



Lusail Real Estate Development Company

Health, Safety, Security, Environment, Logistics & Quality Department

Lusail Construction Safety Management Procedure – Confined Space Entry

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1. Description

This element of the Lusail Construction Safety Management Procedures (LCSMP) details the information and processes required for safe entry into confined spaces. This element applies to all Lusail personnel, Contractors, Developers, Consultants, and Subcontractors working on the Lusail projects.

This element does not address specific requirements for related safety and health topics, which are included in the following LCSMP elements:

- [LUS-HSE-WG3-446-001](#) Medical Qualification and Surveillance
- [LUS-HSE-WG3-446-002](#) First Aid
- [LUS-HSE-WG3-446-008](#) Respiratory Protection Program
- [LUS-HSE-WG3-446-011](#) Emergency Planning & Response
- [LUS-HSE-WG3-446-016](#) Signs, Barricades, and Traffic Control
- [LUS-HSE-WG3-446-023](#) Lockout/Tagout
- [LUS-HSE-WG3-446-024](#) Electrical Safety
- [LUS-HSE-WG3-446-028](#) Welding, Cutting, and Brazing
- [LUS-HSE-WG3-446-037](#) Ventilation

2. Definitions

Term	Description
Job Hazard Analysis (JHA)	A process used to identify hazards or potential hazards associated with each step of a job or work plan to uncover hazards and then eliminate, control, or remove them before work is started.
Acceptable Entry Conditions	Conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.
Attendant	An individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space plan. Attendants shall have no other assigned duties while acting as an Attendant.
Authorized Entrant	An employee authorized by the employer to enter a confined space.
Confined Space	A space that: <ul style="list-style-type: none"> • Is large enough and so configured that an employee can bodily enter and perform assigned work; and • Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and • Is not designed for continuous human occupancy
Entry	Action by which a person passes through an opening into a confined space. Includes work activities in the space and is considered to occur when any part of the entrant's body breaks the plane of an opening into the space.
Entry Permit (permit)	Written or printed document provided by the employer to allow and control entry into a permit required confined space.

Term	Description
Entry Supervisor	Person (e.g., employer, foreman, or crew chief) responsible for determining that acceptable entry conditions have been met at a permit required space where entry is planned; for authorizing and overseeing entry operations, and for terminating an entry event as required by this section.
Hazardous Atmosphere	<p>An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (i.e., escape unaided from a permit space), injury, or acute illness from one or more of the following causes:</p> <ul style="list-style-type: none"> • Flammable gas, vapor, or mist in excess of 10% of its lower explosive limit (LEL); • Airborne combustible dust at a concentration that meets or exceeds its LEL (Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet [1.52 m] or less.) • Atmospheric oxygen concentration below 19.5% or above 23.5% • Atmospheric concentration of any substance for which a dose or a Workplace Exposure Limit (WEL) published in EH/40 that could result in employee exposure in excess of its dose or WEL. • Any atmospheric condition immediately dangerous to life or health (IDLH).
Immediately Dangerous to Life or Health (IDLH)	Any condition that poses an immediate or delayed threat to life, or that would cause irreversible adverse health effects, or that would interfere with an individual's ability to escape unaided from a confined space.
Nonpermit-required Confined Space	A confined space that does not contain or have the potential to contain any hazard capable of causing death or serious physical harm.
Oxygen-Deficient Atmosphere	Atmosphere containing less than 19.5% oxygen by volume.
Oxygen-Enriched Atmosphere	Atmosphere containing more than 23.5% oxygen by volume.
Permit-Required Confined Space	<p>A confined space that has one or more of the following characteristics:</p> <ul style="list-style-type: none"> • Contains or has the potential to contain a hazardous atmosphere • Contains a material that has the potential to engulf an entrant • Has an internal configuration such that an entrant could be asphyxiated or trapped by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section • Contains any other recognized serious safety or health hazard
Permit-required Confined Space Plan	A plan to control and protect employees from permit space hazards and to regulate employee entry into permit spaces.
Permit System	Employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.
Prohibited Condition	Any condition in a permit required space not allowed by the permit during the period when entry is authorized.
Rescue Service	Agency, entity or personnel trained and designated to perform rescue of employees from confined spaces.
Retrieval System	Equipment (including a retrieval line, chest, or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue/ retrieval of persons from confined spaces.

Term	Description
Testing	Process by which hazards that may confront entrants of a confined space are identified and evaluated. Includes specifying tests to be performed in the confined space. (Note: Testing allows employers to devise and implement adequate control measures to protect authorized entrants and to determine if acceptable entry conditions are present immediately prior to and during entry.)

