

## **Section 3**

# **Safe Work Practices**



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## **Safe Work Practice**

1. Introduction – Safe work practices are in place to assist in ensuring that all employees are aware of the safe guidelines for getting work/ tasks done safely.
2. About Safe Work Practices - Safe work practices are a set of positive guidelines helpful to the performance of a specific type of work that may not always be done in a set way. It is hard to develop a job procedure for these types of tasks because they are not done the same way every time and we are not able to develop a step-by-step procedure for the job. For these jobs, it may be more practical to have a safe work practice.

Safe work practices are ways of controlling hazards and doing jobs with a minimum of risk to people and property. To reduce risks, an organization must have a set of safe work practices. These must be developed to fit the particular trade. Management must understand and fully support these safe work practices, and ensure that:

- a. Safe work practices are in writing
  - b. All employees understand the safe work practices that apply to them
  - c. All equipment and management support to permit compliance are available
  - d. Supervisors ensure that all safe work practices are followed
3. When to use Safe Work Practices
    - a. Employee Orientations
    - b. Proper Job Instruction
    - c. Planned Observation
    - d. Coaching, teaching, mentoring others
    - e. Tool Box Topics
    - f. Accident / Incident Investigation
    - g. Skill Training



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## **Safe Work Practices**

### **Annual Review of Safe Work Practices**

1. In an effort to ensure that a safe work environment is maintained and is in line with any changes in practices or conditions in the workplace an annual review of the work practices in place must be conducted.
2. This annual review should take place at approximately the same time annually in order to create predictability in the process and to assist in ensuring cooperation at all employee levels.
3. The annual review of Safe Work Practices will take place on a Thursday morning in the first week of February as the work situation permits.
4. The following positions will require representation at the annual review. It is critical that all positions identified have a representative so that the actual work practices are reviewed by those who execute them and those who observe them.
  - a. GDSL Safety Officer (act as scribe during review)
  - b. Senior Foreman for Woodframe
  - c. Senior Foreman for Commercial
  - d. 1 x Site Superintendent
  - e. 1 x worker from Woodframe
  - f. 1 x worker from Commercial
5. Any changes or amendments will be forwarded to the GDSL Safety Officer for transition into current Safe Work Practices and for dissemination to all personnel through updates to the company safety manual.



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### **Steel stud framing at leading edges or building exteriors**

1. Steel stud framing at a leading edge or on the exterior of a structure has the potential for a catastrophic event if care is not taken.
2. As per rules for fall protection use, workers within 2 meters of an unguarded leading edge, or working on a building exterior, will be tied off and using fall protection equipment as directed.
3. All tools will be tied off with a tool lanyard or similar device while in use near a leading edge.
4. All materials will be secured by a clamp. That clamp will be tied off and secured to a suitable anchor point or structural portion of the building. This is to prevent the material from free-falling off the building if it comes free during construction. Workers will NOT tie off the clamp to themselves in order to avoid being pulled towards the leading edge should the material be dropped.
5. Where possible a control zone below the work in progress should be established. In any location with routine foot traffic a sidewalk closure should be considered.
6. Prior to end of day all materials and equipment on open floors will be secured.



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## **Working in High Winds**

1. Working in inclement weather is part of doing construction. Of particular concern is working in high winds. Gusting and sustained winds can lead to falls from height and can lead to material becoming loose on site.
2. Foremen should always be aware of weather conditions for the day and plan ahead before poor weather comes in. With regard to working in winds the following will apply
  - a. Work on Mobile Elevated Work Platforms will cease if winds gust or are sustained at 40kmh (28mph)
  - b. Work at height on the exterior of buildings will cease if winds gust or are sustained at 40kmh (28mph)
  - c. Work on exposed floors (no windows or hoarding) will cease if winds gust or are sustained at 40kmh (28mph) if workers are not tied off
  - d. In the event of gusting or sustained winds of 40kmh (28mph) all loose materials will be tied off.
3. On high rise construction the two primary indicators regarding wind would be if either the skip elevator or crane are shut down by wind.
4. Prior to end of day all materials and equipment on open floors will be secured.



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## **Housekeeping**

1. Poor housekeeping is the cause of many accidents, it also contributes to lost or misplaced tools. The following will help keep a work area safe and free of hazards:
  - a. Work locations, vehicles and buildings must be kept clean and orderly at all times.
  - b. Combustible materials such as gasoline, solvents, oil-soaked rags must be kept in fire resistant metal containers and clearly marked, i.e. flammable. 20lb ABC Fire Extinguisher must be in the immediate area.
  - c. All solvents will be kept in approved, properly labelled containers, and must be kept in a secured room that is marked to identify the dangers, i.e. Danger-flammables, no smoking, with an ABC Fire Extinguisher in immediate area
  - d. Floors and work platforms must be kept free of projections, (i.e. nails) and obstructions and must be maintained as to not create tripping or slipping hazard
  - e. Materials and supplies must be stored in an orderly manner so as to prevent tripping hazards.
  - f. All materials will be secured/ tied down when working on open floors where materials may be affected by wind.
  - g. Emergency exits, stairways, aisles, roadways, walkways MUST be identified and kept clear at all times.
  - h. Strict adherence MUST be paid to —No Smoking‡ in areas that use flammable materials.
  
2. Keeping your work area clean and tidy will help increase work time and eliminate wasted time looking for tools and materials and will reduce the chance of injury.



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### **Mobile Elevated Work Platform (MEWP)**

1. A mobile elevated work platform (MEWP) should only be operated by a worker who is certified and considered competent on the MEWP. Only a certified operator may operate the MEWP.
2. The operator shall perform a careful pre-use inspection of the MEWP, and must document and report any problems identified to the supervisor immediately
3. An MEWP which is not working properly, or which has sustained damage to critical components must not be used until repaired by a qualified/competent mechanic
4. The operator must do a careful pre-use/ path of travel inspection of the work area to identify any possible operating hazards. Any hazards identified shall be documented and reported to the supervisor if they cannot be adequately controlled.
5. Each worker using an MEWP at 3m or higher shall wear appropriate fall arrest equipment, including a full body harness and a lanyard. The lanyard shall be tied off to the anchor designated by the manufacturer
6. Standard PPE will be used along with fall protection equipment as required.
7. Workers on the platform must ensure there is a means of communication with someone nearby in the event of an emergency
8. An MEWP will not be driven in a raised position
9. An MEWP will not bear more than its rated working load and where possible, the loads must be distributed over the platform
10. When MEWPs are used to lift materials, ensure that the materials are firmly secured to the platform
11. Do not place makeshift platforms such as boxes, access equipment such as ladders and scaffold on an MEWP to gain access to areas above
12. Overhanging loads will not be lifted on an MEWP
13. An MEWP or any other part of a manlift device must not be erected or moved closer than 7m (23 ft) to overhead power lines unless the device is



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equipped for live electrical line work and the workers on the platform are qualified/competent for such work

14. An MEWP will not be used for pulling, pushing or dragging materials
15. The MEWP will not be extended by using cantilevered planks or similar platform materials. Only manufacturers platform extension devices will be used
16. Planks or similar platform materials will not be used to bridge the gap between an MEWP and other work areas
17. Workers will always maintain three-point contact (one hand and two feet or two hands on one foot) when getting on or off the platform of an MEWP
18. For all types of off-road devices, the terrain on which the device is placed or over which it will travel must be firm enough to support the device and its rated working load
19. Operator will ensure controls are operated smoothly and sudden starts/stops are avoided
20. When traveling on a slope, the operator shall travel in line with the slope, as opposed to traversing it. If work is being done while on a slope, face uphill and use chocks
21. An MEWP will not be used under high wind conditions. This is especially important for smaller scissor lifts and boom-type devices
22. When the MEWP is not being used, turn off the power system to prevent exhaust fumes from accumulating in an enclosed work area
23. Never alter any safety device on a manlift
24. Never stand on guard rails



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## **Explosive Actuated Tools**

