**FQM LIMITED**

**Safe Entry to Confined Spaces**

1. **PURPOSE**

The purpose of this Procedure is to define the minimum requirements for work activities associated with entry into a confined space and to specify the controls and precautions required to achieve the necessary control of such activities.

1. **SCOPE**

This Procedure applies to work in confined spaces at all [COMPANY NAME] operated sites and all personnel involved in activities that require confined space entry.

The term “Confined Space” has a wide interpretation in law. It includes large pipelines, tanks, vessels, separators, silos, ducts, sewers, pits, flues, manholes and voids between modules and in legs on installations. It also includes any space in which dangerous levels of contaminants can accumulate and ventilation is restricted, or where access/egress is very restricted or complicated requiring a rescue plan e.g. excavations (normally deeper than 1.2 meters), the space above floating roofs on floating roof tanks, open-topped tanks, closed or unventilated rooms, sumps and culverts, crane pedestals and any other poorly ventilated areas.

Confined Space Entry is controlled by the ISSOW process via Work Control Certificates / Permits to Work (PTW) for Confined Space Entry (CSE).

1. **RESPONSIBILITIES**

* **HSE Manager/H&S Advisor** shall be responsible for:
  + Ensuring that this procedure is maintained and communicated to all relevant DMS personnel.
  + Ensuring a risk assessment has been carried out for the proposed confined space entry. To review and confirm the adequacy of the assessment in relation to the anticipated hazards possibly remaining within the confined space out with a normal atmosphere.
  + Ensuring a rescue plan has been carried out for the proposed confined space entry.
  + Revisiting the rescue plan as the tasks connected with the CSE progress to ensure it remains suitable and sufficient for ongoing entry.
  + Maintaining a recorded system of training (e.g. Site-Specific Training Matrix) for confined space entrants, entry attendants and site rescue teams.
* **Operations Managers** shall be responsible for:
* Ensuring all employees are operating in accordance with this Procedure.
* Justifying any deviations where existing facilities do not allow the method of confined space entry set out in this procedure to be followed, or where other deviations are proposed.
* Appointing competent persons to take responsibility with regard to this Procedure
* **Foreman** shall be responsible for:
* Confirming the Risk Assessment has been carried out for the proposed confined space entry and to verify the adequacy of the assessment in relation to the anticipated hazards within the confined space.
* Ensuring the control measures are being adhered to throughout the CSE work scope.
* Discussing work scope with nominated responsible person before commencing CSE.
* **Nominated Responsible Person** Shall be responsible for:
  + Compliance with the task description.
  + Ensuring that all members of the work party are familiar with all aspects of the proposed CSE. As the tasks connected with the CSE progress, the nominated responsible person is to ensure the foreman / HSE Advisor are kept informed of any changes that may affect the validity of the rescue plan.
  + The worksite is left in a safe and clean condition at the end of shift and on completion of the tasks.
  + Ensuring there is a nominated entry sentry in place before any CSE by work party.
* **The Entry Sentry** Shall be responsible for:
  + Ensuring the maximum and minimum numbers allowed for the CSE are never breached.
  + Control of entry to the space at all times, checking that all personnel entering the confined space have donned the correct PPE and are aware of what to do in the event of an emergency.
* **The Authorised Gas Tester** Shall be responsible for:
  + Carrying out initial/additional gas tests at the request of the foreman or the nominated responsible person.
  + Ensuring that the confined space has been tested to the permitted limits for CSE work.
  + Communicating the findings with the foreman, nominated responsible person, entry sentry and work party by means of DMS Confined Space Inspection Record Card (CSIRC), Appendix 4.

1. **DEFINITIONS**

**Breathing Apparatus**

A device that ensures that the wearer has a continuously available supply of uncontaminated air through a facemask, helmet or mouthpiece.

**Canister Respirator**

Respiratory equipment consisting of a face piece attached to a canister that contains a filter absorber to remove specific contaminants. It has no separate supply of air.

**Cold Work**

The carrying out of any task, or the use of any tool or equipment that will not produce a source of ignition (see also Hot Work). It includes the use of tools for erection, dismantling and cleaning, which are not liable to produce sparks, and operations such as drilling, tapping and cutting carried out in such a way as to limit the heat produced and keep the temperature of the tools and work below 100° C.

**Combustible Gas Indicator**

An instrument designed to measure the concentration of flammable gas.

