

Purpose

The purpose of this safety procedure is to specify the general requirements, in accordance with the confined space regulations of the Occupational Health & Safety Act, for entry into confined spaces as part of the City of Toronto's confined space program.

Definitions

“acceptable atmospheric levels” means that,

- (a) the atmospheric concentration of any explosive or flammable gas or vapour is less than,
 - (i) 25 per cent of its lower explosive limit, if the worker is performing only inspection work that does not produce a source of ignition,
 - (ii) 10 per cent of its lower explosive limit, if the worker is performing only cold work and
 - (iii) 5 per cent of its lower explosive limit, if the worker is performing hot work and is following all provisions of *Safe Working Procedure, SWP023.05, Hot Work Permit System*.
- (b) the oxygen content of the atmosphere is at least 19.5 per cent but not more than 23 per cent by volume; and
- (c) the exposure to atmospheric contaminants does not exceed any applicable level set out in a regulation made under the Act such as *The Control of Exposure to Biological or Chemical Agents and Designated Substances*.

“adequate”, when used in relation to a procedure, plan, material, device, object or thing, means that it is,

- (a) sufficient for both its intended and its actual use; and
- (b) sufficient to protect a worker from occupational illness or occupational injury.

“anoxic” means an absence or near absence of oxygen and therefore, by regulation, an atmosphere less than 19.5% oxygen.

“assessment” means an assessment of hazards with respect to one or more confined spaces in a workplace.

“atmospheric hazards” means,

- (a) the accumulation of flammable, combustible or explosive agents,

- (b) an oxygen content in the atmosphere that is less than 19.5 per cent or more than 23 per cent by volume, or
- (c) the accumulation of atmospheric contaminants, including gases, vapours, fumes, dusts or mists, that could,
 - (i) result in acute health effects that pose an immediate threat to life,
 - or
 - (ii) interfere with a person's ability to escape unaided from a confined space.

“**cold work**” means work that is not capable of producing a source of ignition.

“**confined space**” means a fully or partially enclosed space,

- (a) that is not both designed and constructed for continuous human occupancy; and
- (b) in which atmospheric hazards may occur because of its construction, location or contents or because of work that is done in it.

“**doable**” means capable of being done.

“**emergency work**” means work performed in connection with an unforeseen event that involves an imminent danger to the life, health or safety of any person.

“**hot work**” means work that is capable of producing a source of ignition.

“**Inerting**” means displacing oxygen from a space using an inert gas (such as nitrogen, carbon dioxide or argon) to remove the hazard of fire or explosion.

“**plan**” means a plan for one or more confined spaces in a workplace, as described in this procedure.

“**practicable**” means doable.

“**purging**” means *removing* contaminants inside the confined space by displacement with air to achieve acceptable atmospheric levels.

“**qualified worker**” means a person with adequate knowledge, training and experience to perform the specific assigned work; a qualified worker is equivalent to a competent worker in the Construction Regulations.

“**Ventilation**” means the continuous provision of fresh air into the confined space by mechanical means to maintain acceptable atmospheric levels.

Hazards

There are many hazards associated with confined space work:

Combustible atmospheres	Hot Work	Poor lighting/visibility
Oxygen deficiency (less than 19.5%)	Noise	Insects/animals
Oxygen enrichment (more than 23%)	Temperature extremes	Harmful substances
Toxic atmospheres	High water flow	Poor housekeeping
Irregular/slippery walking surfaces	Traffic	Psychological factors
Hazardous energy	Biological	Constricted space
Engulfment	Drowning	Moving machinery
Falls		

Responsibilities

Managers shall:

- be familiar with all aspects of the departmental/divisional confined space entry program;
- be familiar with the actual and potential hazards associated with confined space work;
- ensure that the requirements of the program and related elements of the Occupational Health and Safety Act and regulations, and applicable industry standards are applied at all times;
- ensure that an adequate written plan, including procedures for the control of hazards identified in the assessment, has been developed for the confined space and implemented by a competent person;
- ensure the resources required are available to ensure the work can be done safely,
- where practicable, use appropriate equipment and methods that do not allow employees to enter confined spaces;
- ensure that all supervisors and workers have received training appropriate to the work,
- ensure that an annual review of the training is completed; and
- ensure that the joint health and safety committees have been given all elements of the confined space program for yearly review.

