turning	▪ starts and stops safely with and without a load ▪ allows sufficient room for turning corners ▪ operates at low speed when turning ▪ uses appropriate steering techniques when turning in confined and limited spaces
	Shut Down/Parking	▪ brings the truck to a complete stop, sets the parking brake, returns transmission/directional control lever to "Neutral" ▪ lowers forks to the ground, tilts them forward ▪ uses appropriate shut down procedures and turns off power supply ▪ chocks wheels if risk of truck moving
	Forward and Reverse Driving on Level Ground	▪ keeps all parts of the body inside the operator's compartment at all times ▪ ensures clear visibility in the intended direction of travel ▪ if visibility is restricted, drives the truck in reverse or asks to be guided ▪ keeps the load-engaging means or the load itself low (usually within 10 cm of the floor) and tilted backward ▪ keeps safe operating distance from other lifting devices, pedestrians, machinery ▪ observes traffic management rules established by the employer ▪ drives at an appropriate speed, taking into consideration the type of device, the load, the pedestrian traffic along the path of the travel route, any obstructions and the condition of the driving surface ▪ adjusts fork arms and/or attachments appropriately to maintain stability ▪ observes weight restrictions for floors and elevators ▪ takes appropriate action when meeting restrictions such as overhead equipment and/or other obstructing stationary structures
	Forward and Reverse Driving on Inclines, Ramps or Uneven Terrain	▪ when not carrying a load, travels forward down an incline and travels in reverse up an incline ▪ when carrying a load, travels in reverse down an incline and travels forward up an incline ▪ ensures that there is sufficient clearance for the lift truck, operator and load prior to travelling on an incline or uneven terrain ▪ does not turn the truck around on a ramp or incline ▪ drives at an appropriate speed taking into consideration the effects of gradient on the truck and on load security ▪ approaches the grade straight and not at an angle ▪ operates in gear ▪ ensures visibility is clear in the direction of travel ▪ verifies that the incline does not exceed the maximum permissible slope
	Operating Around Personnel	▪ always faces in the direction of travel ▪ when turning, ensures no personnel within the truck's danger zone ▪ observes employer's guidelines for ensuring the safety of pedestrians ▪ if stopped at intersection, does not move until eye contact made with any personnel at intersection ▪ maintains safe distance from pedestrians

Load Handling	Selection of Loads	Before picking up a load: ▪ assesses the weight distribution of the load and identifies limitations of the structures where the load has to be placed ▪ ensures that load is within the rated capacity for the device, taking into account the job to be done ▪ checks forks/attachments to ensure that they are safe to use with respect to capacity rating
	Load Pick Up and Placement	▪ checks overhead clearance ▪ ensures truck safe distance from any live power lines ▪ engages at least 2/3 of the load length to be lifted and centres load evenly on forks ▪ adjusts the tilting angle of the mast, height of fork arms and reach extension to stabilize load ▪ ensures no loose articles lying on top of the load ▪ does not drag the forks when inserting or withdrawing them from a load ▪ does not raise or lower loads while truck is in motion
	Load Security and Integrity	▪ observes the limits for freestanding stack height ▪ makes sure load is secure and balanced before lifting
	Stacking and Destacking	▪ is able to stack safely the particular types of loads encountered in the workplace ▪ ensures that pallets or skids are safe to be moved and stored; for example, ensures no broken runners or legs
	Personnel Lifting, Lowering and Supporting	▪ ensures lift truck meets prescribed requirements ▪ uses only a platform specifically designed for the purpose and having a guardrail ▪ ensures that the platform is secured to the mast as prescribed ▪ raises and lowers the platform to test its operation before allowing anyone on it ▪ ensures that the person on the platform is secured as prescribed ▪ keeps the upright in a vertical position ▪ remains at the controls at all times while a person is on the platform ▪ does not travel with personnel on the platform ▪ ensures the safety of pedestrians in the area
	Loading Trucks and Railway Cars	▪ Before driving into any truck, trailer or railway boxcar: ▪ ensures that the vehicle being loaded is adequately restrained to prevent movement ▪ inspects floors for stability and integrity ▪ ensures adequate lighting ▪ ensures that the dock/bridge plate is one designed to support the mass of the loaded lift truck ▪ ensures that the dock/bridge plate is firmly in position ▪ ensures the trailer is properly supported by a jackstand where appropriate (e.g., when not connected to the tractor)
	Transporting Loads in Elevators	▪ ensures the elevator is capable of supporting the loaded lift truck ▪ before entering, makes sure the elevator floor is level with the building floor ▪ if applicable, waits for the signal from the elevator operator before entering ▪ ensures that no other person remains on the elevator with a truck and load on board ▪ sets the brakes "on", lowers the load to the floor, places controls in neutral, shuts off the power and gets off the truck
Loading and Unloading	Unloading	▪ verifies that the structure where the load has to be placed is able to carry the weight of the load ▪ when stacking loads, does not block access to fire extinguishers, exits or stairways ▪ ensures the load at the bottom is secure and levelled ▪ tilts load forward ▪ exits with forks level
Operational Maintenance	Refuelling and Recharging	▪ follows the manufacturer's requirements and employer's procedures for safe refuelling and recharging of lift trucks including: wearing the appropriate personal protective equipment, including eye protection properly positioning and securing vehicle observing workplace precautions with respect to fires

Employee: _____ Date: _____ Time: ____

Evaluator: _____ Equipment Type: _____

Yes	No	PERFORMANCE EVALUATION FOR LIFT TRUCK OPERATORS
		Shows familiarity with truck controls.
		Gave proper signals when turning.
		Slowed down at intersections.
		Sounded horn at intersections.
		Obeyed signs.
		Kept a clear view of direction of travel.
		Turned comers correctly - was aware of rear end swing.
		Yielded to pedestrians.
		Drove under control and within proper traffic aisles.
		Approached load properly.
		Lifted load properly.
		Manoeuvred properly.
		Travelled with load at proper height.
		Lowered load smoothly/slowly.
		Stops smoothly/completely.
		Load balanced properly.
		Forks under load all the way.
		Carried parts/stock in approved containers.
		Checked bridge-plates/ramps.
		Did place loads within marked area.
		Did stack loads evenly and neatly.
		Did drive backward when required.
		Did check load weights.
		Did place forks on the floor when parked, controls neutralized, brake on set, power off.
		Followed proper instructions for maintenance - checked both at beginning and end.