1. Explosive actuated tools are a key part of our work. If used incorrectly, severe injury or death may result. Following these rules will reduce the risk of injury:
2. Only trained/competent, complete with documentation, workers who are familiar with the regulations governing the use of the tool are to operate explosive actuated tools. The following rules must be adhered to:
  - a. Safety glasses and hearing protection must be worn when using explosive actuated tools
  - b. NEVER point the tool at anyone
  - c. Do not carry loaded tools from job to job
  - d. All workers must be clear of area where explosive actuated tools are being used. This will protect them against flying shards or ricochet
  - e. Clean and maintain tools in accordance with the manufacturer's recommendations
  - f. Check tools prior to use to ensure they are in good working order
  - g. Remove defective tools from service
  - h. Store tools and cartridges in a secure location when not in use
  - i. Do not use tool where there are flammable or explosive vapours
  - j. Do not place your hand over the muzzle end of a loaded or unloaded tool
  - k. Use only projectiles (nails, studs, etc.) recommended by the manufacturer
  - l. Ensure that the material you are shooting into is thick enough as not to let the projectile shoot through
  - m. ONLY load tool before each use
  - n. Do not leave tool unattended
  - o. Use only cartridges recommended by the manufacturer. Use only the cartridge that is appropriate for work being done
  - p. Unload cartridges with the utmost caution
  - q. Keep cartridges locked up when not in use
  - r. Do not force a cartridge into a tool
  - s. DO NOT DISCARD unfired or fire cartridges carelessly. Do not throw them on the ground
  - t. Do not carry loose cartridges in a pocket, they may go off prematurely



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### **Use of Heaters on a job site**

1. General – Due to seasonal conditions portable heating is used on almost all sites. This can come in the form of electrical, natural gas powered or propane powered. All these forms of heat come with some inherent risks.
2. Propane is non-toxic and non-poisonous. It is artificially ODORIZED to aid in detecting leaks. In the event of a gas leakage, close all cylinder valves immediately and close all appliance valves and do not turn them on again until the cause of the leakage has been found and corrected
3. Propane gas is heavier than air. If a leak should occur, the gas will collect near the floor or flow into a basement. Therefore, cylinders and regulators must be located outside and at least three feet away from any opening in any building, as prescribed by the National Fire Protection Association and the Canadian Standards Association
4. All installations and use of this product on the job site must comply with the Government legislation set out for its safe use and must be done by a fully trained/competent worker
5. Natural gas - While natural gas is considered the safest and cleanest fossil fuel for domestic and industrial use, there are inherent dangers to remember. Natural gas is non-toxic (non-poisonous) but can cause death by suffocation if the gas displaces the air in a confined space.
6. Natural gas is heavier than air. If a leak should occur, the gas will collect near the floor or flow into a basement. Therefore, cylinders and regulators must be located outside and at least three feet away from any opening in any building, as prescribed by the National Fire Protection Association and the Canadian Standards Association
7. All installations and use of this product on the job site must comply with the Government legislation set out for its safe use and must be done by a fully trained/competent worker
8. Electrical sources for heat are the safest for site as the fire risk is reduced. That being said safety must be adhered to during installation of electrical heating devices.
9. Always check manufacturer's specifications for correct usage and placement of heaters in an enclosed area.
10. All fire precautions must be in place and respected. This includes keeping combustible materials away from the device.
11. All personnel on site will be briefed on the signs and symptoms of carbon monoxide and carbon dioxide poisoning. This will be done so that any one team member may be able to recognize the symptoms in another team member



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## **Material Storage and Handling**

1. Improper storage and handling of materials not only results in lost dollars but is a direct cause of injuries. The following guidelines shall be adhered to at all times:
  - a. When lifting heavy objects, lift with your legs and not your back
  - b. Always get assistance when lifting heavy loads
  - c. When lifting watch out for pinch points and don't allow yourself to get into a position where jamming could occur
  - d. Guard against getting into an off balance position when lifting, pulling or pushing materials or equipment
  - e. When hoisting materials using a rope be certain the materials are secured and their path up is obstructed. Also, be certain there is either a warning sign or co-worker below the direct lift area to prevent those underneath
  - f. Be certain piled materials do not obscure or obstruct warning signs or walkways
  - g. When releasing secured loads under tension (strapping and packing materials will be pulled taut) ensure that ratchet straps are fully released and then pulled off of loads. For plastic or metal strapping under pressure be sure to stand off the side of the strap (out of the line of fire), where possible place a weighted object over the strap to keep it from flying on release. Standing perpendicular to the strap cut the strap ensuring at all times that the workers face is away from the line of fire.
  - h. When covering insulation be certain it is first placed on pallets and then securely covered. When material is taken from a pile be sure to recover it
  - i. Dispose of waste materials on a constant basis in the proper storage bins. Even small pieces of construction material can cause serious injury when picked up by a gust of wind
  - j. Be certain all metal cladding materials are secured and not just piled on the ground. Unsecured cladding can result in serious injury when blown around
  - k. When working with or lifting metal wear gloves at all times
  - l. All flammable/combustible material must be stored in adequate containers and must be adequately marked to be clearly identifiable complete with WHMIS labels
  - m. When handling hazardous materials, adequate protective personal equipment must be worn



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## **Forklifts**

1. Knowledge, skill and confidence are the essential tools of a professional forklift operator. The knowledge that your equipment is in safe working condition and the skill that comes from practicing safe operating techniques will produce the confidence you need to get the job done right.
2. Following these rules will greatly reduce the risk of turning the forklift over the injuring the worker:
  - a. Any worker using a forklift must be fully trained and competent to operate the forklift, these are not toys, so they should not be treated as such. Certification must be updated as required and maintain currency
  - b. Pre-use inspection must be recorded
  - c. Spotters must be used in congested areas
  - d. Operating surface is very important to the safe use of a forklift. Floors, wherever possible, must be level, free of holes, free of oil and grease and as dry as possible, noted. If the ground is wet or muddy, the operator must take extra care when operating the forklift. Be aware of overhead hazards, i.e. electrical lines, lights, and utility pipes
  - e. Do not operate the forklift in enclosed or confined areas. The build-up of carbon monoxide can prove to be deadly
  - f. Do not operate the forklift beyond manufacturer's recommendations. Do not try to lift more weight than it is rated for. This may cause the forklift to tip
  - g. Always inspect the forklift before you operate it. Look for things like cracked or broken lines. Are there any puddles underneath the forklift? Are any of the tires flat?
  - h. Make sure the back up alarm is operating. In Alberta, mobile equipment over 6000 kg, or has limited visibility must have an audible back-up alarm or a competent flag person
  - i. For maintenance, follow the manufacturer's recommendations and only properly trained, competent workers are allowed to perform maintenance on forklifts
  - j. Operators must be aware of their surroundings, are there obstacles, is there pedestrian traffic, watch the blind spots. Be sure that you have enough room to turn. Operate the machine safely
  - k. Do not allow any riders on the forks
  - l. Operators must handle each load differently, not all loads are the same, watch for things like the height of the load, the position of the load on the forks, the speed you are travelling at, the load weight and the center of gravity of the load
  - m. On some loads, because of the size of the cargo, visibility may be obstructed, at these times the operator must stop to have a flagman or signaler to help out



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- n. Watch for steep grades, these may require the operator to travel backwards, again, a trained/competent signaler may be required. Never turn on ramps, slopes or inclines. This may cause the forklift to turn over, wait until you are back on level ground
- o. Never stand underneath the forks, the hydraulics may fail, this would result in severe injury or death
- p. Always wear your safety restraint when operating the forklift. In the event of a rollover, your seat belt may be the only thing that saves you from injury
- q. Never move unstable loads. If the load cannot be safely lifted, you may be required to restack the load