Supervisors shall:

- evaluate and document work operations to determine where confined space entry procedures, devices and training are required in consultation with joint health and safety committees;
- develop written **site-specific** safe work procedures for individual tasks, particularly in unusual or unique situations, in consultation with work crews and joint health and safety committees;
- be familiar with all aspects of the departmental/divisional confined space entry program;

- be familiar with the actual and potential hazards associated with confined space work;
- ensure that the requirements of the program and related elements of the Occupational Health and Safety Act and regulations, and applicable industry standards, are applied at all times and if violations occur, that appropriate action be taken, which may include progressive discipline;
- shall ensure that an adequate written plan, including procedures for the control of hazards identified in the assessment, has been developed and implemented before any worker enters a confined space;
- ensure that all employees under their supervision who work in confined spaces are competent to do the assigned work and have been provided with instructions and training prior to commencing work;
- provide practical training in the use of safety equipment such as fall arrest systems, retrieval systems, body harnesses, gas detection devices, respiratory equipment and communication systems, etc.;
- ensure all records of training are retained indefinitely;
- ensure all records of confined space permits, assessments and emergency response procedures are retained for the longer of the following periods:
 1. One year after the document is created or
 2. The period that is necessary to ensure that at least the two most recent records of each kind that relate to a particular confined space are retained.
- ensure that all equipment needed for confined space work is maintained in good working condition;
- ensure that all workers use or wear required safety equipment when performing assigned task;
- monitor staff to ensure procedures are followed; and
- take every reasonable precaution to protect worker health and safety.

Workers shall:

- work in accordance with legislative requirements, corporate policy and departmental safe work procedures;
- attend all relevant confined space training before performing confined space work and apply the knowledge gained in the performance of their work;
- use or wear all equipment required to safely perform their work;
- report any violations, hazards or deficiencies in equipment to their immediate supervisor without delay;
- assist supervisory staff in developing safe work procedures for specific tasks; and
- follow established procedures in the event of an injury, accident or emergency.

General Requirements

Prior to any confined space entry, all requirements of the Ontario Occupational Health and Safety Act and Regulations, Corporate policy, this procedure and, where required, site/work specific procedures, shall be complied with.

Training

All personnel who are required to enter confined spaces shall be trained in confined space entry which will include:

- legislative, corporate and departmental requirements;
- confined space recognition;
- hazard recognition;
- record keeping requirements;
- the proper use of tools, machinery and safety equipment;
- familiarity with this procedure and other appropriate site-specific procedures;
- plan specific procedures and on-site rescue procedures;
- first aid and Cardio-Pulmonary Resuscitation(CPR);
- lockout, tag and test;
- hotwork requirements;
- practical training by supervisor in the use of safety equipment such as fall arrest systems, retrieval systems, body harnesses, gas detection devices, respiratory equipment, communication systems, etc. ; and
- training in other procedures, such as *Safe Working Procedure, SWP015.03, Traffic Control*, where required.

Confined Space Recognition and Identification

- Each division shall develop a list of confined spaces.
- Each facility/location/yard manager shall assign a qualified worker to identify the confined spaces into which workers may be required to enter.
- These spaces may be documented as either always being considered confined spaces, or those which may become confined spaces as a result of the work activities being performed therein.
- For each facility/location/yard, **definite** confined spaces shall have appropriate signage placed at the entrance(s) where practicable.
- Maintenance holes that lead to sewage systems are definite confined spaces but do not require identification signage.
- Workers shall be advised in writing of definite and possible confined spaces in their assigned work areas into which they may be required to enter.
- Contractors and external consultants shall also be advised in writing of definite and possible confined spaces in their assigned work areas, into which they may be required to enter.

1. Pre-Entry

1(a). Hazard Assessment

- Before a worker enters a possible confined space, the supervisor shall appoint a qualified worker to carry out an assessment of the hazards into which the worker may be exposed to in the space.
- The appointed worker shall complete the Confined Space Hazard Assessment form (SWP001-a) and shall consider:
 - the hazards that may exist due to the design, construction, location, use or contents of the space; and
 - the hazards that may develop during the work that may be done in the space.
- If this assessment establishes that the space is not a confined space, appropriate precautions may still required.
- Where the assessment has concluded that it is a confined space, the full procedure shall apply.