3. Responsibilities

The Contractor is fully responsible for the pre-planning, development of Method Statements, Job Hazard Analysis, overall safe work planning and implementation. The Contractor's Project Management is responsible for the assurance that all work is planned and conducted according to the pre-planning document, Contractor and Lusail Health Safety & Environment (HSE) procedures and the Qatar Construction Specifications 2010. Should a conflict occur between procedures/standards or requirements the more stringent will apply.

4. Confined Space Entry Plan

The Contractor shall develop and implement a Project Confined Space Plan in accordance with this LCSMP section.

The Project Manager and HSE Representative shall facilitate implementation and compliance with the Plan.

The Project Manager designates roles and assignments for each entry. Entrants, attendants, Entry Supervisors, and persons conducting air monitoring must be trained to fulfill their respective duties as assigned in the Plan. Personnel and their roles are identified on the permit for each entry.

The Entry Supervisor is responsible for overseeing entry and monitoring employees and subcontractors to ensure compliance with the Plan. An entry supervisor also may serve as an attendant or authorized entrant if he is trained and equipped for each role as required by this section. The duties of entry supervisor may be passed from one individual to another during an entry operation. Contractors must develop and implement a Plan to be submitted to the Supervising Consultant and approved prior conducting confined space entry work on the Lusail Project. The Supervising Consultant shall also require copies of training records for all persons planning to participate in confined space entry activities.

At a minimum, the Confined Space Entry Plan must include the following information:

- Designation and identification of all confined spaces on site
- Measures to prevent unauthorized entry, including barriers, signs and other administrative controls to prevent accidental or unapproved entry
- Procedures to identify and evaluate all potential hazards of confined spaces prior to entry
- Pre-entry briefings conducted by the Entry Supervisor intended to discuss all known and anticipated hazards inside the space(s), air monitoring results, lockouts in place, methods of communication, etc
- Procedures to ensure spaces are continuously ventilated to minimize potential atmospheric hazards to the lowest levels possible.
- Procedures to continuously monitor atmospheric conditions inside spaces for identification of changes which may adversely affect the health of entrants
- Procedures to ensure that all necessary ventilation, communication, and lighting equipment; PPE; barriers; equipment for safe access/ egress; and emergency response rescue equipment and services (personnel) is provided, as determined by the pre-entry evaluation.
- Procedures to ensure that activities conducted by entrants do not exacerbate conditions inside confined spaces, and
- Procedures to ensure all persons are accounted for during all phases of an entry activity.

5. Evaluation of Confined Spaces

The HSE Representative, with assistance from Construction Management, shall evaluate all known and suspected confined spaces on the Lusail Project site using the Confined Space Evaluation Form (Attachment [LUS-HSE-FM4-446-036](#)). The evaluation procedure will allow the Contractor to determine the designation of a space as either non-permit required or permit-required.

Hazards and special requirements pertaining to a specific space, as determined via the evaluation process must be recorded onto the Confined Space Entry Permit (Attachment [LUS-HSE-FM4-446-037](#)) or the Confined Space Downgrade Sheet (Attachment [LUS-HSE-FM4-446-038](#)). This process, and individual permits, shall be conducted/prepared for each space.

The Contractor coordinates additional evaluations if changes are made to the project site that could alter existing spaces or create additional permit-required confined spaces. Changes include any alteration of a space or circumstances that might increase hazards to entrants, such as impaired ventilation, a restricted access/ egress, or use of hazardous materials in the space or adjacent areas as part of the scope of work.

Tanks or similar confined spaces that are to be cleaned must be thoroughly researched to determine the previous contents and effect of these contents on the interior of the tanks, such as corrosion or chemical reactivity, and the structural integrity of the tank.

6. Non-Permit Required Entry

A space which meets the definition of a confined space; however, presents no atmospheric, entrapment, engulfment, physical or environmental hazard to entrants may, in most cases, be classified as a non-permit required confined space designation.

In cases where a space previously designated as “permit required” has been evaluated and shown to be free of substantial hazard, Contractors may downgrade the space classification to “non-permit required” using the Confined Space Downgrade Sheet (Attachment [LUS-HSE-FM4-446-038](#)). In order for a downgrade to occur, the following conditions must be met/ present:

- The space poses no actual or potential atmospheric, entrapment/ engulfment hazards
- The space does not require lockouts to maintain hazard free status
- Hazard elimination inside the space does not require entry into the space
- Work activities inside or nearby the space which may create hazards to entrants inside the space do not exist
- Frequent air monitoring confirms the absence of atmospheric hazards

Should monitoring of a non permit required space indicate that an atmospheric or other substantial hazard exist all entrants shall immediately exit the space. The Contractor HSE Representative and Entry Supervisor shall re-evaluate the space. The evaluation shall determine the cause of the increased hazard inside the space, control measures necessary to safeguard workers, and whether the space must be re-classified as “permit required.” No personnel shall re-enter the space until the Contractor has designated the space according to known hazards, provided a safety briefing to all personnel involved in the entry activity, and prepared a new entry permit specific to the newly identified hazards inside the space.

