



TITLE: Confined Spaces Management**STANDARD:** 226**ISSUE DATE:** 31 October 2015**ISSUE No:** 001

Definitions (in relation to this Standard)

Attendant	An individual stationed outside the confined space who monitors the entrants and controls and monitors entry and exit of the confined space.
Authorized entrant	An employee who is trained & authorized to enter a confined space.
Hazardous atmosphere	An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self rescue, injury or acute or chronic illness
Competent	Trained, experienced & qualified
Confined Space	<p>A space (i.e. pipe, duct, tank, trench, pit, recess, sewer, vat, silo etc...) that is:</p> <ul style="list-style-type: none">▪ large enough that an employee can enter and perform work,▪ may contain hazardous materials, be oxygen-deficient, have a flammable atmosphere, or have the potential for such conditions,▪ has limited or restricted means for entry and exit,▪ is designed such that entrapment or crushing could occur▪ is not designed for continuous occupancy
Entry Supervisor	The competent person responsible for determining if acceptable conditions are present in a confined space where entry is planned, for authorizing and overseeing entry, and for terminating entry. Shall be trained and certified by a recognized 3 rd party training provider and shall be subject to an interview by RC ES&H for approval prior to any confined space works being undertaken.

Cross-References

- Contract Special Condition 19 – Contractor ES&H Program
- Contract Special Condition 20 – ES&H Construction Phase Plan
- Standard 235 – Control of Hazardous Energy

Standard

Planning

1. Contractor must appoint a competent person (Entry Supervisor) to supervise entry into confined spaces in accordance with Special Condition 19. Resume of the proposed Entry

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Supervisor is to be submitted to Royal Commission for review and approval (refer to SC 9 – key personnel); this person must have “Confined space management” training certification by a 3rd party provider and shall be subject to interview by Royal Commission ES&H for approval prior to any confined space works being undertaken.

2. Contractor shall then submit the Construction Phase ES&H Plan containing risk assessment, Safe Sequence of Work and a copy of the Confined Space Entry Permit to be used, to the Royal Commission for approval in accordance with Contract Special Condition 20.
3. No entry into confined spaces is to commence before approval of the Construction Phase ES&H Plan by Royal Commission.

Training

4. Confined Space Entry training shall be mandatory for all personnel who will control entry, enter, supervise works in a confined space, or are dedicated members of the Contractor's emergency Initial Response Team (IRT). This training shall be conducted before employees are first assigned their duties and works in the confined space, whenever there is a change to procedures or duties, or when activities are not continuous and there has been a lapse of time between confined space works.
5. Records of training are to be kept for the entire Contract on site, and made available to the Royal Commission upon request. Details to be recorded are the date of the training, employee's name, employee's signature, trainer's name and a summary of the training contents. Training Provider (internal or external) is to have a valid internationally recognized "Confined Space Trainer" certification.
6. Training delivered to **all** persons must consist of the following topics:
 - functions of the Attendant
 - means of communicating with the Attendant
 - entry & explosive atmosphere hazards
 - signs, symptoms and consequences of exposure
 - testing and monitoring equipment to be used
 - correct use of communications, ventilation and lighting equipment
 - evacuation signals and alarms
 - signs and symptoms of heat stress injuries
 - when to alert the attendant
 - how to quickly exit the space
7. Additional training to be delivered to the Attendant and Entry Supervisor must include:
 - Behavioral effects of hazard exposure of the entrants
 - How to communicate with entrants to monitor their status
 - How to alert entrants of the need to evacuate the confined space
 - How to monitor activities inside and outside of the space to determine if it is safe for entrants to remain
 - How and when to order an evacuation
 - How to summon the IRT and emergency services

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- How to prevent unauthorized access to the confined space
- How and when to perform non-entry rescue

8. Additional training to be delivered to the Entry Supervisor must include:

- The tests, procedures, and equipment required by the permit system
- How & when to endorse the permit to allow entry
- When to terminate the entry and cancel the permit
- How to determine that acceptable conditions are maintained