1(b). Entry Control Plan

- The supervisor shall ensure that a *Confined Space Entry Control Plan* (SWP001-b) is developed and implemented for each confined space, before a worker enters the confined space.
- The plan shall include methods, procedures and practices for controlling all hazards identified in the *Hazard Assessment* form and the procedures for rescue in the event of an emergency.
- The supervisor shall ensure that the emergency procedures including the use of all rescue equipment shall be practiced on a regular basis to ensure proficiency. A quarterly basis is considered to be the minimum standard.
- Before a worker enters the confined space, the supervisor shall ensure that the worker has received adequate training in the site specific *Entry Control Plan*.
- A record of this *Confined Space Entry Control Plan* training shall be included in the *Confined Space Permit*.

1(c). Emergency Rescue

- No person shall enter or remain in a confined space unless an effective rescue can be carried out.
- The supervisor shall ensure that a suitable emergency rescue plan(s) is developed prior to assigning work in any confined space or spaces, and that the employees are trained in the requirements of the plan(s).
- Rescue plans shall be specific to the space or classes of spaces to be entered.
- A qualified worker shall set out in writing, in the *Confined Space Permit*, the procedures to be followed in the event of an emergency in or near a confined space, including a procedure for immediate evacuation.

- A record of the emergency rescue training shall be included in the *Confined Space Permit*
- Where practicable, a non-entry retrieval system shall be used to remove the affected worker from the confined space.
- An approved full body harness shall be worn by all entry persons to facilitate potential rescue.
- No one may enter a confined space, even for rescue purposes, unless there is an attendant present.
- Any rescue attempt shall only be made when the rescuer is properly trained to perform a rescue, is wearing self contained breathing apparatus (SCBA) and other appropriate equipment, and where all risks have been controlled.
- After retrieval, the Emergency Services shall be notified (911); first aid/Cardio-Pulmonary Resuscitation (CPR) shall be performed. Immediately thereafter, the supervisor shall be informed.

1(d). Equipment Checks

- All equipment and devices required for the specific job must be inspected and/or tested prior to each entry to ensure proper operation.
- Any equipment or device, which does not meet accepted safe operating standards, must be removed from service and repaired or replaced. Entry work shall not proceed unless the required equipment is present and operational.
- Emergency rescue equipment shall be inspected by a qualified worker, as often as is necessary and immediately prior to each entry to ensure it is in good working order, and shall be recorded in writing on the *Confined Space Entry Permit* (SWP001-c).
- Equipment that may be required includes:

Gas detection devices	Forced Ventilation	Traffic control devices
Spark resistant tools	Communication system	Respiratory P.E.
Fall arrest systems	Standard P.P.E.	Lighting (explosion proof)
Warning signs	Ladders	Emergency equipment
Barricades	Lockout equipment	

1(e). Confined Space Entry Permits

For each confined space identified, a *Confined Space Entry Permit*, (SWP001-c) shall be completed and signed by the attendant, who shall be a qualified worker. The permit shall include:

1. the location of the confined space;
2. a description of the work to be performed there;
3. a description of the hazards and the corresponding control measures;
4. the time period for which the entry permit applies;
5. the name of the attendant;
6. a record of each worker's entries and exits;
7. a list of the equipment required for entry and rescue, and verification that the equipment is in good working order;
8. results obtained in atmospheric testing; and

9. if the work to be performed in the confined space includes hot work, the requirement for the *Safe Working Procedure, SWP023.05, Hot Work Permit Systems* shall be followed.

1(f). Traffic Control

For confined space operations in roadway allowances, traffic control measures as outlined in the safe working procedure, *SWP015.03, Traffic Control*, must be set up prior to entry into the confined space.

1(g). Preventing Unauthorized Entry

For each confined space, the supervisor shall ensure that:

- only authorized workers are allowed entry into the confined space, in accordance with the procedures identified in the plan;
- all measures and procedures shall be in place;
- each entrance into the confined space is to be adequately secured against unauthorized entry or accidental entry; and
- adequate barricades, warning signs or any combination thereof, are installed to protect workers and the public.

1(h). Access and Egress

An adequate means for entering and exiting shall be provided for all workers who enter a confined space.