7. Alternate Entry Procedures

If the only hazard inside a confined space is an actual or potentially hazardous atmosphere which can be successfully controlled with mechanical ventilation, “Alternate Entry Procedures” can be used. The Contractor will document approval on the Alternate Entry Procedures Approval Form (Attachment [LUS-HSE-FM4-446-039](#)). Alternate entry procedures may be approved under the following conditions:

- In accordance with [LUS-HSE-WG3-446-037](#), Ventilation, continuous forced air ventilation alone can maintain the space safe for entry.
- In accordance with [LUS-HSE-WG3-446-009](#), Exposure Identification & Controls, testing and inspection data supports the claim that continuous forced air ventilation can maintain the space safe for entry. Testing data must be available to each employee who enters the space.

- If an initial entry of the permit required space is necessary to obtain the data to support the alternate entry procedure, the initial entry shall be performed in compliance with the Plan specifications for permit required confined space entry.

8. Permit System

Lusail implements a Permit to Work (PTW) Program on site which incorporates confined space entry. The PTW Program is implemented by the Supervising Consultant using Lusail permit records.

Contractors planning to conduct work activities inside spaces meeting the definition of permit required confined spaces shall notify and coordinate with the Supervising Consultant prior to space entry. The Supervising Consultant, Contractor Entry Supervisor, and Contractor HSE Representative shall prepare a Confined Space Entry Permit (Attachment [LUS-HSE-FM4-446-037](#)) for each entry into a permit required confined space that identifies known and anticipated hazards inside the space and the acceptable entry conditions.

The Supervising Consultant shall review and approve (sign) all confined space entry permits prior to the start of entry activities. The duration of the entry permit may not exceed the time required to complete the assigned task, or one ten (10) hour shift, whichever comes first. Upon completion of the task, the Entry Supervisor contacts the Supervising Consultant, who is responsible for terminating the entry permit at the completion of the task or shift.

Any problems encountered during operation are noted on the permit so that the Plan can be revised appropriately. The HSE Representative reviews the entry operations when there is reason to believe that the measures taken under the Contractors Plan may not be sufficient to protect personnel. This review shall include the space evaluation process and Evaluation Form recordings. The HSE Representative revises the Contractor's Plan to correct any deficiencies before subsequent entries are authorized.

9. Permit Space Entry Procedures

9.1 Before Entry

- The Entry Supervisor reviews the entry area immediately before entry and identifies new hazards that could be introduced by the planned work activity(s). Examples include use of hazardous and/ or flammable materials, ignition sources, or any other condition in the space that could present a threat to human health or safety. These hazards are listed on the permit in addition to those previously identified.
- The Entry Supervisor posts the approved entry permit at the entry portal before entry so that authorized Entrants can confirm that pre-entry preparations are complete and requirements have been met.
- If hot work is to be performed, fill out a Hot Work Permit (Attachment [LUS-HSE-FM4-446-063](#)) in accordance with, Welding, Cutting, and Brazing. At no time shall fuel gas cylinders be introduced into confined spaces.
- The Entry Supervisor has the following responsibilities:
 - Identify and isolate all potentially hazardous energy sources connected to the space per [LUS-HSE-WG3-446-023](#), Lockout/Tagout (LOTO). Potential energies must be relieved prior to entry.
 - Ensure that all special conditions of the Entry Permit are met.
 - In accordance with [LUS-HSE-WG3-446-016](#), Signs, Barricades, and Traffic Control, post signs near permit spaces notifying employees of the hazards present and stating that only authorized personnel may enter the confined space area.
 - Set up emergency and rescue equipment according to the permit. Ensure the confined space rescue team/service is in place.
 - Purge, flush, or ventilate the permit space as necessary to eliminate or control atmospheric hazards, in accordance with [LUS-HSE-FM4-446-037](#), Ventilation.
 - Monitor the space atmosphere for oxygen content, gas and vapor concentrations, flammability, and potential toxic contaminants in accordance with [LUS-HSE-WG3-446-009](#), Exposure Identification & Controls.
 - Ensure adequate access and egress is provided.
 - Ensure an effective method of communication between entrants and attendant(s) is provided and communicated to all personnel involved in the entry activity.
 - Post a trained Attendant outside the permit space for the duration of entry.