## **Scaffolds**

1. The erection and dismantling of scaffolds must be carried out under the supervision of personnel trained/competent in such operations
2. Workers erecting or dismantling a scaffold more than 6 feet high must be tied off with a full body harness, and adequate double latching lanyard complete with shock absorber
3. Scaffolds must be erected with all braces, pins, screw jacks, adjustable base plates and other fittings, as required by the manufacturer. All pins are to be placed at connection points.
4. Scaffolds must be adequately braced horizontally and vertically:
  - a. Most tubular frame scaffolds should have braces both on every section in the vertical plane
  - b. Horizontal bracing is provided to some extent by the scaffold platform and the base plates on the scaffold legs. However, where scaffolds are sever sections high or where they are on casters, most manufacturers recommend that horizontal bracing be used
5. Scaffolds MUST be equipped with guardrails consisting of a top rail 42 inches, mid-rail at 21 inches and toe board, if 6 feet high and above
6. Scaffold platforms must be at least 20 inches wide and if they are over 10 feet high they must be planked across their full width. All platforms will be free of debris and tools when in use
7. Scaffolds must be tied to a building at vertical intervals for each 4.6 meter intervals and 6.4 meter horizontal intervals
8. Where scaffolds cannot be tied into a building, guide lines adequately secured must be used to provide stability
9. Scaffold frames must be effectively pinned together where scaffolds are over two frames in height or where they are used as rolling scaffold towers
10. Scaffold planks must be securely fastened to prevent them from sliding, i.e. cleats
11. Scaffold planks must be of good quality, free from defects such as loose knots, splits or rot, rough sawn, measuring 50mm x 255 mm (2" x 10") in cross section and No. 1 spruce or better when new. All planks will have kickers at each end
12. Scaffolds must be erected, used and maintained in a reasonably plumb condition
13. Scaffold planks must be installed so that they overhang by at least 150mm (6 inches) but not more than 300mm (12 inches)
14. Scaffolds must be equipped with a proper ladder for access. Vertical ladders must be equipped with 150mm (6 inches) stand-off brackets and a ladder climbing fall protection device or safety cage when they are more than 5m (16 feet) high
15. Scaffolds over 15m (50 feet) in height must be designed by a professional engineer and constructed in accordance with the design, and must have an Engineer stamp
16. Remove ice, snow, oil, grease and other slippery material from the platform and sand the surface, if necessary



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17. Wheels or casters on rolling scaffolds must be equipped with braking devices and securely pinned to the scaffold frame. Wheels and casters will be locked at all times
18. Outriggers will be used if the platform height is more than 3x the minimum base dimension
19. Tagging Requirements:
  - a. An employer must ensure that a bracket scaffold, double-pole scaffold, needle-beam scaffold, outrigger scaffold, single-pole scaffold, suspended scaffold or swingstage scaffold is colour coded using tags at each point of entry indicating its status and condition as follows:
    - i. a green tag with —Safe for Use, or similar wording, to indicate it is safe for use;
    - ii a yellow tag with —Caution: Potential or Unusual Hazard, or similar wording, to indicate the presence of a potential or unusual hazard;
    - iii a red tag with —Unsafe for Use, or similar wording, to indicate it is not safe to use
20. An employer must ensure that a bracket scaffold, double-pole scaffold, needle-beam scaffold, outrigger scaffold, single-pole scaffold, suspended scaffold or swingstage scaffold erected but not immediately put into service, or not used for more than 21 consecutive calendar days, has a red tag at each point of entry until it is inspected and tagged by a competent worker for use.
21. An employer must ensure that a bracket scaffold, double-pole scaffold, needle-beam scaffold, outrigger scaffold, single-pole scaffold, suspended scaffold or swingstage scaffold is inspected and tagged by a competent worker before it is used for the first time and at intervals of not more than 21 calendar days while workers work from the scaffold or materials are stored on it.
22. A tag attached to a scaffold under this section expires 21 calendar days after the date of the inspection listed
23. A tag required by this section must include;
  - a. the duty rating of the scaffold
  - b. the date on which the scaffold was last inspected
  - c. the name of the competent worker who last inspected the scaffold
  - d. any precautions to be taken while working on the scaffold, and
  - e. the expiry date of the tag



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## **Fall Protection**

1. As much of construction work is done above ten feet, workers are very susceptible to injuries from falls. These rules must be followed to reduce that risk of fall injuries:
  - a. When working at heights of 10 feet or more, workers must wear a full body harness, complete with adequate double latching lanyard complete with shock absorber
  - b. Workers must be trained and competent in the use of harnesses and lanyards
  - c. When working from scaffolds, the platform must be fully planked and must extend no less than 6 inches past and no more than 12 inches past scaffold end and they must be cleated
  - d. Guard rails consisting of a top rail 42", mid-rail 21" and toe board are required whenever the work platform is 10' or more above floor level. Scaffold must also be adequately secured to the building or must have outriggers in place when 3x higher than wide
  - e. Wheels and castors must be locked when personnel are working on the scaffold
  - f. If the scaffold is more than 10' high, it must not be moved with personnel on it unless:
    - i. They are tied off by means of a full body harness with adequate double latching lanyard complete with shock absorber to an independent life line
    - ii. The floor is smooth and level
    - iii. Scaffolds must be adequately pinned or secured together
  - g. In Alberta workers will not ride scaffold if it is more than two times higher than its width
  - h. Workers must wear full body harness with adequate double latching lanyard complete with shock absorber when working from a swing stage, they must be tied off:
    - i. To an independent lifeline if the swing stage has only two independent suspension lines
    - ii. To the swing stage if it has four independent suspension lines, two at each end
  - i. Workers must wear full body harness with adequate double latching lanyard complete with shock absorber if they are working within 5' of a potential fall hazard
  - j. Only workers who are properly trained and are competent are to work from swing stage scaffolds, or under direct supervision of an adequately trained, competent worker complete with documentation
  - k. A site specific Fall Protection Plan must be reviewed, understood and signed by all workers before any work commences
  - l. Employers must provide a written fall protection plan in the event workers are not protected by guardrails.
  - m. Always refer to Provincial Regulations



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## **ELEVATOR SHAFTS AND FRONTS**

1. The principle risk in working with elevator shafts and on elevators fronts is the risk of falling. All workers who are involved in work in elevator shafts and on fronts will be familiar with the *Site Specific Fall Protection Plan* and with the GDSL *Safe Work Procedure for Fall Protection*.
2. Following these steps will help reduce the risk of injury or death while working in elevator shafts or on elevator fronts:
  - a. Complete a Hazard Assessment before beginning any work that may cause injury to workers
  - b. Discuss the plan with the workers, input from others might help with problem areas
  - c. When setting up the platform to work on in the shaft all workers will use a fall restraint system until the work platform is completely installed and approved by the Site Foreman or Site Safety Representative.
  - d. When taking down the platform in the shaft all workers will use a fall restraint system until the work is complete.
  - e. When working on elevator fronts no fall restraint system is required if guardrails are in place at 21 inches and 42 inches above floor level
  - f. When working on elevator fronts and no guardrails are present a fall restraint system will be used if any openings are 12 inches or wider.
  - g. All workers working in shafts or on elevator fronts who are using fall restraint systems should be Fall Protection Qualified and should have proof of qualification in their possession.
  - h. It is the responsibility of the GDL Site Foreman to ensure that qualified workers are doing work in these areas.



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## Respiratory Hazards

1. Respiratory hazards may be present as:
  - a. Gases
  - b. Vapors
  - c. Fumes
  - d. Mist or
  - e. Dusts
  
2. Gases – consist of individual molecules of substances and at room temperature and pressure are always in the gaseous state. Common toxic gases found in construction are carbon monoxide from engine exhaust and hydrogen sulphide produced by decaying matter found in sewers and other places.

Vapours – are similar to gases except that they are formed by the evaporation of liquids (i.e. water vapour). Common vapours found in construction are produced by solvents such as xylene, toluene and mineral spirits used in paints, coatings and degreasers.

Fumes – are quite different from gases or vapours, although the terms are often used interchangeably. Technically, fumes consist of small particles formed by the condensation of materials which have been subjected to high temperatures. Welding fume from coal tar used in built-up roofing and fume from diesel engines.

Mists – are small droplets of liquid suspended in air. The spraying of paint, from oils and other materials generates mists of varying composition.