Comments: _____

_____

_____

Total Rating: □ Excellent □ Good □ Fair □ Poor □ Fail

_____

Evaluator's Signature Date

_____

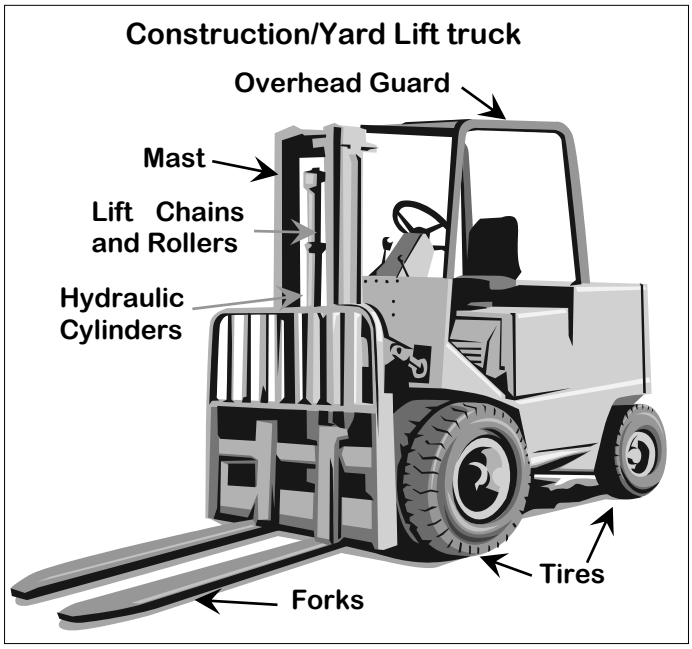
Operator's Signature Date

Daily Inspection Checklist - Construction / Yard Lift Truck

KEY OFF Procedures

The vehicle inspection

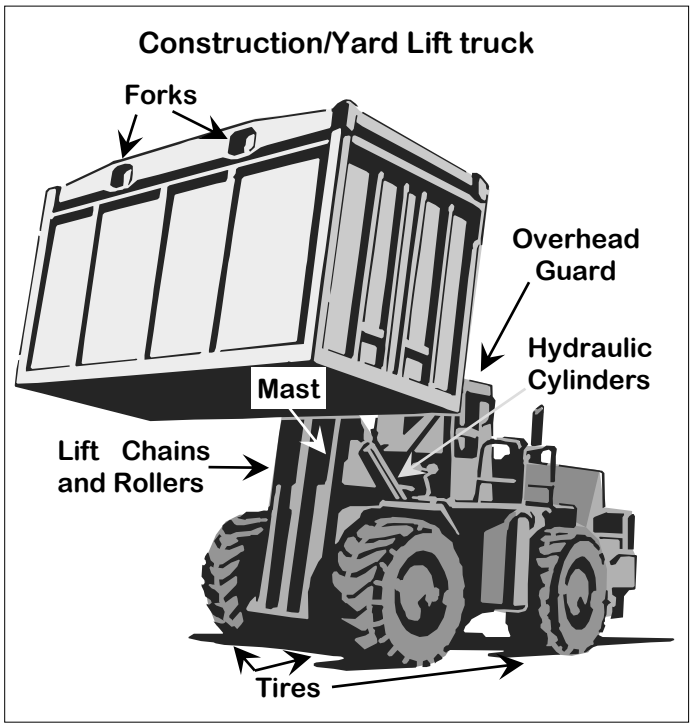
- ☐ Overhead guard
- ☐ Hydraulic cylinders
- ☐ Mast assembly
- ☐ Lift chains and rollers
- ☐ Forks
- ☐ Tires
- ☐ Gas gauge
- ☐ Check the engine oil level
- ☐ Examine the battery
- ☐ Inspect the hydraulic fluid level
- ☐ Check the engine coolant level



KEY ON Procedures

Test the standard equipment

- ☐ Front, tail, and brake lights
- ☐Fuel gauge (if diesel)
- ☐ Windshield wiper
- ☐ Heater



ENGINE RUNNING Procedures

Check the gauges

- ☐ Oil pressure indicator lamp
- ☐ Ammeter indicator lamp
- ☐ Ammeter
- ☐ Hour Meter
- ☐ Water Temperature Gauge

Test the standard equipment

- ☐ Steering
- ☐ Brakes
- ☐ Horn
- ☐ Safety seat (if equipped)
- ☐ Check the operation of load-handling attachments
- ☐ Check the transmission fluid level

Record of Employee Training-Lift Trucks

Printed Name	Signature	Trainer Signature	Date

Chapter 18

Welding & Hot Work

Statement of Company Policy

Dan-Ex Contracting Ltd. is dedicated to the protection of our employees from occupational injuries and illnesses. This Company is responsible for providing a safe working environment, and the employees have and must assume the responsibility of working safely.

The objective of this program is to supplement our safety policy by providing specific standards regarding "Hot Work" and to ensure that each employee is adequately trained and fully aware of safety procedures associated with it.

Welding and other hot work such as cutting, brazing, or grinding presents a significant opportunity for fire and injury. Company employees or contractors must apply all precautions of this program prior to commencing any welding or hot work.

Elimination of injuries and illnesses improves employee morale, improves customer service, improves product quality, and reduces Workers' Compensation costs. This policy serves as a tool to increase employee protection, and to reduce jobsite hazards.

Any Company employee who disobeys and/or disregards the guidelines set forth in this program or the company's safety program will be subject to disciplinary action.

Welding and hot work include any activity which results in sparks, fire, molten slag, or hot material which has the potential to cause fires or explosions.

"Special Hazard Occupancies" include any area containing flammable liquids, dust accumulation, gases, plastics, rubber, and paper products.

Employees are required to comply with the guidelines set forth, and to comply with the instruction of ***Glenn Willesen***. In the event an unsafe condition arises, employees should alert the lead person on the jobsite immediately. Employees should also alert co-workers of any unsafe conditions that arise.

Dan-Ex Contracting Ltd. employees are required to become familiar with and understand these guidelines regarding Welding and Cutting operations. Designated welders and cutters must receive annual training and must demonstrate their understanding of these guidelines.