**Competent Person**

A person who has the necessary ability in the process, trade, plant or equipment to which the text refers, to render him capable of the work involved, and who has been duly authorised to undertake the work.

**Flammable**

Refers to any substance, solid, liquid, gas or vapour, which is easily ignited. The addition of the prefix ‘non’ indicates that the substances are not readily ignited but does not necessarily indicate that they are non-combustible.

**Flammable Limits**

The limits of combustibility of flammable vapours when mixed with air.

**Gas Free**

A tank is considered to be gas-free when the concentration of flammable gases is within safe prescribed limits. The term gas-free does not imply absence of toxic gases or sufficiency of oxygen for vessel entry.

**Hot Work**

There are two classes of Hot Work; Hot Work Naked Flame and Hot Work Spark Potential.

**Incendive Spark**

A spark of sufficient temperature and energy to ignite a flammable gas.

**Lower Flammable Limit (LFL)**

The lowest concentration of flammable gas in air at atmospheric pressure capable of being ignited. The figure is expressed as percentage by volume.

**Pyrophoric Scale or Deposits**

Usually finely divided ferrous sulphide formed inside a tank, pipeline or equipment, in the presence of mercaptans or hydrogen sulphide. It is capable of such rapid oxidisation on exposure to air that heating to incandescence can occur.

**Progressive Entry**

If the size of the space to be tested is such that other levels or areas cannot be accessed without additional rescue equipment being installed to protect the AGT, then the gas testing will be performed in a staged and progressive manner. Whilst taking in to account the risks for the AGT and emergency responders, further rescue arrangements and any other methods to protect the AGT and ERT i.e. additional rescue equipment, lighting etc, will be put in to place in the areas that have already been gas tested.

**Representative sample**

If the area that is to be entered is of a size that will not allow sufficient testing of the atmosphere from the proposed entry point, then where possible additional hatches or vents should be opened to allow this.

**Source of Ignition**

Naked lights, fires, certain electrical equipment, hot surfaces above ignition temperature or a spark or flame produced by any other means.

1. **CONFINED SPACE ENTRY PROCESS FLOWCHART**
2. **PROCEDURE**
   1. **Planning**

Confined Space Entry planning shall identify the hazards and risks involved, and whatever mitigation required for the tasks that will be undertaken during work. Planning should be carried out in advance of the work starting. Planning should be discussed with the Operations Manager, Foreman, [COMPANY NAME] H&S Department representative and AGT.

**Note:** A detailed account of the overall process is shown in Appendix 5 and 6.

* 1. **Risk Assessment**

A hazard identification and Risk Assessment shall be carried out to establish whether the proposed confined space entry can be performed safely in accordance with this procedure. Hazards which should be considered, are identified in Appendix 1. Risk assessment should be completed by the [COMPANY NAME] H&S Department in discussion with the nominated responsible person from the work party.

* 1. **Rescue Plan**

The Rescue Plan defines the minimum requirements for confined space entry, personnel involved in the rescue, the Emergency Response Team (ERT) and on-site rescue equipment. Rescue plan will be completed by the [COMPANY NAME] H&S Department in discussion with the nominated responsible person from the work party and ERT representative.

* 1. **Gas Testing**

No CSE will take place until an Initial Gas test has been undertaken. The results and condition of the confined space atmosphere shall be discussed with the AGT and Foreman which will then determine the entry requirements, Appendix 3 outlines the specific criteria for this.

Gas testing for entry shall only be carried out by approved personnel who have been fully trained and certified in gas testing for confined space entry purposes.

Upon completion of the Initial gas test, the AGT Level 1 will record the results on the CSIRC and this will be displayed at the CS entrance.

Once approved for entry the AGT will report this back to the Operations Manager, who will then inform the Foreman that a confined space entry/permit to work certificate can now be opened and entry/work can commence.

Continuous gas testing throughout the task is to be carried out by a trained and competent person. At a minimum the confined space will be gas tested every 24 hours while the work task is on-going.

Further information and guidance is contained in Appendix 3.

* 1. **Other Considerations** 
     1. **Prerequisites for Entry**

Prior to Entry, the Foreman will confirm that the Confined Space has been isolated, purged, cleaned to a safe level and gas tested to the criteria laid out in Appendix 3 Figure 1 Colum 2. The Foreman will then brief the Nominated Responsible Person and issue the PTW certificate along with relevant documentation to the Nominated Responsible Person.