Dusts – are particles which are usually many times larger than gases, vapours or fumes and are generated by crushing, grinding, sanding or cutting. The most common hazardous dusts in construction are asbestos from insulation and fireproofing, and silica from sandblasting, rock drilling and concrete cutting.

In construction settings, respiratory hazards may be compounded, depending on the number and variety of jobs underway. For example, both mist and vapours may be present from paint spraying or both gases and fumes from welding.

3. Health Effects - Respiratory hazards can be divided into the following classes based on the type of effects they cause:
  - a. Irritants are materials which cause irritation of the eyes, nose, throat and lungs. This group includes fiberglass dust, hydrogen chloride gas, ozone and many solvent vapours. With some materials i.e. cadmium fume produced by welding or oxyacetylene cutting of metals coated with cadmium, the irritation leads to a pneumonia-like condition called



- pulmonary edema. This effect may not be apparent until several hours after exposure has stopped
- b. Asphyxiates interfere with the body's ability to use oxygen. Carbon monoxide and hydrogen sulphide are examples of chemical asphyxiates.
  - c. Central Nervous System Depressants interfere with nerve function and cause symptoms such as headache, drowsiness, nausea and fatigue. Most solvents are central nervous system depressants.
  - d. Fibrotic Materials cause —fibrosis or scarring of lung tissue in the air sacs. Common fibrotic materials found in construction include asbestos and silica.
  - e. Oxygen Deficiency results when the oxygen in the air has been displaced by another gas or vapour (i.e. nitrogen used to purge piping and tanks) or has been consumed by chemical or biological activity (i.e. rusting or bacteria digesting sewage). The oxygen content of normal outside air is approximately 21% by volume. Oxygen content below 18% is considered insufficient to support life. Many authorities specify 19.5% as the minimum acceptable oxygen concentration. Oxygen concentrations lower than 15% can cause loss of consciousness and may quickly be fatal.
  - f. Nuisance Dusts do not cause significant effects unless exposure is of high concentration and/or long duration. Excessive exposure to these substances can be adverse in itself or can aggravate existing conditions such as emphysema, asthma or bronchitis. Examples include plaster dust, cellulose from some insulation and limestone dust.
4. Styles of Face pieces - In addition to the type of respirator and mode of operation, the style of face piece is used to classify respirators. Only 3M 8210, 8710, or equivalent disposable masks on sites (these masks have two straps and are thicker):
- a. Disposable Masks – most of these devices are designed to be worn only once. They fit over the mouth and nose, rest on the chin and are held in place by one or two straps. Some of the more sophisticated versions with adjustable straps and exhalation valves can be worn more than once, provided they are not damaged.
  - b. Quarter-Face Masks – these are usually designed to be reused and fit over the mouth and nose. They rest on the chin and are held in place by one or two straps.

In order to select the proper respirator for a particular job, it is necessary to know and understand the characteristics of the contaminant(s), the anticipated exposure conditions and the performance limitations of the equipment. The selection of respirators should only be done by someone who understands all three factors.

Most respirator manufacturers can assist with selection.



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5. When seeking information on the type of respirator for use in specific situations, contact the manufacturer or distributor and ask to speak with the respiratory protection specialist. Provide as much of the following information as possible:
  - a. Name of the material
  - b. Type of work to be done (i.e. painting, welding)
  - c. Description of worksite conditions (i.e. inside a tank, outdoors)
  - d. Exposure concentration, if known (i.e. 150 ppm of toluene)
  - e. Whether the material will be heated, sprayed, etc.
  - f. Other materials being used in the vicinity

The respiratory protection specialist will evaluate this information and compare it with the following additional data.

- a. The permissible exposure limit of the dust, gas or vapour, often referred to as the TLV or threshold Limit Value\*. These values are used in conjunction with the protection factors listed in Table 3 to determine the maximum use concentration. (TLV is a term copyrighted by the American Conference of Governmental Industrial Hygienists)
- b. The physical properties of the contaminant:
  - a. Vapour Pressure – the maximum amount of vapour which can be generated under given conditions
    - i. Warning Properties (i.e. irritation, odor, taste) – if the material has poor warning properties (for example, when the lowest concentration than can be detected by odor is greater than the permissible exposure concentration), air-purifying respirators are usually not permitted
    - ii. Types of Effects – with center-causing materials a higher degree of protection is usually specified
    - iii. Performance of Filters – with some gases and vapours, the filter can become overloaded in just a few minutes. Therefore, knowledge of the filtering material and its performance against gases and vapours is necessary
    - iv. The Lower Explosive Limited (LEL) of the gas or vapour. If the expected concentration is in excess of the LEL, only Self Contain Breathing Apparatus (SCBA) respirators are considered adequate
    - v. The concentration considered to be immediately dangerous to Life or Health (IDLH). IDLH atmospheres pose an immediate threat to life or health or the threat of a serious but delayed effect on health (i.e. radioactive dust exposures). An example of an IDLH situation is the repair of a chlorine leak where a worker could be overcome by the gas very quickly. IDLH atmospheres should only be entered by persons wearing SCBA or SCBA/airline respirators
    - vi. Possibility of skin absorption. With some chemicals, the amount of material which can be absorbed through the skin is

of equal or greater concern than the amount of gas or vapour which can be inhaled. For these situations, supplied-air protective suits may be necessary

As evidenced by points a) to k), many factors must be considered to ensure that the proper respirator is selected for a specific situation.

Remember: Respirators must be selected only by someone who is knowledgeable and competent in this field.

6. Respirator Maintenance - Like any equipment, respirators require maintenance. The following instructions cover the major points.  
Filters should be changed as follows:
  - a. Dust/mist/fume filters should be changed when there is noticeable resistance to normal breathing
  - b. Chemical cartridge respirators should be changed when the gas or vapour can be tasted or smelled
  - c. Any filter should be changed at the interval specified by the manufacturer or when damaged in any way

Inhalation and exhalation valves should be checked before the respirator is used

Damaged face piece, straps, filters, valves or other parts should be replaced with original equipment parts

Face pieces should be washed with mild soapy water as often as necessary to keep them clean and wearable

Respirators should be assigned to the exclusive use of individual workers

Where a respirator must be assigned to more than one worker, it should be disinfected after each use (check with the manufacturer regarding acceptable sanitizers/disinfectants)

Check all supply hoses, valves and regulators on supplied-air respirators as specified by the manufacturer

SCBA units and high pressure cylinders of compressed breathing air should be used and maintained in accordance with Canadian Standards Association CAN3-Z180.1-M85 Compressed Breathing Air and Z94.4-M1982 Selection, Care and Use of Respirators

Compressors and filtration systems used with supplied-air respirators must be maintained in accordance with the manufacturers' recommendations



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7. Approvals and Standards - The Canadian Standards Association has issued two standards pertaining to respiratory protection which should be reviewed by users:
  - a. CAN3-Z180.1-M85 —Compressed Breathing Airl lists the criteria for air purity and delivery systems
  - b. Z94.4-M1982 —Selection, Care and Use of Respiratorsl offers recommendations on the three aspects of the subject



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## Overhead Power Lines

### **Power Lines Are Everywhere**

1. General - Using proper safe practices/procedures near power lines is absolutely necessary. Work with your Supervisor and co-workers to ensure a proper safety attitude at your workspace.
2. Injuries and deaths near power lines are preventable. Near misses are frequent. Avoiding contact with power lines requires common sense, a strong awareness of safety factors and good decision making ability.
3. Please review and adhere to the following practices/procedures when planning and performing work near overhead power lines:
  - a. Before work begins, conduct a written Hazard Assessment and examine the work area to identify and correct hazards and to establish that the safe limits of approach distances to overhead power lines
  - b. Contact the electrical utility company to determine the operating voltage of the line and confirm the safe limits of approach
  - c. No work is to be performed at a distance that is less than those specified in table 1. In this situation have the electrical utility company disconnect or relocate the line if needed. If this isn't practical or feasible to do so, carry out the following:
    - a. Keep an eye out for overhead lines at all times; take time to examine the hazard
    - b. Before operating equipment, make a safety plan that prevents contact with lines
    - c. Take extra care and caution
    - d. Check the height of your equipment or load
    - e. Plan your moves; are there power lines to pass under or avoid
    - f. Look out for uneven ground that may cause your vehicle to weave, bob or bounce
    - g. Think about wind and temperature; they may affect the power lines height
    - h. Never ride or climb on equipment or a load when near a power line
    - i. Work around power lines to be done only during daylight hours
    - j. Don't ground your equipment around a power line
    - k. Do not allow equipment or objects to approach the overhead power line closer than the safe limit of approach specified
    - l. If work is being carried out near the safe limit of approach, use a trained/competent signaler to act as an observer to ensure that the required distance is maintained (communication by radio or air horn)
    - m. Do not place materials under or adjacent to the overhead power line if it reduces the clearance above ground required by