Training will include:

- Review of OHS requirements
- Use of Hot Works Permit System
- Supervisor responsibilities
- Fire Watch responsibilities
- Operator responsibilities
- Contractors' responsibilities
- Documentation requirements
- Respirator usage requirements
- Fire Extinguisher training

Upon completion of Welding and Cutting training, ***Dan-Ex Contracting Ltd.*** will certify in writing that each designated welder has received and understands training requirements. Certification must include the employee's name, name of the trainer, date of training, and subject of certification.

All Company employees are required to comply with the rules set forth in this written program. This program is intended to comply with OHS regulations and to provide the maximum protection for our employees. Any employee who disobeys and/or disregards the safety requirements set forth in The Company's Safety Program will be subject to disciplinary action.

Hot Work Procedures

- Where practicable all combustibles will be relocated at least 11 metres (35 feet) from the work site.
- Where relocation is impractical, combustibles must be protected with flameproof covers, shielded with metal, guards, curtains, or wet down to help prevent ignition of material.
- Ducts, conveyor systems, and augers that might carry sparks to distant combustibles must be protected or shut down.
- Where cutting or welding is done near walls, partitions, ceilings, or a roof of combustible construction, fire-resistant shields, or guards will be provided to prevent ignition.
- If welding is to be done on a metal wall, partition, ceiling, or roof, precautions must be taken to prevent ignition of combustibles on the other side, due to conduction or radiation of heat.
- Where combustibles cannot be relocated on the opposite side of the work, a fire watch person will be provided on the opposite side of the work.
- Welding will not be attempted on a metal partition, wall, ceiling, or roof having a covering nor on walls having combustible sandwich panel construction.
- Cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings, or roofs will not be undertaken if the work is close enough to cause ignition by combustion.
- In areas where there is dust accumulation of greater than 1.5 mm within 11 m of the area where welding/hot works will be conducted, all dust accumulation will be cleaned up following the housekeeping program of the facility before welding/hot work is permitted.
- Suitable fire extinguishers must be provided and maintained ready for immediate use.
- A fire watch person will be provided during and for two hours past the completion of the welding project.
- A welding/cutting permit will be issued on all welding or cutting outside of designated welding areas.

Cutting or welding will not be permitted in the following situations:

- In areas not authorized by management.
- In sprinklered buildings while such protection is impaired.
- In the presence of potentially explosive atmospheres.
- In areas near the storage of large quantities of exposed, readily ignitable materials.

Welding & Hot Work Fire Prevention Measures

A designated welding area should be established to meet the following requirements:

- Floors swept and clean of combustibles within 11 m of work area.
- Flammable & combustible liquids & material will be kept 11 m from work area.
- Adequate ventilation providing 20 air changes per hour, such as a suction hood system should be provided to the work area.
- At least one 4.5 kg dry chemical fire extinguisher should be within access of the 11 m of work area.
- Protective dividers such as welding curtains or non-combustible walls will be provided to contain sparks and slag to the combustible free area.

Requirements for Welding Outside Designated Areas

- Portable welding curtains or shields must be used to protect other workers in the welding area.
- A "Hot Work Permit" must be completed and complied with prior to welding operation.
- Respiratory protection is mandatory unless an adequate monitored airflow away from the welder and others present can be established and maintained.
- Plastic materials must be covered with welding tarps during welding procedures.
- Fire Watch must be provided for all hot work operations.

Safe Welding and Cutting Procedures

Electric Welding

- Perform Safety Check on all equipment.
- Ensure fire extinguisher is charged and available.
- Ensure electrical cord, electrode holder and cables are free from defects (no cable splices are allowed within 3 m of the electrode holder).
- Ensure PPE (welding hood, gloves, rubber boots/soled shoes, and aprons) are available and have no defects.
- Ensure the welding unit is properly grounded.
- All defective equipment must be repaired or replaced before use.
- Remove flammables and combustibles.
- No welding is permitted on or near containers of flammable material, combustible material or unprotected flammable structures.
- Place welding screen or suitable barricade around work area to provide a fire safety zone and prevent injuries to passersby (do not block emergency exits or restrict ventilation).
- Ensure adequate ventilation and lighting.
- Execute Hot Work Permit procedures.
- Set Voltage Regulator no higher than the following for:
  - Manual Alternating Current Welders - 80 volts
  - Automatic Alternating Current Welders - 100 volts
  - Manual or automatic Direct Current Welders -100 volts

- Uncoil and spread out welding cable
- To avoid overheating, ensure proper contact of work leads and connections, remove any metal fragments from magnetic work clamps. (To avoid electric shock do not wrap welding cables around a body part and avoid welding in wet conditions.)
- Fire watch for one hour after welding & until all welds have cooled.
- Perform final fire watch and terminate permit.

Manual Electrode Holders

- Only manual electrode holders which are specifically designed for arc welding and cutting, and are of a capacity capable of safely handling the maximum rated current required by the electrodes, shall be used.
- Any current-carrying parts passing through the portion of the holder which the arc welder or cutter grips in his hand, and the outer surfaces of the jaws of the holder, shall be fully insulated against the maximum voltage encountered to ground.

Welding Cables and Connectors

- All arc welding and cutting cables shall be of the completely insulated, flexible type, capable of handling the maximum current requirements of the work in progress, taking into account the duty cycle under which the arc welder or cutter is working.
- Only cable free from repair or splices for a minimum distance of 3 metres (10 feet) from the cable end to which the electrode holder is connected shall be used, except that cables with standard insulated connectors or with splices whose insulating quality is equal to that of the cable are permitted.
- When it becomes necessary to connect or splice lengths of cable one to another, substantial insulated connectors of a capacity at least equivalent to that of the cable shall be used. If connections are effected by means of cable lugs, they shall be securely fastened together to give good electrical contact and the exposed metal parts of the lugs shall be completely insulated.
- Cables in need of repair shall not be used. When a cable becomes worn to the extent of exposing bare conductors, the portion thus exposed shall be protected by means of rubber and friction tape or other equivalent insulation.

