

Confined Spaces – Definitions, Regulations and Statistics

Description

Confined spaces may present hazardous physical and atmospheric working conditions. It is the responsibility of the employer to ensure these hazards are recognized and mitigated prior to work being conducted within the confined space, and in compliance with relevant local or national regulations.

Scale of the problem – injuries and fatalities within Confined Spaces

Accurate and up to date statistics on near misses, injuries and fatalities in confined space are difficult, if not impossible to find.

In the US, confined space fatalities only are recorded. However, changes in definitions, industries or activities within scope mean that statistics can be problematic to analyse. European countries do not classify injuries or fatalities by confined space in their reporting statistics. Statistics from a US study looking at fatalities, causes and victims between 2005 and 2009 is oft quoted and helps to give a sense of the scale of the problem.

What limited data is available does support one clear conclusion: every year many people die or are seriously injured entering and working within confined spaces, with many incidents resulting in multiple fatalities, including would-be rescuers.



**Deaths occur
each year – 96
in the USA alone**

(averaged per year,
based upon data from
OSHA for years 2005-
2009)

Sources:

<https://www.rocorescue.com/roco-rescue-blog/confined-space-fatalities-a-closer-look-at-the-numbers#.XKkuxFMzbOQ>

Figure 1 – Number of confined space fatalities in the USA (2005-2009)

! IMPORTANT NOTE

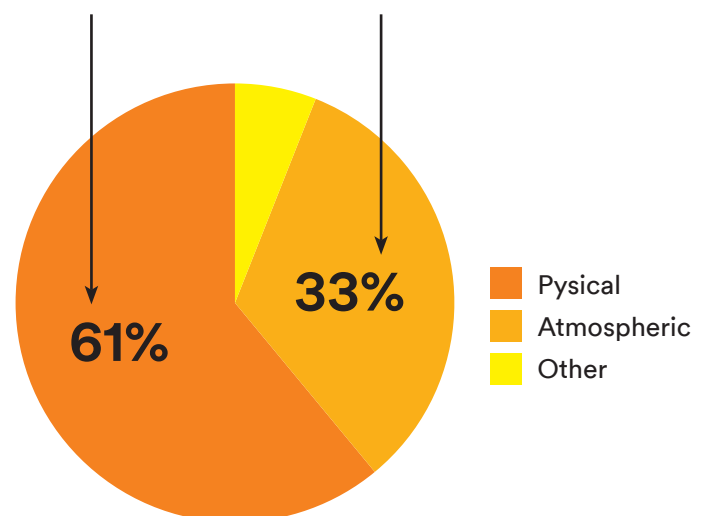
This document is only a summary of some regulations that may be applicable in the Europe, Middle East and Africa region. The regulation landscape is summarised, but the reader is strongly encouraged to review and understand all relevant local or national regulations applicable in the country of operations prior to attempting any confined space entry. The introduction or preamble to most regulations, as well as the web pages of issuing national regulators are additional sources of information that should be consulted to help ensure a complete understanding of relevant regulations.

61% from Physical Hazards

engulfment, falls, “Stuck by”,
electrocution, heat, etc.

33% from Atmospheric Hazards

toxic chemicals, oxygen deficiency,
combustible dusts, fires, etc.



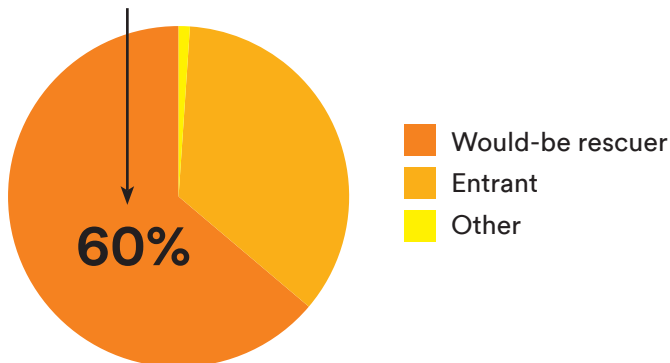
Sources:

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Figure 2 - Main causes of confined space fatalities in the USA (2005-2009)

In multi-fatality incidents reviewed, 60% of deaths are would-be rescuers:

- More people die attempting to rescue others than afflicted entrants



Sources:

<https://www.ohsonline.com/articles/2018/08/01/we-must-change-the-statistics-of-confined-space-injuries-and-fatalities.aspx>

Figure 3 – Fatalities of ‘would-be rescuers’ (2005-2009)

General Definition of Confined Spaces

A review of different workplace confined space programs and applicable regulations finds that throughout the diverse regions of the world confined space are not all defined in the exact same fashion. Despite the differences in wording, there are commonalities to most of the various definitions for confined spaces.