9. Training to be delivered to the IRT must include:

- Training on the Respiratory Protective Equipment (RPE) provided and rescue equipment
- Simulated rescue operation at least once every 12 months from the actual confined space, or a representative space that simulates the type of confined space being worked in
- Basic first aid and cardiopulmonary resuscitation (CPR)

Equipment Requirements

10. The following equipments must be made available by the Contractor, and where the risk assessment or Safe Sequence of Work require, used during work in confined spaces:

a. Ventilating equipment

Where the existence of dangerous air contamination and/or oxygen deficiency is suspected or determined, forced air or exhaust ventilation shall be implemented. Ventilation will continue whilst employees are in the confined space and until all have exited. Air supply shall be from a clean source and must not increase the hazards in the space. The atmosphere within the confined space shall be monitored continuously.

b. Communication system

An effective continuous means of communication between Attendant and those in the confined space shall be provided by the Contractor. Pre-work checks must be conducted prior to entry. Equipment may consist of radios, portable phones; video equipment etc...an alternate means (whistles, bells, flashing lights etc...) must be in place in case of failure of the primary system.

c. PPE

PPE shall be worn as identified by the risk assessment.

d. Temporary Lighting

Temporary lighting shall be supplied as necessary to ensure an adequate degree of illumination for the safe performance of the work task. Standby emergency lighting to be made available. Lights provided must be explosion proof (spark proof) to eliminate the risk of fire, and rated as such.

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e. Hand & Power Tools

All confined spaces will be evaluated for specific hazards relating to hand/power tool usage. The use of low-voltage (12V) or GFCI-equipped electrical tools shall be required. Any compressed air-powered tool used shall be powered by Grade D breather air or its equivalent.

f. Signage

"Danger – Permit to enter required – Confined Space – Do Not Enter" signs must be posted to ensure adequate warning of the existence and location.

g. Barriers

Barriers shall be erected around the confined space site to ensure that persons have to come into contact with the Attendant, and cannot accidentally enter the confined space. Barriers shall also protect the opening to the confined space preventing accidental fall through and to protect the persons inside from falling objects.

h. Non-entry rescue equipment (to be available on site)

Full body harness with retrieval line attached
Mechanical device for lifting (i.e. tripod) positioned immediately outside the space in such a manner that rescue can begin immediately.

i. Other equipment

Ladders, scaffolding or working platforms, potable water provision and other welfare considerations, shoring devices will be used as necessary to provide safe conditions for entry. Suitable and sufficient fire fighting equipment shall be available.

Special Precautions

11. Depending upon the scope of work, location and results of the risk assessment, the following precautions may be required:

- co-ordination with other employers (i.e. sub-contractors)
- co-ordination with Property Owners
- co-ordination with Service providers (SEC, Marafiq etc...)
- lock-out/tag-out procedures of energy sources
- isolation of processes and process lines
- hot work required
- pre-approval by Royal Commission for nighttime work

12. Under no circumstances should work be performed under the sole protection of entry permit procedures other than those issued and controlled by the Contractor. Other entities (at Serial 11) who wish to implement their own permit procedures in addition to this Standard will be permitted to do so as a means of control over their own activities and facilities.

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Pre-Entry

13. The Contractor ES&H Manager and Entry Supervisor shall visit the confined space and review their risk assessment and Safe Sequence of Work to the actual conditions. The Safe Sequence of Work shall be revised to correct any deficiencies identified and approval for any amendments sought from a member of the Royal Commission Construction ES&H Department before entry is permitted.
14. The Safe Sequence of Work shall be reviewed whenever there is a reason to believe that measures taken may not be protecting the employees, or causing other hazards to arise.
15. A pre-task briefing must then be conducted by the Entry Supervisor to all persons involved with the entry to the confined space, including the IRT members; the following topics should be covered and checked:

ACTION	RESPONSIBILITY
Obtain other relevant permits (RC Security, SEC etc...)	Works Supervisor
Account for all entrants	Attendant
Co-ordinate with owners, operators, sub-contractors	Works Supervisor
Verify training and assign roles	Entry Supervisor
Verify availability of emergency personnel (IRT)	ES&H Manager
Obtain Hot Work Permit or Permit to Dig signature (if applicable)	Entry Supervisor
Initiate Confined Space Permit	ES&H Manager
Assemble equipments / materials	Works Supervisor
Test Atmosphere	Entry Supervisor
Assess and evaluate Safe Method Statement	Entry Supervisor
Initiate ventilating equipment as required	Entry Supervisor
Secure Area	Attendant
Check PPE	ES&H Manager
Discuss actual work task	Works Supervisor
Sign the Confined Space Permit	All involved
Authorize the Confined Space Permit	Entry Supervisor & ES&H Manager
Account for entrants	Attendant
Commence works	All involved

Entry Testing and Monitoring

16. The Entry Supervisor and Contractor ES&H Manager must then perform pre-entry testing to determine if acceptable entry conditions are present prior to entry. Instruments will be of sufficient sensitivity and specificity to identify and evaluate hazardous atmospheres that may exist or arise. Calibration checks shall have been performed in accordance with manufacturer's instructions. Records of atmosphere testing shall be recorded and made available to Royal Commission upon request.
17. If it is necessary to enter a hazardous atmosphere to perform testing, a positive pressure, pressure demand self-contained breathing apparatus, or, supplied air full face respirator with 5-minute emergency escape pack must be supplied and worn. Additionally a rescue person with similar protection shall be immediately available.

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18. The Entry Supervisor and Contractor ES&H Manager shall test the internal atmosphere of the confined space before any employee enters, with a properly functioning direct-reading instrument for the following conditions, and record findings on Appendix 1:

CONDITION TO BE TESTED	ACCEPTABLE PARAMETERS
Oxygen content	More than 19.5%, but less than 23.5% of oxygen
Flammable gases & vapors	Less than 10% of the lower explosive limit
Toxic gases & vapors	Less than the permissible exposure limit for known contaminants, or less than 1 part per million for unknowns
Radiological hazards	Less than 10% of the derived air concentration

19. OSHA Permissible Exposure Limits (PEL) shall apply, and a full list can be found at:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992&p_text_version=FALSE

20. OSHA Lower Explosive Limits (LEL) shall apply; the Material Safety Data Sheet (MSDS) for the flammables concerned will detail this limit, and more guidance can be found at:

http://www.osha.gov/dcsp/ote/library/flammable_liquids.pdf

Permit to Work (Confined Space) System

21. A confined space entry permit (See Appendix 2) must be completed prior to any work in a confined space.
22. The Entry Supervisor and Contractor ES&H Manager are the only employees authorized to sign the permit and authorize entry.
23. The completed and signed permit should be posted at the entry of the confined space prior to the time of entry so that entrants can confirm control measures are in place.
24. The duration of the permit must not exceed the time required to complete the task, or one shift, whichever comes first.
25. The Entry Supervisor shall terminate entry to a confined space and cancel the permit when:
- the authorized time of the permit has expired
 - work has been completed
 - a condition not allowed under the permit arises in or near the confined space
 - an emergency or incident requiring evacuation of the area
26. The Attendant must monitor the internal atmosphere of the confined space at a minimum of every 15 minutes, with a properly functioning direct-reading instrument for the conditions at Serial 18, and record findings on Appendix 1.

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27. In the event a hazardous atmosphere is detected after entry operations have begun, the Entry Supervisor and Attendant must:

Step	Action	Responsibility
1	Order an immediate evacuation of the confined space	Attendant
2	Account for all entrants	Attendant
3	Prevent anyone from re-entering	Attendant
4	Evaluate the space to determine how the hazardous atmosphere occurred	Entry Supervisor
5	Implement engineering controls to reduce the hazardous atmosphere to an acceptable level	Entry Supervisor
6	Document the event on the Permit	Entry Supervisor
7	Inform the Royal Commission ES&H Department	ES&H Manager

28. The original cancelled permit will be kept and maintained with the Construction Phase ES&H Plan.

Emergencies & Emergency Services

29. ES&H Manager shall co-ordinate with off-site rescue services before the start on **any** works on the Project to determine:

- Availability and extent of Services
- Back-up arrangements
- Response time
- Emergency phone numbers and contacts
- Availability of standby services for complicated entries
- Any special requirements of the emergency services

30. ES&H Manager shall provide the off-site rescue services (Civil Defense, Ambulance Service etc) with the following information:

- Full extent of the confined space works
- Hazards expected including details of known hazardous substances
- Details of Contractor's emergency arrangements
- Details of emergency practice drill they may want to participate in

31. Contractor medical staff shall have copies of all MSDS.

32. Where feasible, entry rescues will only be performed by qualified off-site emergency personnel. If off-site emergency services are deemed too far away from the work site, Contractor's personnel must be fully trained and equipped to perform entry rescue activities.

33. Only employees fully trained in Attendant duties shall perform non-entry rescues.

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Figure 1 – Tripod used for lowering / lifting a person into a vertical confined space

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000	May-2009	Original	MS	WG	HS
001	Oct - 2015	1 st Revision	FH	FC	AK

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VAPOUR / EXPOSURE TEST RECORD

Appendix 1

Contractor:

Contract No:

Location:

Date:

Entry Supervisor:

ES&H Manager:

[illegible]

LEL Lower Explosive Limit: the leanest vapor-to-air concentration that will ignite if an ignition source is present

PEL Permissible Exposure Limit: the level of exposure to a chemical at which an employee can work safely

Derived Air Concentration: the concentration of radionuclide in the air

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Appendix 2

CONFINED SPACE ENTRY PERMIT

Contractor: Contract No: Location:

Date: Entry Supervisor: ES&H Manager:

Description of Work:

Time Permit Valid from: Time Permit Expires at:

CONTROL MEASURES TO BE ACCOMPLISHED PRIOR TO AUTHORIZATION:

All non-applicable items are to be initialed by Entry Supervisor in "N/A" column.

All applicable items to be acknowledged as in place and initialed by Works Supervisor in "Yes" column.

CONTROL MEASURES	YES	N/A
Proposed Work checked with Engineer / Works Supervisor / Entry Supervisor?		
Standby firefighting equipment or fire watch required?		
Piping and conduit drawings checked before any excavation or work?		
Precautions taken against release of vapors, gas, product, dust or other contaminants / hazardous materials?		
Lock-out / Tag-out of valves, electrical, hydraulic, mechanical, steam or air activated equipment?		
Lines, Vessels, Valves, Equipments etc...Depressurized or pressure reduced to a safe level?		
Lines, Vessels, Valves, Equipments etc...Drained or purged?		
Lines, Vessels, Valves, Equipments etc...Vapor free or inerted?		
Lines, Vessels, Valves, Equipments etc...Valves closed, blinded, blanked or double blocked & bled?		
Sewer and pipe openings covered or protected?		
Gage glass columns, pressure-relief and sample lines drained, closed, protected or disconnected?		
Ventilation equipment installed?		
Proper means of access / egress available?		
Works Supervisor, Entrants, Attendant, and Entry Supervisor identified and present?		
Emergency rescue, IRT and method of notification provided?		
MSDS's reviewed and workers trained for physical / health hazards?		
Welding or cutting equipment safety grounded, sparks & flash protected?		
Barriers and confined space warning signs displayed?		
Vapor / Exposure tests required?		
PPE required:		
Other precautions required:		

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This acknowledges that the above items marked "Yes" have been satisfied prior to the start of work and will continue in effect throughout the course of the work specified in this Permit.

Signature of Works Supervisor:

Printed Name:

Signature of ES&H Manager:

Printed Name:

Signature of Entry Supervisor:

Printed Name:

Work now Authorized

This acknowledges that work has now ceased in the Confined Space, with adequate precautions taken to ensure it is safe, and that all Entrants have exited the Confined Space and have been accounted for.

Time:

Signature of Works Supervisor:

Printed Name:

Signature of ES&H Manager:

Printed Name:

Signature of Entry Supervisor:

Printed Name:

Permit now Closed