Ground Returns and Machine Grounding

- A ground return cable shall have a safe current carrying capacity equal to or exceeding the specified maximum output capacity of the arc welding or cutting unit which it services. When a single ground return cable services more than one unit, its safe current-carrying capacity shall equal or exceed the total specified maximum output capacities of all the units which it services.
- Pipelines containing gases or flammable liquids, or conduits containing electrical circuits, shall not be used as a ground return. For welding on natural gas pipelines, refer to the technical portions of regulations issued by the CSA Standard W117.201 *Safety In Welding and Allied Processes*. When a structure or pipeline is employed as a ground return circuit, it shall be determined that the required electrical contact exists at all joints. The generation of an arc, sparks, or heat at any point shall cause rejection of the structures as a ground circuit.
- When a structure or pipeline is continuously employed as a ground return circuit, all joints shall be bonded, and periodic inspections shall be conducted to ensure that no condition of electrolysis or fire hazard exists by virtue of such use.
- The frames of all arc welding and cutting machines shall be grounded either through a third wire in the cable containing the circuit conductor or through a separate wire

which is grounded at the source of the current. Grounding circuits, other than by means of the structure, shall be checked to ensure that the circuit between the ground and the grounded power conductor has resistance low enough to permit sufficient current to flow to cause the fuse or circuit breaker to interrupt the current.

- All ground connections shall be inspected to ensure that they are mechanically strong and electrically adequate for the required current.

Operating Instructions

Employees shall be instructed in the safe means of arc welding and cutting as follows:

- When electrode holders are to be left unattended, the electrodes shall be removed and the holders shall be so placed or protected that they cannot make electrical contact with employees or conducting objects.
- Hot electrode holders shall not be dipped in water; to do so may expose the arc welder or cutter to electric shock.
- When the arc welder or cutter has occasion to leave his work or to stop work for any appreciable length of time, or when the arc welding or cutting machine is to be moved, the power supply switch to the equipment shall be opened.
- Any faulty or defective equipment shall be reported to the supervisor.

Shielding

- Whenever practicable, all arc welding and cutting operations shall be shielded by noncombustible or flameproof screens which will protect employees and other persons working in the vicinity from the direct rays of the arc.
- When practical, objects to be welded, cut, or heated shall be moved to a designated safe location or, if the objects to be welded, cut, or heated cannot be readily moved, all movable fire hazards in the vicinity shall be taken to a safe place, or otherwise protected.
- If the object to be welded, cut, or heated cannot be moved and if all the fire hazards cannot be removed, positive means shall be taken to confine the heat, sparks, and slag, and to protect the immovable fire hazards from them.
- No welding, cutting, or heating shall be done where the application of flammable paints or the presence of other flammable compounds, or heavy dust concentrations creates a hazard.
- Suitable fire extinguishing equipment shall be immediately available in the work area and shall be maintained in a state of readiness for immediate use.
- When the welding, cutting, or heating operation is such that normal fire prevention precautions are not sufficient, additional personnel shall be assigned to guard against fire while the actual welding, cutting, or heating operation is being performed, and for a sufficient period of time after completion of the work to ensure that no possibility of fire exists. Such personnel shall be instructed as to the specific anticipated fire hazards and how the firefighting equipment provided is to be used.
- When welding, cutting, or heating is performed on walls, floors, and ceilings, since direct penetration of sparks or heat transfer may introduce a fire hazard to an adjacent area, the same precautions shall be taken on the opposite side as are taken on the side on which the welding is being performed.
- For the elimination of possible fire in enclosed spaces as a result of gas escaping through leaking or improperly closed torch valves, the gas supply to the torch shall be positively shut off at some point outside the enclosed space whenever the torch is not to be used or whenever the torch is left unattended for a substantial period of

time, such as during the lunch period. Overnight and at the change of shifts, the torch and hose shall be removed from the confined space. Open end fuel gas and oxygen hoses shall be immediately removed from enclosed spaces when they are disconnected from the torch or other gas-consuming device.

- Except when the contents are being removed or transferred, drums, pails, and other containers which contain or have contained flammable liquids shall be kept closed. Empty containers shall be removed to a safe area apart from hot work operations or open flames.
- Drums containers, or hollow structures which have contained toxic or flammable substances shall, before welding, cutting, or heating is undertaken on them, either be filled with water or thoroughly cleaned of such substances and ventilated and tested.
- Before heat is applied to a drum, container, or hollow structure, a vent or opening shall be provided for the release of any built-up pressure during the application of heat.

Mechanical Ventilation

OHS regulations require that mechanical ventilation meet the following requirements:

- Mechanical ventilation shall consist of either general mechanical ventilation systems or local exhaust systems.
- General mechanical ventilation shall be of sufficient capacity and so arranged as to produce the number of air changes necessary to maintain welding fumes and smoke within safe limits.
- Local exhaust ventilation shall consist of freely movable hoods intended to be placed by the welder or burner as close as practicable to the work.
- This system shall be of sufficient capacity and so arranged as to remove fumes and smoke at the source and keep the concentration of them in the breathing zone within safe limits.
- Contaminated air exhausted from a working space shall be discharged into the open air or otherwise clear of the source of intake air.
- All air replacing that withdrawn shall be clean and respirable.
- Oxygen shall not be used for ventilation purposes, comfort cooling, blowing dust from clothing, or for cleaning the work area.

Welding, Cutting, and Heating in Confined Spaces

- General mechanical or local exhaust ventilation shall be provided whenever welding, cutting, or heating is performed in a confined space.
- When sufficient ventilation cannot be obtained without blocking the means of access, employees in the confined space shall be protected by air line respirators and an employee on the outside of such a confined space shall be assigned to maintain communication with those working within it and to aid them in an emergency.
- ***Lifelines —*** Where a welder must enter a confined space through a manhole or other small opening, means shall be provided for quickly removing him in case of emergency. When safety belts and lifelines are used for this purpose they shall be so attached to the welder's body that his body cannot be jammed in a small exit opening. An attendant with a pre-planned rescue procedure shall be stationed outside to observe the welder at all times and be capable of putting rescue operations into effect.

Welding, Cutting, or Heating of Metals of Toxic Significance

Welding, cutting, or heating in any enclosed spaces involving these metals shall be performed with either general mechanical or local exhaust ventilation or employees shall be protected by air line respirators.

- Zinc-bearing base or filler metals or metals coated with zinc-bearing materials.
- Lead base metals.
- Cadmium-bearing filler materials.
- Chromium-bearing metals or metals coated with chromium-bearing materials.
- Metals containing lead, other than as an impurity, or metals coated with lead-bearing materials.
- Cadmium-bearing or cadmium-coated base metals.
- Metals coated with mercury-bearing metals.