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- OH&S regulations. Contact the electrical company for assistance to determine the required clearance between power line and the ground
- n. Do not allow excavations to reduce the support required for power poles. Contact the electrical company to determine support required. Request line locates in case of grounding grids buried at the base of power poles
  - o. Remember; electricity is invisible, do not take any chances
  - p. Keep a safe working distance between your equipment and power lines; follow Provincial Regulations which require you to stay clear of power lines. Do not go too close with people or equipment
  - q. Only trained/competent workers are to work near power lines
4. The limits are outlined in the regulations. Depending on the voltage of the power line, you need to establish a safe working distance and make sure everyone follows the guidelines shown, Alberta Table 1 for Safe Limits of Approach.
5. In an Emergency - Accidents can be prevented with —Safety First in mind. If you or a co-worker come into contact with an overhead line, remember:
- a. If you are alone and don't have a radio, stay in the vehicle until help arrives; this is the safest place
  - b. Stay away or keep other workers away from the area
  - c. Try to break contact with the lines by moving the vehicle at least 10m (32 feet) away
  - d. Do not try to break contact if the cable or equipment appears to be welded to the line; this could cause the line to whip or snap
  - e. Do not touch power lines with wood, it may be damp and conduct electricity
  - f. If a line is on the ground, it could be charging the surrounding area. Stay back 30 feet from the line. As well, if a line is touching a piece of equipment, do not come to the equipment or touch it. Never assume the breaker is open or the line is dead
  - g. **DO NOT ASSUME LINES ARE DEAD**
  - h. Transmission lines are on a 30 second breaker delay which reactivates three times
  - i. A distribution feed line is two lines, one carrying power into the property and the second line carrying power back. If contact is made with both of these wires, it is fatal
  - j. Contact the electrical utility company to turn off the power
6. Fires and Power - In the event of a life threatening fire, jump clear and try to land as far away as possible (on both feet) without touching the equipment as you land.



Jump with both feet together and hop as far away as possible. Remember, you are still in danger even if you have cleared the vehicle; shuffle away to minimize the danger of electrical currents in the ground passing through your body.

7. Reporting - If you strike a power line, call the electrical utility company right away. Report the details of the incident. The utility company will inspect and repair the area. You also need to report the incident to the Provincial Authority.
8. The following applies under new 1995 —General Safety Amendment Regulation:
  - a. 26(1) An employer shall ensure that no worker approaches and that no equipment is operated, and no worker shall approach or operate equipment within 7 meters of a live overhead power line unless:
    - a. The worker is, or the operation is directed by, a competent utility employee within the meaning of the Electrical Utility Regulations (Alberta Regulation 44/76)
    - b. At least the following clearances, as set out in the following table, are maintained between the worker or the equipment and the overhead power line conductors:
9. This new provision comes from the Electrical and Communication Utility Systems Regulation (AR 44/76, 378/88) and provides consistency for both regulations.

TABLE 1 Safe Limit of Approach Distances from Overhead Power Lines for Persons and Equipment <b>ALBERTA</b>	
Operating Voltage of Overhead Power Line Between Conductors	Safe Limit of Approach Distance For Persons and Equipment
0 – 750V Insulated or Polyethylene Covered Conductors (1)	300 mm
Above 750V Insulated Conductors (1) (2)	1.0 m
0 – 40 kV	3.0 m
69 kV, 72kV	3.5 m
138kV, 72 kV	4.0 m
230 kV, 240kV	5.0 m
500 kV	7.0 m

## Noise in the Workplace

1. Noise is one of the most common hazards in the workplace. Workers in many industries and occupations are exposed to noise levels that are so high that their hearing is damaged. The hearing loss caused by excessive noise exposure at work is considerable, costly and preventable.
2. This guideline outlines what you can do to prevent noise induced hearing loss due to exposure at your worksite. It provides information so that you can help reduce hearing loss claims in current and future workers and at the same time, comply with the requirements of the Noise Regulation. For purposes of interpreting and applying the law, you should refer to Noise Regulation.
3. In Alberta, any noise over 85 dB, requires hearing protection to be used. Remember, if you have to raise your voice, you need hearing protection.
4. Occupational Exposure Limits - Occupational Exposure Limits define the maximum permitted daily exposure to noise without hearing protection. The Occupational Exposure Limits (OELs) are given in the Noise Regulation and are as follows:

<b>Sound Level (decibels, A-weighted)</b>	<b>Maximum Permitted Duration (hours per day)</b>
<b>80</b>	<b>16</b>
<b>85</b>	<b>8</b>
<b>90</b>	<b>4</b>
<b>95</b>	<b>2</b>
<b>100</b>	<b>1</b>
<b>105</b>	<b>½</b>
<b>110</b>	<b>¼</b>
<b>Greater than 115</b>	<b>0</b>

5. Measuring Sound Levels and Identifying Noise-Exposed Workers - The best way to identify whether a noise hazard exists, and to identify the noise-exposed workers, is to have a noise survey in all areas of our worksite. The noise survey must include both the noise levels and an estimation of the duration of worker exposure to the noise in the various work areas. Testing is to be done by a fully trained/competent worker.



6. An initial noise survey should be done in any work area where you have to shout to be heard when speaking with someone beside you. Remember what work areas are not only indoors, but also outside and in mobile equipment. If the results of the initial noise survey indicate that there are no potentially noise-experienced workers, then only periodic noise surveys are required to make sure that conditions have not changed. Remember, if you have to raise your voice to talk, you need to use hearing protection.
7. Periodic noise surveys are indicated in each work area where there is a potential for exposure to noise levels higher than the Occupational Exposure Limits (OEL) and more specifically when:
  - a. There is new equipment for a new work process that produces noise
  - b. There is old equipment that seems to get louder, over time, when in operation
  - c. Changes in work practices and/or work procedures occur
  - d. Equipment is not maintained and serviced on a regular basis
  - e. Workers complain of noise causing speech interference, ringing in their ears or temporary changes in hearing

Periodic noise surveys should be done at least once a year, or more often if warranted. Noise surveys, if complete, will identify those workers who are noise-exposed and those who are not. Noise testing will be done by a trained/competent person.

8. Administrative Controls - The occupational exposure limits for noise can be used as a guide to reduce worker exposure times. For example: if a worker is in an area that has a noise level of 90 dB, the time spent in that area should be less than two hours, and so on. The higher the noise level, the less time allowed in the noise. Remember that it is the total of all noise exposure for the individual worker that will determine whether he is noise-exposed, not just whether his exposure in each individual area is acceptable.
9. The Noise Regulation also requires that signs be posted near each area in which noise levels exceed 85 dBA. The signs should clearly indicate that a noise hazard exists and should describe the protective equipment that is required in that area.
10. Providing Personal Protection - If reasonable steps for reducing noise levels or reducing exposure times do not effectively prevent noise exposures, then the next step is to provide personal protection for noise-exposed workers. Personal hearing protectors can be either muffs or plugs, but MUST:
  - a. Reduce noise levels enough so that hearing is protected (see the Provincial Noise Regulation)



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- b. Be approved by the Canadian Standards Association (CSA)
  - c. Be worn in noisy areas
  - d. Not to be modified in any way that reduces its capability to reduce noise levels at the ear, when worn
11. The best hearing protector is the one that workers will wear. Therefore, protectors should be comfortable, fit well, be worn correctly and be cared for properly. The Noise Regulation requires that workers wear hearing protection when exposed to noise.
12. Educating Workers - All workers who are exposed to noise above the Occupational Exposure Levels (OEL) need instruction about the noise hazard, how it can affect their health and how to protect themselves. Workers should also be informed regarding their responsibilities under the Noise Regulation.
13. Conclusion - When hearing is lost due to noise at work it cannot be repaired or replaced, therefore it must be prevented. Both employers and workers have responsibilities defined under the Noise Regulation so that noise and noise-induced hearing loss in workplaces can be reduced.