9.2 During Entry

- The Entry Supervisor and Attendant monitor the entry for deviations to the permit requirements or Contractors Plan.
- Conduct periodic atmospheric monitoring of the space interior and record the results on the Entry Permit (Attachment [QDC-HSE-FM4-446-037](#)). Where continuous gas monitors are worn by Entrant(s), the Entrants must communicate the readings to the Attendant at least every thirty (30) minutes.
- The Entry Supervisor stops work inside the space, evacuates the space, and suspends the entry permit in the event of any instrument alarm, unsafe condition, or observation of symptoms of worker exposure to hazards. Supervising Consultants shall be summoned to the space in this instance.

10. Potential Hazards

10.1 Presence of Flammable Liquids, Vapors, or Dust

- If the prior contents of a confined space were flammable or combustible, all electrical equipment introduced into the space must be explosion safe.
- Hand tools should be constructed of brass, rendering them non-sparking.
- Contractor must evacuate all spaces where the concentration of flammable gases in air exceeds 10% of the LEL. Where < 10% LEL concentrations are evident, the above controls must be mandatory.
- Tanks that have contained hydrocarbons or other chemicals create special problems based on residue or scale buildup on tank walls that could emit toxic and/or flammable vapors.
- Entrapment of flammable or toxic material behind a liner wall and inside the outer wall of double-walled or insulated tanks may present special problems for fire prevention.
- Sulfur deposits usually build up on the underside of a tank ceiling; workers must wash down the roof before performing any heat-producing work.
- Workers must inspect for leakage from or around hollow roof supports, unsealed sections of foam chambers, pontoons, heating coils, the tank interior and lining, and other absorbent materials.
- Workers must be aware of hydrogen sulfide (H₂S, commonly called sour gas), which has a rotten egg odor. The safe exposure level of hydrogen sulfide is lower than the odor threshold. Prolonged exposure to even low concentrations may be fatal.
- A tank that once contained leaded gasoline and is later used to store other products without cleaning is always considered lead hazardous.
- Sludge may contain lead for an indefinite period. Sludge from tanks that stored leaded gasoline must be kept wet until disposal.
- A tank cannot be considered free of lead hazard until:
 - Sludge has been removed.
 - Loosely adherent material has been scraped from all surfaces that have been in direct contact with the sludge and the material has been removed from the tank.
 - The tank has been steam cleaned, swept free of liquids, and thoroughly ventilated after the foregoing operations.

10.2 Immediately Dangerous To Life And Health (IDLH) Conditions

- Contractors shall never work in IDLH conditions inside confined spaces. The Supervising Consultants shall not approve permits for work inside IDLH confined spaces.
- IDLH atmospheres shall warrant immediate space evacuation and permit suspension. The Supervising Consultant must be summoned to the space in this instance.
- Contractor shall implement all necessary controls to eliminate potential for IDLH conditions to arise in confined spaces on the Lusail Project.

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- Contractors should eliminate sources of toxic gases from all areas adjacent to confined spaces; i.e., internal combustion engine type vehicles and equipment.

10.3 Fire/ Electrical Hazards

- Disconnect or blank off any pipelines connected to the space. Double valve protection with a drain cock monitor is an alternate but less desirable method and requires compliance with lockout procedures.
- If atmospheric checks detect LEL concentrations in excess of 10%, install non-sparking or explosion safe electrical devices (e.g., lamps, tools, fixtures, and switches).
- Inspect extension cords, lighting, and static electricity sources for defects.
- Use air tools at all times possible when there is potential for flammable gases or vapors inside the space.

10.4 Physical and Personnel Hazards

- Workers must be physically fit and able to work inside confined spaces. Only healthy personnel should be tasked with confined space work activities.
- Mechanical ventilation must be capable of successfully minimizing temperatures and humidity inside spaces to safe levels.
- Access and egress provided shall not create excessive hazard to entrants. Access must be large enough support space required for extraction of an unconscious worker and the equipment he is wearing.
- Decontamination procedures must be followed where applicable per the Lusail Waste Management Plan (Rev. 3).