Beryllium-Containing Base or Filler Metals

- Because of its high toxicity, work involving beryllium shall be done with both local exhaust ventilation and air line respirators.
- Employees performing such operations in the open air shall be protected by filter-type respirators.
- Employees performing such operations on beryllium-containing base or filler metals shall be protected by air line respirators.
- Other employees exposed to the same atmosphere as the welders or burners shall be protected in the same manner as the welder or burner.

Metal-Inert-Gas (MIG) Arc Welding

Since the inert-gas metal-arc welding process involves the production of ultra-violet radiation of intensities of 5 to 30 times that produced during shielded metal-arc welding, the decomposition of chlorinated solvents by ultraviolet rays, and the liberation of toxic fumes and gases, employees shall not be permitted to engage in, or be exposed to the process until the following special precautions have been taken:

- The use of chlorinated solvents shall be kept at least 61 metres (200 feet), unless shielded, from the exposed arc, and surfaces prepared with chlorinated solvents shall be thoroughly dry before welding is permitted on such surfaces.
- Employees in the area not protected from the arc by screening shall be protected by filter lenses.
- When two or more welders are exposed to each other's arc, filter lens goggles of a suitable type, and shall be worn under welding helmets.
- Hand shields to protect the welder against flashes and radiant energy shall be used when either the helmet is lifted or the shield is removed.
- Welders and other employees who are exposed to radiation shall be suitably protected so that the skin is covered completely to prevent burns and other damage by ultraviolet rays.
- Welding helmets and hand shields shall be free of leaks and openings, and free of highly reflective surfaces.
- When inert-gas metal-arc welding is being performed on stainless steel, employees shall be protected against dangerous concentrations of nitrogen dioxide.

Gas Welding and Cutting

- Perform Safety Check on all equipment.
- Ensure tanks have gas and fittings are tight.
- Ensure fire extinguisher is charged and available.
- Inspect hoses for defects.
- Ensure PPE (welding hood, gloves, rubber boots/soled shoes, and aprons) are available and have no defects.
- All defective equipment must be repaired or replaced before use.
- Remove flammables and combustibles
- No welding is permitted on or near containers of flammable material, combustible material or unprotected flammable structures.
- Place welding screen or suitable barricade around work area to provide a fire safety zone and prevent injuries to passersby (do not block emergency exits or restrict ventilation).
- Use an authorized Air Filtering Respirator, if required.
- Ensure adequate ventilation and lighting.
- Execute Hot Work Permit procedures.
- Open valves on oxygen and gas tanks to desired flow.
- Shut tank valves & relieve hose pressure. Store hoses.
- Maintain fire watch for one hour after welding and until all welds have cooled.
- Perform final fire watch and terminate permit.

Transporting, Moving, and Storing Compressed Gas Cylinders

- Valve protection caps shall be in place and secured.
- When cylinders are hoisted, they shall be secured on a cradle or slingboard.
- They shall not be hoisted or transported by means of magnets or choker slings.
- Cylinders shall be moved by tilting and rolling them on their bottom edges.
- When cylinders are transported by powered vehicles, they shall be secured in a vertical position.
- Valve protection caps shall not be used for lifting cylinders from one vertical position to another.
- Bars shall not be used under valves or valve protection caps to pry cylinders loose when frozen. Warm, not boiling, water shall be used to thaw cylinders loose.
- Unless cylinders are firmly secured on a special carrier intended for this purpose, regulators shall be removed and valve protection caps put in place before cylinders are moved.
- A suitable cylinder truck, chain, or other steadying device shall be used to keep cylinders from being knocked over while in use.
- When work is finished, when cylinders are empty, or when cylinders are moved at any time, the cylinder valve shall be closed.
- Compressed gas cylinders shall be secured in an upright position at all times except, if necessary, for short periods of time while cylinders are actually being hoisted or carried.

- Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 6 m or by a noncombustible barrier at least 1.5 metres high having a fire-resistance rating of at least one-half hour.
- Inside of buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location, at least 6 m from highly combustible materials such as oil or excelsior. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways.

Assigned storage places shall be located where cylinders will not be knocked over or damaged by passing or falling objects, or subject to tampering by unauthorized persons. Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.

Placement of Gas Cylinders

- Cylinders shall be kept far enough away from the actual welding or cutting operation so that sparks, hot slag, or flame will not reach them. When this is impractical, fire resistant shields shall be provided.
- Cylinders shall be placed where they cannot become part of an electrical circuit.
- Electrodes shall not be struck against a cylinder to strike an arc.
- Fuel gas cylinders shall be placed with valve end up whenever they are in use.
- They shall not be placed in a location where they would be subject to open flame, hot metal, or other sources of artificial heat.
- Cylinders containing oxygen or acetylene or other fuel gas shall not be taken into confined spaces.

Handling and Treatment of Gas Cylinders

- Cylinders, whether full or empty, shall not be used as rollers or supports.
- No person other than the gas supplier shall attempt to mix gases in a cylinder.
- No one except the owner of the cylinder or person authorized by him shall refill a cylinder.
- No one shall use a cylinder's contents for purposes other than those intended by the supplier.
- All cylinders used shall meet the CSA Standard W117.201 Safety In Welding and Allied Processes.
- No damaged or defective cylinder shall be used.

Use of Fuel Gas

All employees shall be thoroughly instructed in the safe use of fuel gas, as follows:

- Before a regulator to a cylinder valve is connected, the valve shall be opened slightly and closed immediately. (This action is generally termed "cracking" and is intended to clear the valve of debris that might otherwise enter the regulator.)
- The valve of a fuel gas cylinder shall not be cracked where the gas would reach welding work, sparks, flame, or other possible sources of ignition.
- The cylinder valve shall always be opened slowly to prevent damage to the regulator.
- For quick closing, valves on fuel gas cylinders shall not be opened more than 1.5 turns.