## **Fire Extinguisher Use**

1. Good housekeeping is essential in the prevention of fires. Fire can start anywhere and at any time.
2. Always keep fire extinguishers visible and easy to get at. Fire extinguishers have to be properly maintained to do the job. Where temperature is a factor, ensure that care is taken in selecting the right extinguisher.
3. There are basically three classes of fire:
  - a. Class A: These fires consist of wood, paper, rags, rubbish and other ordinary combustible materials
  - b. Class B: These are flammable liquids, oil and grease
  - c. Class C: These are electrical fires
4. Because there are different types of fires, the best, and only fire extinguisher that will be permitted on the job site is a 20lb ABC extinguisher. This extinguisher is made of carbon dioxide and dry chemical. This will fight all types of fires without worrying about electric shock or a reaction to water and chemical fires.
5. To fight a fire you must use short bursts on the base of the fire, never aim the extinguisher at the flames, this is not attacking the fire, all you are doing is wasting your extinguisher. Fire extinguishers smother the fire by taking away the oxygen it needs to burn.
6. If you feel that you cannot control the fire within 30 seconds, leave, sound the alarm and call 911 for the fire department. Give them the EXACT location, every second counts when fighting fires.
7. Fire protection and prevention procedures must comply with the requirements of local and provincial occupational health and safety regulations.
8. Additional direction as to the procedure required for investigation, clean-up and reconnection of services will be provided by the respective fire agency. Fire prevention measures depend on identifying potential hazards and taking appropriate remedial action, including inspections.
9. The following are some guidelines to prevent fires:
  - a. Clean up spilled flammable liquids immediately
  - b. Prevent any accumulation of dust, scrap wood, saw dust, etc.
  - c. NEVER store volatile liquids such as gasoline, solvents, etc. in open or unsuitable containers
10. Keep exits and passageways clear of obstructions, this is for easy escape in case of emergency



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11. Keep emergency equipment clear of obstructions for easy access
12. When open flame, welding or similar equipment is in use you must complete a hot work permit and must have a 20lb extinguisher within arms reach
13. Special precautions must be taken to avoid causing sparks or allowing or creating open flames in places where a fire or explosion may occur, i.e. where the air may contain:
  - a. Gasoline vapours
  - b. Gas in battery charging rooms
  - c. Flammable vapour, i.e. paints or solvents
14. Fuel tanks on equipment will not be filled with gasoline or vaporizing liquids:
  - a. While the engine is running
  - b. While anyone is smoking on or around the vehicle
  - c. Where there is any known source of ignition in the immediate area
15. All containers that have flammable liquids must be clearly and distinguishing marks i.e. Danger, Flammable and they must have a WHMIS label
16. With the ABC fire extinguisher, it should be shaken every month so the chemicals will not settle to the bottom and render the extinguisher useless
17. Fire extinguishers must be checked and certified once a year



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### **Flagging Traffic**

1. The objective for properly flagging traffic is to reduce the risk of personnel injury as well as damage to commercial and residential property.
2. Flagging personnel must be very distinguishable from other workers, they must stand out in order for drivers and operators to see them. For this reason all flagging personnel must wear fluorescent orange vests, a bright colored hard hat (i.e. red) and the flagmen MUST have a regulation size STOP/SLOW paddle.
3. The following are rules that will prevent accidents at or near construction sites:
  - a. Workers MUST be adequately trained and competent to perform the job of flagmen (in Alberta, documentation must be available to prove that proper training has been completed)
  - b. Flagmen must stand 100 meters from equipment crossing in order to give construction vehicles enough room to run or stop and general public enough warning there is a hazard
  - c. The SLOW sign must be raised if approaching traffic is encountered. The STOP sign will be shown if construction traffic is present
  - d. The sign must be held so oncoming traffic can clearly see it
  - e. Flagmen must be alert at all times, they must know what is going on around them, they must be able to recognize potential hazards



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## **Ergonomics in Construction**

1. Workplace design should accommodate the variety of workers shapes and sizes and provide support for the completion of different tasks.
2. Here is a list of do's and don'ts to help take the strain off the problem areas of your body:
  - a. If possible, adjust the height of the work surface according to your dimensions
  - b. Organize your work so that the usual operations are performed within easy reach
  - c. Face your work at all times, do not twist your body to see your work
  - d. Keep your body close to your work, do not reach or over extend beyond the point of comfort
  - e. Sit if at all possible
  - f. Bend the tool, not your wrist
  - g. Lift with your legs, not your back, let your larger leg muscles do all the work, keep your back straight at all times
  - h. If an object is too heavy, use a lifting device, i.e. pallet jack. If you cannot use a pallet jack, get help from a co-worker
  - i. If work is higher than you can reach, use a ladder, do not stand on your tip-toes, this puts strain on your ankles and back
  - j. Have one leg raised to take the weight off of your back, this will help when standing for long periods of time



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## **Equipment Guards**

1. Guards are safe as long as the people who use them monitor the equipment regularly and take the time to care for it. Guards need to be maintained on a regular basis in order for them to be effective.
2. All guards on all tools must be secured and in proper working condition. If the guard is loose or is not working, tag and take the tool out of service until the tool is fixed by a trained, competent person.
3. Use the proper guard for the tool, make shift or no guards on tools will not be tolerated. Guards are specifically designed for that tool, make shift tool guards can result in severe injury or death.
4. The purpose of guards is to keep your body and clothes from contacting any dangerous moving parts of a tool (i.e. table saw guards keeps the lumber from shooting back at the feeder if the wood binds). A proper guard prevents injuries and keeps a slip-up from becoming more serious.
5. Always wear proper P.P.E. when operating power tools, i.e. CSA approved safety glasses, hearing protection when required. A full face shield must be worn when grinding metal or steel.
6. Provincial regulations are very specific when it comes to equipment guards. For example, you must never make guards inoperative. Provincial regulations must be followed at all times.
7. Guards will protect you from:
  - a. Extreme temperatures (hot or cold)
  - b. Pinch points
  - c. Electrical currents
  - d. Thrown or flying objects/materials
  - e. Fast moving parts of machinery, i.e. belts
8. Things to remember that will help keep you safe when working with equipment:
  - a. Use the machine only for jobs that it is designed to do
  - b. Maintain your balance and posture to reduce fatigue and stay steady on the job
  - c. Use other safety devices along with guards, i.e. proper push stick when using table saw