11. Rescue and Emergency Services

- The Contractor must provide for emergency confined space rescue. Rescue services may be provided internally by trained Contractor staff or contracted from an external agency that specializes in confined space entry rescue. Rescue services provided must be in accordance with [LUS-HSE-WG3-446-011](#), Emergency Planning & Response.
- The Entry Supervisor shall coordinate all emergency procedures for the specific space prior to entry. This information must be indicated on the permit and communicated to all personnel involved in the entry.
- The Qatar Civil Defense (Fire Department) is not adequately trained and equipped for emergency rescue from most types of confined spaces found on the Lusail Project.
- The Contractor must provide mechanical retrieval equipment specific to the orientation and design of the spaces they are entering and working in. Equipment must be readily available on site for use by rescue personnel.
- Contractor shall use non-entry rescue methods and equipment at all times possible.
- Emergency and rescue/ retrieval equipment must be serviced and maintained per manufacturer's instruction and other components of the LCSMP.
- If an injured entrant is exposed to a substance that requires an MSDS or other similar written information to be kept at the worksite, make that information available to the medical facility treating the exposed entrant in accordance with [LUS-HSE-WG3-446-001](#), Medical Qualification and Surveillance.
- To develop and practice appropriate rescue plans and operations, The Contractor and emergency rescue service/ team shall perform regular (bi-annual) drills/ training exercises in select permit required spaces. Medical providers and Lusail should be invited to participate in such drills.

12. Training

All employees must be adequately trained for confined space entry. Training should be consistent with the type and designation of spaces being entered, as well as the scope of work in each space.

Personnel shall be instructed not to enter any space designated as a confined space without prior approval from the HSE Representative and/ Project Manager.

Employees required to enter permit-required confined spaces or to act as an Attendant or Entry Supervisor must be trained for the safe performance of assigned responsibilities and duties, per this Plan.

Employees/ Entrants must be familiar with the types of hazards they might encounter during entry and understand the modes, signs, symptoms, and consequences of exposure to hazards present inside spaces.

- Training is provided under the following circumstances:
 - Before an employee is assigned confined space duties
 - Before a change in assigned confined space duties
 - Before a change in the scope of work that presents a hazard(s) not previously included in prior training
 - When there are deviations from or violations of procedure, or inadequacies in the employee knowledge or performance
- Entrants receive training on the following topics:
 - Methods to communicate with Attendants and the means that the attendants use to notify Entrants of emergencies
 - Operation of any specialized equipment Entrants are expected to use
 - Evacuation signals and procedures and the requirements for notifying the Attendant and evacuating the confined space for any reason
- Attendants receive training on the following topics:
 - Procedures to monitor inside and outside the permit-required confined space
 - Procedures to communicate with Entrants. Knowledge of signals.
 - Procedures to identify and maintain an accurate count of authorized Entrants in the permit space
 - Procedures to evacuate Entrants from the permit-required confined space and the conditions that require evacuation
 - Procedures to control access to the permit-required confined space and to warn unauthorized people away from the space
 - Responsibility to remain outside the permit-required confined space during entry, unless they are relieved by another authorized Attendant
 - Non-entry rescue procedures
- Entry Supervisors receive training on the following procedures:
 - Verifying that the permit has been completed properly.
 - Verifying that all tests specified by the permit have been conducted.
 - Verifying that all procedures and equipment specified by the permit are in place before allowing entry.
 - Determining if conditions are acceptable for entry.
 - Verifying that rescue services are available and notifying those services of a need for a rescue.
 - Authorizing entry.
 - Supervising entry operations and determining that they remain consistent with the entry permit and that acceptable entry conditions are maintained.
 - Removing unauthorized individuals.
 - Terminating entry.

13. Documentation

The Contractor shall maintain all terminated confined space entry permits must be maintained for at least one (1) year. At least annually, the Contractor must review terminated permits covering the past twelve (12) months of site activity and revise the confined space entry plan, as necessary.

The records custodian documents all confined space plan instruction, training, and re-training records. Contractor management maintains these records at the site for the duration of the project and archives them for a minimum retention time of 10 years from creation date.

14. References

Qatar Construction Specifications 2010 Section 1 Part 10.3.6 “Warning Signs” & 10.3.7 “Confined Spaces”

Qatar Construction Specifications 2010 Section 1 Part 10.7 “Welfare of Workmen”

Qatar Construction Specifications 2010 Section 11 Part 1.5.5 “Working in Confined Spaces”

15. Attachments

LUS-HSE-FM4-446-036	Confined Space Evaluation Form
LUS-HSE-FM4-446-037	Confined Space Entry Permit Form
LUS-HSE-FM4-446-038	Confined Space Downgrade Sheet
LUS-HSE-FM4-446-039	Alternate Entry Procedures Approval Form