* + 1. **Entry Sentry**

The Nominated Responsible Person will appoint an Entry Sentry who shall be stationed at the designated entrance to the confined space and shall:

* + Maintain a record of personnel entering and leaving the space.
  + Keep Entrants under effective surveillance by one or more of the following methods:
    - Line of sight wherever possible
    - Voice contact (allowing for distance and ambient noise)
    - Radio with agreed periodicity of contact
    - Pre-arranged lifeline signals where appropriate
  + Be equipped with a radio and be aware of the nearest telephone to summon assistance rapidly if personnel within the confined space experience difficulty. Under no circumstances will the Entry Sentry enter the confined space after raising the alarm. He will wait for emergency assistance.

**Note:** Such assistance shall consist of readily available rescue equipment and suitably trained personnel.

* Ensure an adequate supply of breathable air is maintained whilst personnel are inside the confined space.

The Entry Sentry has a vital function to perform; the Nominated Responsible Person shall therefore check that the Entry Sentry understands his/her duties and is competent to perform them. The Nominated responsible Person is responsible for ensuring all personnel charged with Entry Sentry duties have received the appropriate levels of training.

The HS&E Advisor shall check the validity of the persons training, refresh it if necessary and record it for future reference.

* + 1. **Use of Breathing Apparatus**

If the Confined Space cannot be confirmed as having a safe atmosphere for entry, then further cleaning and purging maybe required as detailed in appendix 5 and 6.

Under no circumstances will the AGT use BA equipment to enter the confined space to carry out his duties.

ERT members summoned to assist in a rescue during an emergency, will be subject to standard operational BA control procedures, only fully trained and competent personnel will use BA equipment to enter the confined space for rescue purposes.

The ERT will enter the CS wearing BA equipment as a precaution, if it is apparent there has been a change in atmosphere in the CS the ERT will only entre the CS wearing BA equipment once the AGT has deemed it safe to do so.

Control of the BA Airline set and the cylinder contents on site must only be delegated to an experienced and trained person. He must be competent in the operation of the unit and be able to change cylinders whilst the operation is ongoing.

* + 1. **Final preparation for Entry**

There will be no entry into a Confined Space without the completion of gas testing by the AGT and the posting of the information on the CSIRC at the CS entrance. On confirmation of this, the foreman will issue the PTW Certificate along with the relevant documentation to the Nominated Responsible Person.

* + 1. **Work within a Confined Space**

The Confined Space Entry PTW Certificate’s purpose is for control of Entry to the confined space and gas testing requirements. It will also detail, area of work, PPE required, hot work requirements, Isolations and proposed work activities.

* 1. **Entry into a Confined Space**

Personnel entering the confined space shall

* Wear suitable Personal Protective Equipment (PPE).
* Where practicable and if specified in the task risk assessment or the PTW, they shall wear a harness and a lifeline. This shall only be considered practicable if the nature of the confined space is such that the Attendant and/or Emergency Response Team could hoist or drag out the entrant from the space if the latter were immobilized, and if the rope would not impede the Entrant in making an unassisted emergency exit.
* According to the type of work, the risk and physical capabilities, take adequate rest periods out in the open air.
* Continuously monitor for oxygen (O2), Hydrocarbons and Hydrogen Sulphide (H2S) by one of the Confined Space Work Party carrying the appropriate personnel gas alarm to ensure that the conditions do not deteriorate. If conditions within the confined space do deteriorate, the space should be vacated, ventilated and re-tested until conditions have improved to the original limits identified on the CSIRC.
* As a minimum standard, atmospheric testing should be carried out at periods of 24 hours while work task is on-going. The Confined Space Inspection Record Card (CSIRC) should:
  + Be prominently displayed at the entrance to a confined space.
  + Clearly indicate either “DO NOT ENTER” or details of conditions for entry.
  1. **Confined Space Final inspection**

Upon task completion the confined space area must be checked by the relevant Foreman or Designated Responsible Person and the PTW signed off accordingly. All PTW must be returned to the Operations Office for review and filing by the HS Advisor.