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## **Electrical Safety**

1. We use electricity for everything from turning on a light to using power tools. We often overlook basic electrical safety, turn a blind eye to frayed electrical cords or missing ground prongs, and these are the most common reasons why people are severely injured, even killed.
2. These rules must be followed when working with or around electrical power:
  - a. A documented Hazard Assessment and specific Job Procedure must be done and reviewed before any work commences
  - b. ONLY fully qualified and competent workers are to perform work to live circuits or equipment
  - c. Exposed circuit parts that could become charged are to be treated as LIVE
  - d. SHORT CUTS AND POOR WORK PERFORMANCE WILL NOT BE TOLERATED
  - e. SUBSTANDARD OR MAKESHIFT PARTS ON ELECTRICAL CIRCUITS WILL NOT BE USED AND ARE NOT ACCEPTABLE
  - f. Adequate P.P.E. must be used when working with live electrical wires, i.e. insulated blankets, covers, line hoses, mats and insulated gloves and sleeves
  - g. Warning signs and barricades must be used to limit access to areas with live circuits, i.e. —Danger Due Tol, —Authorized Personnel Only
  - h. All equipment and tools must be in working order and checked for defects before any work can be done
  - i. Do not use metal ladders when working on exposed energized circuits
  - j. Elevated work close to power lines is only to be done by fully qualified/competent workers
  - k. These workers must know the safe minimum working distance for their work as laid out by provincial regulations
  - l. NO ONE is to approach or lean on or touch vehicles that are working on overhead power lines
  - m. When working in an extremely hazardous electrical area, there must be TWO or more people with at least ONE posted as a safety watch in the event of an accident
3. Protection Against Electrical Shock - Each year statistics indicate there are workers who are flashed or burned, receive serious shocks, or are otherwise injured, sometimes fatally. Following these rules can reduce accidents considerably:
4. A documented Hazard Assessment and specific Job Procedure to be done and reviewed before any work commences
5. Only fully trained/competent workers are to work on electrical lines, live or dead
6. NEVER work along on live circuits. Make your partner aware of your next move so you don't become part of the same circuits



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7. Until positive the circuit is dead, assume it to be live and rated at full voltage.  
DO NOT take anyone's word for it, test it yourself
8. DO NOT work on electrical apparatuses with wet hands or clothing
9. Do not wear rings, watches, jewelry or metallic hard hats. Wear a hard hat with a Class B minimum rating (CSA approved hard hats)
10. Wear safety boots with green triangle that have neoprene or rubber soles.  
Worn down boots provide no insulation
11. All power tools must be grounded through a three-prong plug or double insulated
12. Before working on a circuit, all lockouts must be in place. Lockouts must have the person's name that did the lockout, the date the lockout was put on and words directing persons not to start or operate the machine
13. All electrical panels exposed to weather, must be equipped with Ground Fault Circuit Interrupters (GFCI)
14. Splitters are NOT allowed on any extension cords
15. Inspect all extension cords, check for frayed, worn or damaged cords
16. NEVER break off the ground plug on extension or power tool cords
17. Keep power cords away from heat, water and oil. They can damage the insulation and cause electrical shock



## **Dust in Construction**

1. Dust comes in many forms, from general dirt and debris to concrete, wood, brick, marble, granite and gypsum dust. Quartz or silica dust is also present either in the form of abrasive sands or as a component of concrete, brick or granite dust.
2. Some common dusts are Silica. Silica occurs in two forms: Crystalline and amorphous. The crystalline form is the type of silica known to cause severe health effects. Most crystalline silica comes from quartz. Quartz is extremely common in nature. It is found in rocks and sand. Some rocks, such as granite, contain a high percentage of quartz.
3. The hazards posed by silica will depend on how much quartz dust is generated. Processes that cause mechanical disturbance of quartz contain materials present in silica dust hazard. These processes include cutting, grinding and crushing. The most hazardous processing involving quartz is sandblasting. Sandblasting causes quartz to breakdown into smaller particles and creates very high dust levels.
4. Exposure to crystalline silica causes the lung to become fibrous or scarred around the trapped silica particles. This condition is called silicosis. Silicosis causes shortness of breath, fever and bluish skin. Having silicosis increases the risk of getting tuberculosis. There are three types of silicosis:
  - a. Chronic silicosis which may develop after 10 years or more to relatively low concentration
  - b. Accelerated silicosis which may develop 5-10 years after exposure to high concentrations
  - c. Acute silicosis which may develop within a few weeks to 4-5 years after exposure to very high concentrations

One reason silicosis is such a serious disease is that the condition can worsen even after exposure has ended. There is no evidence that crystalline silica may cause cancer.

5. Some other common dusts on construction sites are excavation dusts, concrete dust, gypsum, brick and marble and granite dusts. These dusts may be very harmful if exposed in high concentrations for a long period of time.
6. Construction dusts may contain small amounts of very hazardous materials. For instance, cement may contain small amounts of nickel, cobalt and chromium. The most abundant metal found in cement is hexavalent chromium. Hexavalent chromium is a skin sensitizer. This means that after repeated exposure, the skin may become sensitive to chromium and bring to break out and become irritated. Hexavalent chromium causes other respiratory problems and has been associated with lung cancer.



7. Construction dust may have the following long-term health effects:
  - a. Lung overload: the lungs have a number of protective mechanisms. Included among these are the macro-phages (tiny fingers) that remove particles from the small air sacs of alveoli. If too much dust is collected in the lung, this system is overloaded. Even relatively harmless dust can interfere with normal function at high exposure levels
  - b. Pulmonary Alveolar Proteinosis (PAP): the small air sacs or alveoli are filled with unwanted fluid and the walls between the air sacs are thickened. The result is shortness of breath. Severe cases of PAP can result in death
  - c. Chronic bronchitis: mucous produced in the lungs helps carry larger dust up and out of the body. Too much dust can cause too much mucous production. The result is irritation of the throat and coughing. This condition is called bronchitis. If it doesn't go away, it's considered chronic bronchitis
  - d. Cancer: a Canadian study which looked at 20 types of cancers and 10 types of dusts common to construction found a higher risk for cancer among workers with exposures to silica, excavation dust, concrete, cement dust, brick, lime and gypsum dust
  - e. Silicosis: silica is found in a number of construction materials including concrete, bricks and excavation dust. Cutting, drilling, chipping or grinding these materials produces exposures to silica. Long term exposures to high dust levels containing silica may increase the risk of chronic silicosis
  
8. Precautions - The best protection against the hazards of dust is the use of exhaust ventilators, i.e. dust collections fitted into power tools, like hammer, drills and jack hammers.

High Efficiency Particulated Air Filter (HEPA) vacuums should be used rather than sweeping. Wetting down dust before sweeping will also control some of the dust.

If respirators are used, they should be part of a respiratory protection program that includes training and testing on use and limitations, regular cleaning, proper storage and regular inspections. Workers must be trained and competent in the use of respirators before they are allowed to work in environments that require respirators.

If an air purifying respirator is used, they must be equipped with HEPAS cartridges. Disposable masks will only be used for very low exposures to a dust atmosphere. 3M 8210, 8710, or equivalent will be permitted



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## **Confined/Restricted Space Entry**

### **Reference – As per provincial regulations**

1. Introduction - The material will define the legislative requirements for confined space entry work and the need for a specific job procedure when selecting, maintaining and using respiratory protective equipment when a worker works in a confined space.

This material will identify the different types of confined and restricted spaces and the attendant hazards, as well as the need to recognize whether the space contains harmful substances, an oxygen deficiency, a flammable atmosphere or other hazards.

Other areas to be covered are: the training and qualification of workers, isolation, ventilation, the testing of the space, the availability and proper use of personal protective equipment including breathing apparatus and the need for rescue procedures and equipment.

2. Hazards can be avoided or overcome if basic rules are followed every time a confined or restricted space entry is made.
3. Definition of a Confined Space - Is a restricted space which may become hazardous to a worker entering it because:
  - a. An atmosphere that is or may be injurious by reason of oxygen deficiency or enrichment, flammability, explosivity, or toxicity,
  - b. A condition or changing set of circumstances within the space that presents a potential for injury or illness, or
  - c. The potential or inherent characteristics of an activity which can produce adverse or harmful consequences within the space.
4. Definition of a restricted space- An enclosed or partially enclosed space, not designed or intended for continuous human occupancy, that has a restricted, limited or impeded means of entry or exit of its construction.
5. Specific Job Procedure - When work is conducted in a confined or restricted space on a regular basis, a safe work procedure must be developed by the employer to ensure that the work is carried out safely.

The employer or principal contractor who establishes a code of practice shall ensure that it is readily available to workers and other persons at the work site and that workers affected by the code have received appropriate education, instruction and training so that they are able to comply with its requirements.

Where the employer has developed a Code of Practice or specific procedure, he must ensure that all the workers affected by the code have been made familiar with it before work starts.



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6. Work Permits - A work permit is a control device that verifies what precautions must be taken to ensure safe working conditions.