- When a special wrench is required, it shall be left in position on the stem of the valve while the cylinder is in use so that the fuel gas flow can be shut off quickly in case of an emergency.
- In the case of manifold or coupled cylinders, at least one such wrench shall always be available for immediate use.
- Nothing shall be placed on top of a fuel gas cylinder, when in use, which may damage the safety device or interfere with the quick closing of the valve.
- Fuel gas shall not be used from cylinders through torches or other devices which are equipped with shutoff valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold.
- Before a regulator is removed from a cylinder valve, the cylinder valve shall always be closed and the gas released from the regulator.
- If, when the valve on a fuel gas cylinder is opened, there is found to be a leak around the valve stem, the valve shall be closed and the gland nut tightened. If this action does not stop the leak, the use of the cylinder shall be discontinued, and it shall be properly tagged and removed from the work area.
- In the event that fuel gas should leak from the cylinder valve, rather than from the valve stem, and the gas cannot be shut off, the cylinder shall be properly tagged and removed from the work area. If a regulator attached to a cylinder valve will effectively stop a leak through the valve seat, the cylinder need not be removed from the work area.
- If a leak should develop at a fuse plug or other safety device, the cylinder shall be removed from the work area.

Fuel Gas and Oxygen Manifolds

Fuel gas and oxygen manifolds shall bear the name of the substance they contain in letters at least 2.5 cm high which shall be either painted on the manifold or on a sign permanently attached to it.

- Fuel gas and oxygen manifolds shall be placed in safe, well ventilated, and accessible locations.
- They shall not be located within enclosed spaces.
- Manifold hose connections, including both ends of the supply hose that lead to the manifold, shall be such that the hose cannot be interchanged between fuel gas and oxygen manifolds and supply header connections.
- Adapters shall not be used to permit the interchange of hose. Hose connections shall be kept free of grease and oil.
- When not in use, manifold and header hose connections shall be capped.
- Nothing shall be placed on top of a manifold, when in use, which will damage the manifold or interfere with the quick closing of the valves.

Hoses

- Fuel gas hose and oxygen hose shall be easily distinguishable from each other.
- The contrast may be made by different colours or by surface characteristics readily distinguishable by the sense of touch.
- Oxygen and fuel gas hoses shall not be interchangeable.
- A single hose having more than one gas passage shall not be used.

- When parallel sections of oxygen and fuel gas hose are taped together, not more than 10 cm out of 30 cm shall be covered by tape.
- All hose in use, carrying acetylene, oxygen, natural or manufactured fuel gas, or any gas or substance which may ignite or enter into combustion, or be in any way harmful to employees, shall be inspected at the beginning of each working shift. Defective hose shall be removed from service.
- Hose which has been subject to flashback, or which shows evidence of severe wear or damage, shall be tested to twice the normal pressure to which it is subject, but in no case less than 2070 kPa or 300 p.s.i.
- Hose couplings shall be of the type that cannot be unlocked or disconnected by means of a straight pull without rotary motion.
- Hoses, cables, and other equipment shall be kept clear of passageways, ladders and stairs.

Torches

- Clogged torch tip openings shall be cleaned with suitable cleaning wires, drills, or other devices designed for such purpose.
- Torches in use shall be inspected at the beginning of each working shift for leaking shutoff valves, hose couplings, and tip connections.
- Torches shall be lighted by friction lighters or other approved devices, and not by matches or from hot work. Defective torches shall not be used.
- Oxygen and fuel gas pressure regulators, including their related gauges, shall be in proper working order while in use.

Oil and Grease Hazards

- Oxygen cylinders and fittings shall be kept away from oil or grease.
- Cylinders, cylinder caps and valves, couplings, regulators, hose, and apparatus shall be kept free from oil or greasy substances and shall not be handled with oily hands or gloves.
- Oxygen shall not be directed at oily surfaces, greasy clothes, or within a fuel oil or other storage tank or vessel.

Manifolds

- Fuel gas and oxygen manifolds must bear the name of the gas they contain.
- Fuel gas and oxygen manifolds must not be placed in confined spaces, but will be placed in safe, well ventilated, and accessible locations.
- Hose connections must be made so they cannot be interchanged between fuel gas, oxygen manifolds, and supply header connections. Keep hose connections free of grease and oil, and do not use adapters to interchange hoses.
- Manifold and header hose connections must be capped when not in use.
- Nothing may be placed on manifolds that will damage the manifold or interfere with the quick closing of the valves.

Fire Protection

- Objects to be welded, cut or heated must be moved to a designated safe location. If the object cannot be easily moved, all moveable fire hazards will be moved or protected.
- If the object to be welded, cut, or heated cannot be moved and if all the fire hazards cannot be removed, positive means must be taken to confine the heat, sparks, and slag, and to protect the immovable fire hazards from them.
- Welding, cutting, or heating must not be performed in the presence of flammable paints, flammable compounds or heavy dust concentrations.
- Fire extinguishers must be immediately available in the work area, free of obstruction, and maintained for instant use.
- When normal fire prevention precautions are not sufficient for the welding, cutting, or heating operation the "Hot Work Supervisor" will assign a fire watch. Sufficient amount of time must be allowed after completion of work to ensure that the possibility of fire does not exist. The designated fire watch must be trained in firefighting equipment.
- Gas supplies must be shut off during lunch breaks, overnight, or during shift breaks.
- Hoses and torches must be removed from confined spaces.

General Welding, Cutting, and Heating

- Welding, cutting, and heating, not involving conditions or materials may normally be done without mechanical ventilation or respiratory protective equipment, but where, because of unusual physical or atmospheric conditions, an unsafe accumulation of contaminants exists, suitable mechanical ventilation or respiratory protective equipment shall be provided.
- Employees performing any type of welding, cutting, or heating shall be protected by suitable eye protective equipment.
- Before welding, cutting, or heating is commenced on any surface covered by a preservative coating whose flammability is not known, a test shall be made by a competent person to determine its flammability. Preservative coatings shall be considered to be highly flammable when scrapings burn with extreme rapidity.
- Precautions shall be taken to prevent ignition of highly flammable hardened preservative coatings. When coatings are determined to be highly flammable, they shall be stripped from the area to be heated to prevent ignition.

Protection against Toxic Preservative Coatings

- In enclosed spaces, all surfaces covered with toxic preservatives shall be stripped of all toxic coatings for a distance of at least 10 cm from the area of heat application, or the employees shall be protected by air line respirators. In the open air, employees shall be protected by a respirator.
- The preservative coatings shall be removed a sufficient distance from the area to be heated to ensure that the temperature of the un-stripped metal will not be appreciably raised. Artificial cooling of the metal surrounding the heating area may be used to limit the size of the area required to be cleaned.