1(i). Isolation

- Where practicable, isolate the confined space from the release of stored energy or materials; (energy sources include electrical, pneumatic, hydraulic, chemical, gravity, thermal, steam, tension, momentum, spring pressure, head and line pressure, etc.
- All sources of ignition shall be controlled.
- No worker shall enter a confined space unless the worker is adequately protected against drowning, engulfment, entrapment, suffocation and other hazards from free flowing material.

1(j). Lockout, Tag and Test

- Follow the safe working procedure, *SWP003.02, Lockout, Tag and Test*.
- Disengage all energy sources from equipment, safely release stored energy or materials and secure all control devices in the off position with a lock. Tag the lock appropriately and test the system to ensure the disengagement has been successful.

1(k). Blanking Off

- Where practicable, all lines and systems, which may permit the entry of hazardous materials, shall be blanked off.

1(l). Confined Space Monitoring

- Follow the safe working procedure, *SWP014.03, Gas Detection Equipment*.
- The attendant and all workers entering a confined space shall have an appropriate gas monitor within their immediate working area that is operated continuously, in addition to the attendant's gas monitor.
- Gas monitors shall be calibrated by a qualified worker, as per manufacturer's instruction and at least once a month with a known concentration of toxic and combustible gases to ensure sensors remain within manufacturer's specifications.
- A label shall be attached to the gas monitor indicating the time of the last calibration, the next calibration due date and signature of the calibrator.
- Prior to opening a maintenance hole cover and prior to each entry, every confined space must be tested by a qualified worker for :
 - Combustible atmosphere
 - Toxic atmospheres; and
 - Oxygen deficiency or enrichment.
- Testing shall be done at varying levels from top to bottom within the confined space.
- The results of the atmospheric sampling must be recorded in the *Confined Space Entry Permit* and retained by the supervisor for the longer of the following periods:
 1. One year after the document is created or
 2. The period that is necessary to ensure that at least the two most recent records of each kind that relate to a particular confined space are retained.
- Entry shall only be made where tests indicate a safe atmosphere and is certified as such by a qualified worker or when additional adequate precautions have been implemented.
- If there is no label on the machine, or it is past the calibration due date, it shall not be used.
- Additionally, all gas monitors shall be bump tested daily to ensure that all alarm point settings are within specifications, when in use.

1(m). Communication

- Supervisors shall ensure a communication system (cell phone, two-way radio) is available at the work site for the purpose of calling on **outside** help.
- Additionally, the attendant shall maintain effective and continuous communication with the entrants while they are in the confined space; where direct communication with outside workers is not possible, workers entering a confined space shall use intrinsically safe (explosion proof) communication devices.

1(n). Attendant

An attendant(s) shall be stationed immediately outside and near the confined space entrance(s) and shall be assigned no other duties.

The attendant shall be trained in First Aid and Cardio-Pulmonary Resuscitation (CPR) and shall carry proof of training.

The attendant will be responsible for ensuring that:

- the protective equipment required for entry and rescue is on hand, in use, or being worn by those entering the confined space, as required by the *Confined Space Permit*;
- the *Confined Space Entry Permit* has been completed prior to entry;
- there is constant communication contact with all personnel in the confined space at all times;
- communication devices necessary for summoning an adequate rescue response are present;
- assistance is given to workers in the confined space, as they require it;
- the access point(s) is guarded or secured at all times; if it becomes necessary for the attendant to leave, even for a few minutes, all workers must leave the confined space for the duration of the attendant's absence, or another qualified worker must be assigned to act as a temporary attendant;
- prior to closing up the confined space, all entry workers have been accounted for and proof of this is to be recorded on the *Confined Space Entry Permit* form;
- the emergency plan is present at the worksite and is reviewed and understood by all workers involved with the confined space entry; and
- the plan is initiated, assistance is summoned, and emergency removal from the confined space is accomplished in a timely manner.

1(o). Entry Worker

Supervisors shall ensure that all entry workers are trained in the requirements of the site specific *Confined Space Entry Permit*.