Companies use work permits designed specifically for confined space entry. Others use a more general format that may cover hot or cold work as well as entry emergency rescue.

Permits are required by law required by OH&S code April 30, 2004 so that:

- a. It provides a checklist which helps to ensure that all preparatory steps are complete
- b. It provides a written form which must be signed and understood by all personnel on the job. It helps to verify that all required precautions have been taken and that regulatory requirements are satisfied

Upon completion of work in the confined space, the permit issuer must be informed. The issuer should then check that the equipment or operation is safe to start up.

Design of Permit - Safe Work Permits must be tailored to suit the type of work the hazards present and the general work condition of each company. This permit system coupled with a code of practice can drastically reduce the possibility of accidents or injuries.

7. Harmful Substances - Alberta legislation requires that the employer take all reasonable steps to reduce worker exposure to a contaminant by engineering work practice and administrative controls.

Although contaminants in the air may be toxic, they can be considered safe as long as they stay below certain levels of contamination known as Occupational Exposure Limits (O.E.L.).

Many chemicals are toxic substances and everyone working with chemicals must be made aware of the hazards. Some chemicals may not damage your health if you are exposed to small amounts for a short period of time. Exposure to small amounts over a longer period of large amounts for a short time may be hazardous. Always read the MSDS before working with any chemical. Training in WHMIS is needed to understand the MSDS.

8. Flammable Substances - In confined/ or restricted spaces, fires and explosions can be prevented by:
  - a. Purging the air out of the space with an inert gas such as nitrogen or carbon dioxide, or purging with steam. This is only to be done by a trained, competent worker
  - b. Ventilation to keep the fuel vapours below the lower explosive limit (L.E.L.)



- c. Eliminating all possible sources of ignition such as static or friction sparks, smoking, open flame, sparks from exhausts or electrical equipment. Care should be exercised when cleaning vessels with high pressure steam, water steam, etc. to prevent a build-up of static electricity. It can be eliminated by proper bonding and grounding
9. Ventilation - Depending upon conditions within the confined/restricted space, ventilation may be required to control either harmful substances, flammable substances or atmospheric oxygen. Ventilation can also be used to control extreme temperatures or other discomforts.
10. Equipment for Ventilation Confined Spaces - Natural ventilation, relying on winds and/or thermal drafts, is not dependable and not acceptable for ventilation confined/restricted spaces. Ventilator air movers or fan blowers are commonly used. Ensure the blower is with clean air, and is not placed near vehicle exhausts or where contaminants could be picked up from some other area.

Blower units have the advantage in that they may incorporate heaters for work in cold conditions.

Methods - Confined/restricted spaces that may be contaminated from earth formations, seepage of gases, or sewer lines require air to be blown through hoses to the furthest limits of the confined/ or restricted space. This method reduces the risk of a build-up of hazardous gas anywhere in the space, and results in the most effective air mixing.

In other situations, exhaust ventilation can be used. The equipment must be explosion-proof if dealing with flammable contaminants. Respiratory protective equipment appropriate for the hazard must then be worn.

Duration - The amount of ventilation required depends on condition and will be determined by testing. Ventilation must continue until the oxygen content exceeds 18 kpa partial pressure, toxic contaminants are below their O.E.L. and flammable contaminants are absent.

Where it is impractical to ventilate the space, tests must be carried out by a competent worker before an entry is made and periodically while the worker is in the confined space, to confirm a minimum oxygen content of 18 kpa and no build-up of a harmful substance.

11. Testing Equipment - Three types of testing equipment are generally used in the testing of confined spaces:
  - a. Harmful substances detection devices such as Gastec or Drager which use colour indicator tubes test for toxic gases; i.e. H<sub>2</sub>S and CO



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- b. Flammable gas detection devices B tests for flammable gases; i.e. Methane
- c. Oxygen level indicator to determine the oxygen content of the air

Only workers who are properly trained and are competent may use this testing equipment.

12. Availability and Proper Use of Personal Protective Equipment - Workers may be exposed to a variety of hazards in a confined space and the employer must ensure the availability of all the necessary equipment for a worker to perform an activity safely.

The workers' responsibility is to use the appropriate equipment that is supplied. If this personal protective equipment is damaged or defective, it is the workers' responsibility not to use it.

Examples of personal protective equipment that may be necessary for the safety of workers in a confined space are:

- a. Head Protection
- b. Foot Protection
- c. Eye Protection
- d. Gloves and Protective Clothing
- e. Safety Harness and Lifeline
- f. Hearing Protection
- g. Respiratory Protective Equipment

13. Hazard Assessment - If a worker will enter a confined/or restricted space to work, an employer must appoint a competent person to assess the hazards that the worker will be exposed to, specify the type and frequency of inspections and tests necessary to determine the likelihood of exposure to any of the identified hazards, shall ensure the tests and inspections are performed, specify the safety and PPE required to perform the work and identify the PPE and emergency equipment to be used by the person doing the rescue operations in the event of an accident or other emergency.

14. Rescue Procedures and Rescue Equipment - Rescue procedures must always be in place for a confined/restricted space and the rescuers must be trained in the emergency procedures. The trained rescue personnel must be able to recognize hazards associated with working in confined/restricted spaces, be able to perform the workers duties in a safe manner and the employer must keep the records of training to for the required worker. There must be a communication system established that is readily available to the workers of the confined/restricted space and is appropriate to the hazards. Rescue personnel must be at or near the confined/restricted space entry.



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Where the atmosphere in a confined/restricted space contains a harmful substance or an oxygen deficiency, no worker shall enter unless:

- a. The worker is protected by adequate personal protective equipment
- b. The worker is attended by and in communication with another worker at or near the entrance
- c) Rescue procedures are in place
- c. Appropriate rescue equipment is immediately available

The type and nature of rescue procedures and rescue equipment will vary depending on the location and type of confined space.

If an emergency does occur, the backup worker immediately sounds the alarm to summon rescue and medical personnel and must not attempt a rescue until such personnel arrive.

Rescue workers must be trained/competent in rescue procedures and the use of appropriate rescue equipment with records of PPE inspections and worker training.

Other considerations are:

- a. The number of workers in the confined/restricted space can compound the rescue problems
- b. The more difficult the rescue is liable to be, the more sophisticated the rescue procedures required
- c. As speed is often critical in rescue situations, it is important to have sufficient equipment and trained personnel on hand to effect the rescue

Where extra rescue workers are not available, as in isolated field situations, extra planning and specialized equipment are required.

Rescue Equipment:

- a. A tripod-winch and harness system to get a victim out of a sewer, tank or vessel, when the worker has entered from the top
- b. A basket stretcher or similar for moving the victim to emergency transportation
- c. Sufficient appropriate respiratory protective equipment to protect rescue personnel
- d. Appropriate first aid equipment
- e. Alarm system to summon aid
- f. Vehicle to transport victim to medical facility



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### **Backing Up Mobile Equipment/Trucks**

1. A large percentage of construction site accidents and injuries involve mobile equipment/trucks.  
Most of these accidents occur while machines are backing up. Operators must be continually aware of people/traffic movements and obstacles around them.
2. All vehicles over 6000 kg or with restricted visibility must have an audible back up alarm (AB)
3. Circle your machine before mounting, particularly when in residential and commercial areas
4. Always look back on both sides of the machine before backing up
5. Where ground workers are involved, ensure all are clear of the machine and accounted for before moving. All ground workers must wear a fluorescent vest when working around mobile equipment
6. Use a flagman to guide when:
  - a. Backing up in an area where vision is limited
  - b. Aid in judging distance between the machine and obstacles as required
  - c. Backing into traffic areas
  - d. When equipment does not have an audible backup alarm
7. Flagmen must:
  - a. Be properly trained and competent to do such work
  - b. Stay alert to recognize and deal with dangerous situations
  - c. Wear a fluorescent vest and a bright red hard hat to be easily recognizable
  - d. Know driver or operators blind spots
  - e. Stand where they can see and be seen by the driver, operator and general public traffic
8. The use of cell phones are strictly prohibited while operating equipment