HOT WORK PERMIT

BEFORE INITIATING WORK, CAN THIS JOB BE AVOIDED? IS THERE A SAFER WAY?

This Hot Work Permit is required for any temporary operation involving open flames or producing heat and/or sparks. This includes, but is not limited to: Brazing, Cutting, Grinding, Soldering, Thawing Pipe, Torch Applied Roofing and Welding.

Part 1

INSTRUCTIONS

1. Firesafety Supervisor:

A. Verify precautions listed at right (or do not proceed with work).
B. Complete and retain Part 1
C. Issue Part 2 to person doing job.

Hot Work Being Done By:
☐ Employee
☐ Contractor _____

Date | Job Number

Location/Building & Floor

Nature of Job

Name of Person Doing Hot Work

I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.

Signed: (Firesafety supervisor/Operations Supervisor)

PERMIT EXPIRES:	Date	Time AM PM

NOTE: Emergency Notification on back of form. Use as appropriate for your facility.

REQUIRED PRECAUTIONS CHECKLIST

☐ Available sprinklers, hose streams and extinguishers are in service/operable.
☐ Hot Work equipment in good repair.

Requirements within 35 ft. (11 m) of work

☐ Flammable liquids, dust lint and oily deposits removed.
☐ Explosive atmosphere in area eliminated.
☐ Floors swept clean.
☐ Combustible floors wet down, covered with damp sand or fire-resistive sheets.
☐ Remove other combustibles where possible. Otherwise protect with fire-resistive tarpaulins or metal shields.
☐ All wall and floor openings covered.
☐ Fire-resistive tarpaulins suspended beneath work.

Work on walls or ceilings

☐ Construction is noncombustible and without combustible covering or insulation.
☐ Combustibles on other side of walls moved away

Work on enclosed equipment

☐ Enclosed equipment cleaned of all combustibles
☐ Containers purged of flammable liquids/vapours
☐ Pressurized vessels, piping and equipment removed from service, isolated and vented.

Fire Watch/Hot Work area monitoring

☐ Fire watch will be provided during and for 60 minutes after work, including any coffee or lunch breaks.
☐ Fire watch is supplied with suitable extinguishers, and, where practical, charged small hose.
☐ Fire watch is trained in use of this equipment and in sounding alarm.
☐ Fire watch may be required for adjoining areas, above, and below.
☐ Monitor Hot Work area for 4 hours after job is completed.

Other Precautions Taken

☐ _____
_____
_____
_____
_____
_____
_____
_____
_____

Emergency Notification	Telephone Number
Fire Department:	
Ambulance:	
Hospital:	
Police:	
Safety Coordinator:	
Industrial Accidents:	
Emergency Report Contact:	
Insurance Company:	

HOT WORK PROCEDURE / PERMIT PART 2

Title: Hot Work Procedure	**Date of Issue:**
Approved By:	**Review/Revise Date:**
Location:	

Definition: Any process that may generate an uncontrolled spark or flame that could be a danger to a workplace. The Hot Work procedure/permit is required to be implemented for any temporary operation involving open flame producing heat and/or sparks. This includes but is not limited to: brazing, cutting, grinding, soldering, thawing pipe, torch applied roofing and welding.

Physical Hazards Include:

☐ Radiation ☐ Noise ☐ Infra-radiation ☐ Visible Light
☐ X-rays & Gamma rays ☐ Extreme Temperatures ☐ Electrical Energy ☐ Stray Currents

Chemical Hazards Include:

☐ Fumes ☐ Vapours ☐ Gases ☐ Dusts

Biological Hazards Include:

☐ Bacteria ☐ Fungi ☐ Viruses

Fire/Explosion:

There is always a threat of a fire or explosion occurring when performing hot work. This results from either chemicals reacting with one another to form explosive or flammable mixtures or sparks from cutting and grinding.

Personal Protective Equipment:

☐ Repirator ☐ Welding helmet & shield ☐ Welding Screens ☐ Hearing protection
☐ Fire-proof clothing ☐ Leather gloves ☐ Leather apron ☐ Leather chaps

Personnel (who are authorized to perform hot work must receive specific training):

☐ Maintenance staff ☐ Maintenance supervisor

Protective Measures:

☐ Particular precautions must be adhered to when welding or cutting in a dusty or gaseous environment.
☐ Adequate ventilation must be provided. This may include the use of a portable ventilation system.
☐ The area in which hot work is being completed must be cleared of combustibles, screened off with the proper welding screens and provide with suitable fire extinguishers.
☐ Hoses and cables must be protected against damage.
☐ Never feed oxygen from the cylinder into a confined area.
☐ Protect cylinders, hoses, legs and feet when flame welding.
☐ Put stub ends of welding rods in a suitable refuse container.
☐ Never allow oil or grease to come into contact with oxygen or oxy-acetylene equipment or a hose.
☐ Always remove an oxy-acetylene torch from a confined space when the torch is not in use.

Fire Watch:

☐ Fire watch personnel will be supplied with the suitable extinguishers.
☐ Fire watch personnel are trained in use of this equipment and in sounding the alarm.
☐ A fire watch may be required for adjoining areas, above and below.

The area must be monitored for 4 hours after a job has been completed.

☐ A fire watch will be provided during and for 60 minutes after the completion of work, including any coffee and lunch breaks.

Hot Work Permits:

☐ A hot work permit is only required when welding, cutting, burning, etc. is performed in an area where it is not normally done. (e.g. a hot work permit is not required in a permanent welding shop/area.)
☐ Before hot work is to begin, the maintenance employee must verify that the location has been examined, and that precautions taken to prevent a fire, have been implemented.
☐ Attached is a Hot Work Permit.
☐ Once the 4-hour (monitor) fire watch is complete, the hot work permit must be signed off and filed in the maintenance department.

Training:

The maintenance supervisor and maintenance personnel will be trained in hot work and the technical and safety aspects of their work. The training will include but is not limited to:

☐ Hazard identification ☐ Safe Welding, brazing, cutting procedures
☐ Fire and Safety precautions ☐ Control Methods
☐ Proper use and maintenance of the welding equipment ☐ Proper use and maintenance of the personal protective equipment
☐ Proper use and completion of the hot work permit

Training records will be maintained in the employees personnel file.