Entry workers shall:

- ensure all safety equipment is in good working order;
- have portable lighting that is intrinsically safe;
- wear all safety equipment required for safe confined space entry;
- wear a full body harness to facilitate potential rescue;
- continuously monitor the atmosphere while in a confined space;
- be aware of the potential hazards that may be encountered during entry and the limitations of equipment for control of these hazards;
- know how to respond to emergencies including methods of self-rescue;
- know the symptoms and warning signs of exposure to potential hazards;

- notify the attendant of any emergency or unacceptable condition in the confined space; and
- exit the confined space immediately if symptoms, warning signs, or unacceptable conditions occur or if directed by the attendant;

2. Entry

2(a). General

- The confined space shall only be entered after it has been assessed and evaluated by a qualified worker who notes the hazard(s) on a *Hazard Assessment* form; a written *Control Plan* is developed by a qualified worker who indicates the required precautions or protective equipment that are required; and a *Confined Space Permit* is completed by the confined space attendant.
- Immediately before entry and every half hour (1/2) thereafter, the monitor readings shall be logged on the entry permit.
- Immediately before every re-entry, the space shall be re-tested.
- A copy of the permit shall be kept on site at all times.
- The supervisor or designate shall be informed before any entry takes place.
- The confined space shall be entered only after the required additional precautions or protective equipment are in place or being used.
- Where practicable, if a hazardous atmosphere has been detected, the atmosphere shall be rendered safe by purging and ventilating.
- If the gas monitor indicates a toxic or oxygen deficient hazard, the space shall be ventilated until safe.
- If the hazard is an explosive gas, the space shall be inerted using an appropriate inert gas, where practicable (e.g. nitrogen) until the lower explosive limit (LEL) reading is at 0%. The space shall then be ventilated with fresh air until the oxygen is at a safe level.
- If after testing it is found that inerting has not reduced the explosive gas level below regulated limits, re-purge and retest. If it is found that there is a continuous source of flammable gas, do not enter and contact your supervisor.
- Workers shall immediately leave the confined space when the gas monitor alarms or when directed to by the attendant.
- If mechanical ventilation is required, a failure warning system shall be provided that gives adequate warning to workers to ensure adequate time for their safe egress.

2(b). Entry into Toxic or Anoxic Atmospheres

- Where purging and ventilating fail to provide safe breathing conditions, a suitable portable respirator, a self contained breathing apparatus (SCBA) or a supplied airline respirator with an escape pack shall be used.

- Continue to monitor for the Lower Explosive Limit (LEL) in the confined space even while wearing a self contained breathing apparatus in a toxic or anoxic atmosphere, and exit immediately, if the LEL sensor alarms.

2(c). Fall Protection

Where there is a risk of falling:

- three metres;
- into operating machinery;
- into water or another liquid;
- onto a hazardous substance or object; or
- through an opening on a work surface,

Confined space workers and attendants shall wear and use fall arrest equipment in accordance with manufacturer's specifications.

2(d). Hot Work

- Hot work includes any activity or the use of any tool or equipment that may be a source of spark or ignition. This, for example, includes the use of electrical tools, lighting, communication devices, etc. that are not certified intrinsically safe.
- Where the potential for flammable, combustible or explosive agents exists, no hot work shall be performed in a confined space unless a *Hot Work Permit*, identified in the safe working procedure, *SWP023.05, Hot Work Permit Systems* is issued by the supervisor in charge and continuous testing is performed.
- Work shall continue only while the reading remains below 5% LEL.

2(e). Confined Spaces with Multi-Employer Involvement

This section applies if the workers of more than one employer perform work in the same confined space or related work with respect to the same confined space.

- Before any worker enters the confined space or begins related work with respect to the confined space one employer shall be designated as the lead employer.
- The lead employer shall prepare a co-ordination document, in accordance with section 4 of Ontario Regulation 632/05, to protect the health and safety of all workers who perform work in the confined space or related work with respect to the confined space.
- A copy of the co-ordination document shall be provided to,
 - (a) each employer of workers who perform work in the same confined space or related work with respect to the same confined space; and
 - (b) the joint health and safety committee or health and safety representative, if any, for each employer of workers who perform work in the same confined space or related work with respect to the same confined space.

Legislative Requirements

Occupational Health and Safety Act, RSO 1990

Ontario Regulation 632/05

Regulation for Construction Projects, Reg. 213/91, amended to O. Reg. 628/05

Regulation for Industrial Establishments, Reg. 851, amended to O. Reg. 629/05

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