Generally speaking, a confined space is a partially or fully enclosed space which contains the following five characteristics:

Characteristic #1 – Is large enough and configured such that a person can bodily enter & perform work.

In order for this space to present a danger to a person, it must be big enough to allow the person to enter fully or partially into the space. For example, the fuel tanks located in the wings of a passenger aircraft are large enough to permit a worker to partially enter the space, but in some cases are not large enough to allow a complete entry due to the instrumentation within the tank.

Characteristic #2 – Has limited or impeded openings for entry and exit

This is generally taken to mean that there are only one or two ways in and out of the area, or that getting in and out is unusually difficult. For example, entering a vessel through a hatch may require squeezing or crawling through a tight space or small opening.

Characteristic #3 – Is not designed for continuous human occupancy.

If a space was never designed for people to work inside of it for long periods of time, it might not possess the conditions necessary to support human life. For example, a worker could enter and remain within a well-ventilated sewer system for several hours safely, but the sewer system is not designed to support human life for several consecutive weeks of occupancy.

Characteristic #4 – The provision of emergency response services is compromised.

This describes spaces in which the internal configuration of that space could impede or delay the provision of first aid and rescue services. For example, a worker rendered unconscious inside of an air duct system may require a complex and lengthy rescue system to be extracted from the maze-like structure before first aid can be administered.

Characteristic #5 – Contains a hazard which may pose an illness or injury.

This relates to spaces which have a hazard, or may have a hazard introduced, based on its location, design, construction, contents or atmosphere. These hazards may also be caused by materials or substances present in the space before entry or by ones brought into the space by a worker completing a task. For example, the sparks generated from grinding work completed within a vessel can cause an explosion if an oxygen-enriched atmosphere exists within the vessel.

It is worth noting that a space can become confined space due to the task being performed within it and the creation of a new or temporary hazard. For example, a space which is enclosed but is otherwise not normally classified as a confined space can become a confined space when solvent cleaning chemicals, welding or other hot-work or spray-painting work is undertaken inside.

Intentional or unintentional environmental changes can affect the classification of some spaces, changing them into confined spaces. For example, heavy rain can lead to flooding of basements or tunnels. Perishable goods or flammable materials may be stored with an inert atmosphere that presents an atmospheric hazard.

National Definitions of Confined Spaces

The differences in national regulations can present a challenge for multi-national companies seeking to comply with all applicable regulations. Many of the published articles, journal papers, text books and manuals on confined space were published in North America, and this can also lead to confusion over definitions and terminology. Although there is general commonality, there are clear technical differences between some countries in terms of definitions and in regulatory requirements. Multi-national companies therefore may need to create their own corporate policies that ensure commonality and local compliance across all their sites.

United Kingdom & Republic of Ireland

Both the UK and Republic of Ireland have specific confined space regulations, and the two are very similar in terms of definitions, scope and approach. The UK HSE Confined Space Regulations 1997 - HSE Approved Code of Practice and guidance and the Irish H&SA Code of Practice for Working in Confined Spaces define confined spaces in similar terms as being:

1. A space that is substantially (though not always entirely) enclosed, and
2. Contains one or more of the specified risks must be present or reasonably foreseeable.
 - fire or explosion (gas, vapour, dust, excess of oxygen);
 - loss of consciousness of any person at work arising from an increase in body temperature;
 - loss of consciousness or asphyxiation of any person at work arising from gas, fume, vapour or the lack of oxygen;
 - drowning due to the level of a liquid; or
 - asphyxiation from entrapment by a free flowing solid;

It is worth noting that in both the UK and Ireland, the specified risks detailed in the regulatory definitions cover the most common risks across industrial confined spaces. However, the regulations in both the UK and Ireland both recognise that this list is not exhaustive as many other serious hazards are commonly found in confined spaces, including:

- Biological risks typically from decaying organic materials or the presence of vermin
- Physical risks not covered above, including electricity, mechanical equipment, radiation, stored energy, cold temperatures, vibration, noise, air of fluid pressure
- Configuration risks from the design, shape or dimensions of the space that may limit safe access into, movement within, egress from the space.