Approval Signature:	
Distribution to:	**Document to be posted:**

Record of Employee Training-Welding and Cutting

Printed Name	Signature	Trainer Signature	Date

Chapter 19

Contracts

Dan-Ex Contracting Ltd. **New Hire Orientation Checklist**

- I have read or have had explained the Safety Policy & Program Summary. I have no further questions regarding:
  - The company's Safety Philosophy.
  - My safety responsibilities as an employee.
  - The disciplinary procedures.

_____Initial

- I have read or have had explained the Safety Committee portion of the Safety Program:
  - I am aware of who is in charge of safety if I have questions.
  - I am aware of my ability to report my safety concerns to the Safety Coordinator.
  - I am aware that this company is striving to provide a safe working environment and is committed to my safety and ability to inform the company of unsafe working environments without fear of reprisal.

_____Initial

- I have read or have had explained the General Safety Rules as pertain to the Safety Program:
  - I am aware of all safety rules and general codes of safe practice.

_____Initial

- I have read or have had explained the process for Accident Reporting & Investigation:
  - I understand that I am to immediately report an accident to my supervisor.
  - I understand that I am to immediately stop working.
  - I understand that if I need medical attention I am to see the clinic or hospital that is affiliated with this company.
  - I understand that if I go to a different doctor or medical facility the company may have a right to deny or not pay my medical bill.
  - I understand that I will be cooperative in any accident investigation.
  - I understand that upon any accident I may be tested for drugs and alcohol.
  - I understand that if I am present at my place of employment under the influence of drugs and or alcohol that I automatically self-terminate my employment with or without notice of termination by the company.

_____Initial

- I have read or have had explained the Emergency Response Plan:
  - I understand where my emergency evacuation routes are located.
  - I understand that we are to gather at a specific determined place in order to conduct a head count.

_____Initial

- I have read and or have had explained the Fire Prevention Plan:
  - I understand that I am to report any potential fire hazards.
  - I am to keep all exits clear and free of obstacles.
  - I know where the nearest fire extinguisher is to my workstation.

_____Initial

- I am aware of the First Aid portion of the Safety Program:
  - I am aware of where the first aid kits are located.
  - I am aware that I am to report to management if the first aid kit needs restocked.
  - I am aware of who is trained in First Aid and CPR
  - I am aware of where the nearest Eye Wash Station is located (if appropriate).
  - I am aware that I am to report all injuries immediately to my supervisor.
  - I am aware of where our clinic is located and will have someone drive me there in the event of an emergency (or by ambulance if appropriate).

_____Initial

- I have read or have had explained the Hazard Assessment portion of the Safety Program:
  - I understand that I am to be familiar with the hazards that surround my workstation.
  - I understand that I am to report any hazard that may be present in my workstation.
  - I understand that it is my responsibility to assist in providing a safe working environment for myself and my co-workers.

_____Initial

- I have read Bloodborne Pathogens portion of the Safety Program:
  - I understand that I am to wear personal protective equipment when dealing with blood or body fluids.
  - I understand that I am to properly dispose of any blood, body fluids, or material that has been touched by the blood or fluid.
  - I understand that in the event of dealing with a Bloodborne Pathogen situation it is my responsibility to receive post exposure care by the company's clinic.
  - I am aware of where my hand-washing facilities and/or disinfectant are located.

_____Initial

- I have read or have had explained and understand the Workplace Violence & Harassment policy of the Safety Program:
  - I understand The Company has ZERO TOLERANCE for workplace Violence & Harassment.
  - Workplace Violence & Harassment includes but is not limited to: intimidation, threats, physical attack, property damage, and includes acts of violence committed by employees, customers, relatives, acquaintances, or strangers against company employees in the workplace.
  - Dangerous weapons are prohibited on company property or in Company vehicles.
  - All employees are encouraged to report to a supervisor any possibility of workplace Violence & Harassment. All reports will be confidential.

_____Initial

- I have read or have had explained the Electrical Safety portion and the Lockout and Tagging portion of the Company Safety Program:
  - I understand that only authorized persons are allowed to deal with electrical repairs and or issues.
  - I understand that I am to not touch or in any way use any equipment that is locked out or tagged out.
  - I understand that it is my responsibility to report any electrical hazards to a supervisor immediately.

_____Initial

- I have read or have had explained the WHMIS & Material Safety Data Sheet (MSDS) portion of the Safety Program:
  - I understand what a Material Safety Data Sheet is.
  - I have been given an orientation on how to read a MSDS.
  - I understand that I am to report any Chemical or Hazardous Substance that does not have a label.
  - I understand that I can request further training on MSDSs.

_____Initial

- I have read or have had explained the Personal Protective Equipment portion of the Safety Program:
  - I understand that I am to wear my personal protective equipment as required by this company.
  - I am aware of what I am required to wear for personal protective equipment at this company.

_____Initial

- I am aware of where my company displays all of the required Employee Rights Postings.

_____Initial

- I am aware of where my Company "Designated Medical Provider" is located.

_____Initial

- I am aware that the Safety Program may contain additional written safety Programs in place which require additional training (i.e. Confined Spaces, Fall-Protection, Excavation, Ladders, Scaffolding, Lock-Out/Tag-Out, etc.):
  - I understand that I may receive or request further training on any safety issues that may be appropriate for my particular job.
  - If I have not received adequate training or feel that I cannot conduct my job safely it is my responsibility to notify my supervisor.

_____Initial

My signature certifies and verifies that I have received an orientation and have received or have read the material mentioned in the Company Safety Program. I understand completely the program and have no questions in regards to Company safety policy. I fully understand and am aware that if I have questions regarding the Company Safety Program or my personal safety, I may inquire of my supervisor for additional information and explanation.

_____

New Hire Name Signature

_____

Date

_____

Supervisor Name Signature

_____

Date

DISCLAIMER

British Columbia Health and Safety Regulations are continuously being reinterpreted. Therefore, Safety Services Company is unable to completely guarantee the exactness of the information conveyed in this publication. Safety Services Company assumes no responsibility and shall be held harmless for any inaccuracies or omissions contained within this manual and shall not be held liable to any extent or form for any injury or loss resulting from the manner in which this information is interpreted and / or applied. Careful effort has been dedicated in order to provide a simplified, understandable explanation of British Columbia OHS regulations based on currently available information. This Health and Safety Manual is distributed with the agreement that Safety Services Company is not employed in providing legal or other specialized business services. Should expert assistance be required, retain the services of a competent professional.

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