* 1. **Training**

All personnel involved in confined space entry, either as members of the entry work party, entry sentry, rescue team members or Authorised Gas Testers, shall undergo suitable training to ensure that they possess the understanding, knowledge and skills necessary to safely perform their assigned duties. Training shall include but not be limited to:

* AGT’s shall be trained, assessed and confirmed competent in accordance with OPITO Authorised Gas Tester Level 1 standard.
* Entry Sentries shall be formerly trained in confined space entry and confined space rescue procedures for their required roles and responsibilities. They shall also be briefed on all aspects of the proposed entry activities, associated Rescue Plan and the types of Breathing Apparatus that may be used. They will be required to demonstrate their competency and understanding to the Foreman or Designated Responsible Person when asked.
* Personnel entering the confined space shall be briefed by the Designated Responsible Person and/or Entry Sentry to ensure that they understand the hazards of the task in hand. They must be aware of the emergency procedures should an evacuation become necessary. They must also be competent in the wearing and operation of Breathing Apparatus and may be asked to demonstrate this. A toolbox talk is to be given by the Designated Responsible Person on work task, PPE requirements and emergency procedures prior to entry.
* The Emergency Response Team Members will be BA trained personnel and will have participated in simulated training in casualty recovery and rescue procedures. At least one member of the Emergency Response Team will be First Aid qualified.
* Inexperienced personnel shall not be assigned to the Emergency Response Team unless under training and accompanied by a competent person who is familiar with the hazards of confined space entry.

1. **REVIEW**

This procedure will be reviewed regularly, at a minimum on a yearly basis, at the annual management meeting. Additional review maybe required due to changes in legislation, operations, technology, personnel etc.

**APPENDIX 1 – RISK ASSESSMENT AND HAZARD IDENTIFICATION**

Entry into confined spaces must be strictly controlled to prevent persons being exposed to risks associated with toxic and/or flammable fumes and vapours in the atmosphere, and with atmospheres, which may be deficient (or enriched) in oxygen. If the confined space is not suitable for entry for any reason, then it should be clearly marked **“DO NOT ENTER”**.

Dangerous concentrations of gases and vapours can arise from sources inside or outside a confined space. These include:

* Gas or vapour remaining from the process normally performed in the confined space.
* Gas or vapour entering from adjoining plant, which has not been effectively isolated.
* Gas or vapour emitted from scale or sludge, particularly resulting from mechanical disturbance during access or cleaning or due to the heat from welding operations.
* Gas, vapour or fumes produced by operations being carried out in the confined space such as welding and cutting, brush and spray painting and the use of adhesives and solvents.
* Exhaust gases which could be drawn into the confined space via air mover suction intake.

Other dangers may arise as a result of:

* Mechanical equipment in the space
* The ingress of steam, hot water or large quantities of liquids which may cause scalding or drowning
* Solid materials which can flow, e.g. powdered chemical’s in storage
* Communication difficulties
* Poor access and egress restricting movement for normal work and escape
* Slippery surfaces
* Minimum and Maximum permissible numbers allowed to enter the Confined Space to allow for an effective rescue. This will be decided on a case by case basis depending on the work scope.
* Inadequate visibility
* Excessive temperature in the confined space (causing personnel heat stress)
* Possible ingress of fumes from drain systems, etc.
* Possible collapse of excavations. Adequate shoring to be in place, prior to entry
* Consideration of the physical requirements of the task when working in the confined space.

**APPENDIX 2 – HAZARDS FROM OXYGEN ENRICHMENT AND DEFICIENCY**

Hazards from oxygen-enrichment

The special dangers of working in oxygen-enriched atmospheres cannot be over-emphasised. Oxygen enrichment may occur by leakage of oxygen supplies or by build-up of oxygen during oxygen-rich flame cutting processes. Enrichment of only a few per cent will make materials that normally only burn slowly or with difficulty, burn fiercely with catastrophic results for the occupants of the confined space.

Every precaution shall be taken to avoid oxygen enrichment. In particular:

* Oxygen cylinders shall be kept outside the confined space.
* Oxygen supplies shall be isolated outside the space during work breaks. Quick method of closing cylinder isolation valve to be available at all times, i.e valve key if required.
* Hoses supplying oxygen shall be removed from the space during work breaks.
* Oxygen shall never be used to ‘sweeten’ the atmosphere of a confined space.
* The space shall be adequately ventilated at all times.

Hazards from oxygen deficiency. Oxygen deficiency may result from:

* Purging with inert gas
* Inert gas welding
* Burning and grinding operations which consume oxygen
* Oxidation processes (e.g. rusting) occurring in steel vessels left completely closed for some time

**APPENDIX 3 – GAS TESTING FOR SAFE ATMOSPHERE**

Where gas testing is required and upon confirmation from the Foreman that the confined space has been isolated mechanically and electrically. The Foreman will approve an initial gas test to be carried out by the Authorised Gas Tester.

Where practicable, the initial gas test shall be carried out from outside the confined space (e.g. using extension probes). (See Appendix 5 Flowchart)

In some circumstances it may not be possible to sample a representative portion of the space from the entrance, taking into account ventilation arrangements and the possibility of heavier than air gas remaining in low areas. (See Appendix 6 Flowchart)

In this event, the AGT Level 1 may have to enter the space in order to complete the representative tests and confirm the suitability of the Rescue Plan.

This may become a progressive entry allowing tests, Rescue Plan facilitation and any additional requirements e.g. better lighting to be installed to safeguard the AGT during the testing process and the ERT if a Rescue is required.

The conditions for the entry of the AGT shall include:

* An Entry Sentry shall be stationed at the entrance of a confined space in order to maintain the AGT under effective surveillance
* The space shall only be classed as fit for entry if the oxygen content and hydrocarbon vapour levels are equivalent to those found in the natural atmosphere, both of these are identified in Figure 1.
* The AGT shall confirm that there are no materials left inside which in their opinion may give off such quantities of vapour and fumes if disturbed that the atmosphere would cease to be classed as fit for entry without BA.

**Figure 1. Permitted Limits for Confined Space Entry and Work**

|  |  |
| --- | --- |
| CRITERIA | ENTRY LEVELS |
| OXYGEN CONTENT (%) | 20.8 - 22.5% |
| HYDROCARBON VAPOUR  (% Lower Explosive Limit)  (measured on a Combustible  Gas Indicator) | < 1% LEL  (Inspection, Hot or Cold Work Permitted)  1 – 4% LEL  (Inspection and Cold Work permitted) |
| |  | | --- | | **Notes** | | 1 Continuous gas monitoring must be performed throughout confined space occupancy. | | 2 Gas free certificate will last for a period of 24 hours from testing. | |  | | |

**APPENDIX 4 – CONFINED SPACE INSPECTION RECORD CARD**

**APPENDIX 5 - FLOWCHART FOR EXTERNAL INITIAL GAS TEST FOR CSE**

**CSE Required**

**Record Gas Test Results to appropriate Confined Space Inspection Record Card and display at CS entrance. Work party may commence work task once PTW has been issued.**

**Carryout RA**

DO NOT ENTER CONFINED SPACE

**Request PTW for external initial gas test**

**No further action**

**Revise Rescue Plan as Appropriate**

**Further Cleaning / Purging Required?**

**See Appendix 6**

**Is Entry Required to Complete the Representative Sample?**

**Develop Rescue Plan**

**Has a Representative Sample of Area been taken?**

**Is Rescue Plan Suitable and Sufficient?**

**Any Lessons Learned?**

**Prepare Site for Entry, Positive Isolate, Purge / Clean**

**External Only Gas Test for: Oxygen and Hydrocarbon vapours**

NO YES

YES

NO

YES

**OK for ENTRY WITH BA?**

NO NO

**OK for ENTRY WITHOUT BA?**

YES YES

YES NO

**APPENDIX 6 - FLOWCHART FOR INTERNAL INITIAL GAS TEST FOR CSE**

**CSE Required**

DO NOT ENTER CONFINED SPACE

**No further action**

**Make progressive entry for representative testing.**

**Has a Representative Sample of Area been taken?**

**Any Lessons Learned?**

**Prepare Site for Entry, Positive Isolate, Purge / Clean**

**Carryout RA**

**Develop Rescue Plan**

NO

**Revise Rescue Plan as Appropriate**

**Is Rescue Plan Suitable and Sufficient?**

YES

**AGT takes PTW for internal initial gas test**

**Gas test for Oxygen and Hydrocarbon vapours**

**Further Cleaning / Purging Required?**

NO

YES

**Record Gas Test Results to appropriate Confined Space Inspection Record Card and display at CS entrance**

**OK for ENTRY WITHOUT BA?**

**OK for ENTRY WITH BA?**

NO NO

YES YES

**Work party may commence work task once PTW has been issued**

YES NO