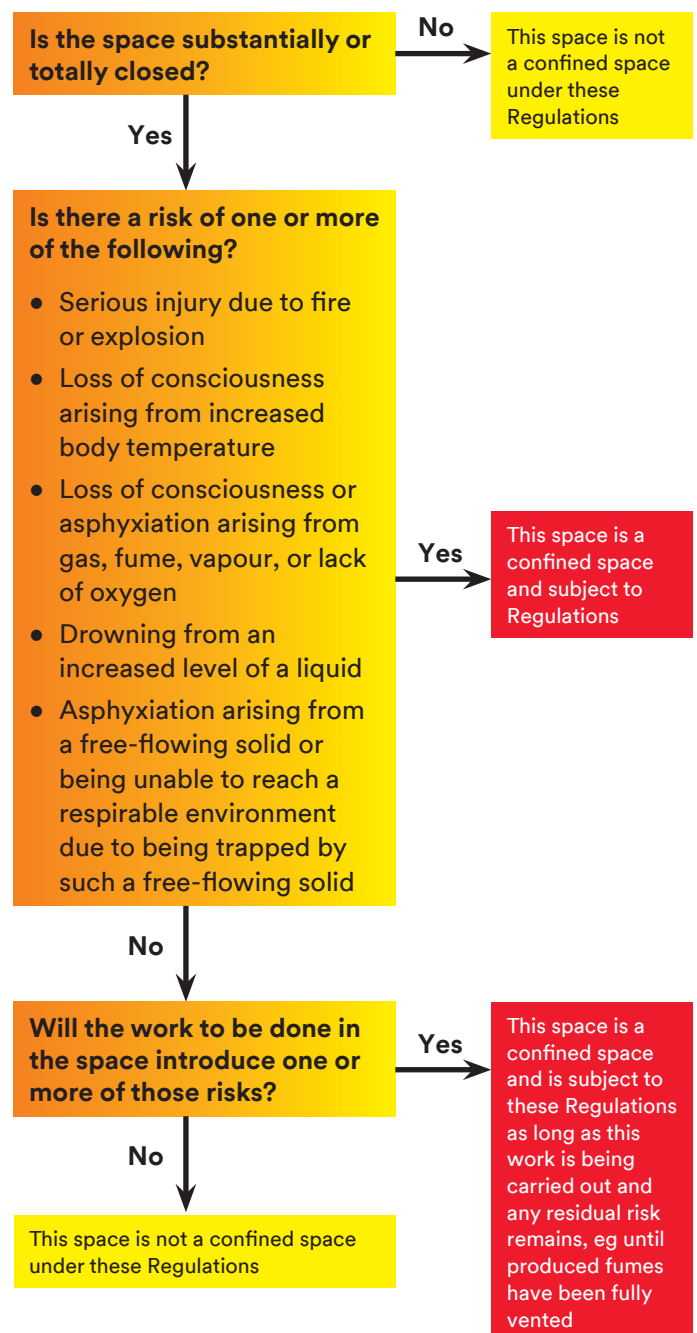


Figure 4 – “Is the area a confined space?”

(Reproduced from UK Health & Safety Executive (HSE) Confined Spaces Regulations 1997 - Approved Code of Practice and guidance - L101, third edition, published 2014)



Germany

According to the Deutsche Gesetzliche Unfallversicherung (DGUV) Regel 113-004 Behälter, Silos und enge Räume - Teil 1: Arbeiten in Behältern, Silos und engen Räumen confined spaces in Germany are defined as being:

1. A space that is substantially (though not always entirely) enclosed with solid walls, and
2. Have little or no air exchange, and
3. Specified hazards that exist within or may arise within the space due to substances, preparations, impurities, facilities or work being undertaken.
 - Chemicals
 - Hazardous atmospheres
 - Chemical reactions
 - Oxygen deficiency
 - Oxygen enrichment
 - Hot substances or preparations
 - Biological agents
 - Fire or explosion
 - Engulfment
 - Mechanical systems, including closing or opening fixtures
 - Hot or cold components
 - Electricity and electrical equipment
 - Radiation
 - Configuration hazards such as ladders, scaffolds, baffle plates, complex structures or floor levels
 - Mental stress caused by hazards such as spatial closeness, large drops or heights, etc.

France

According the L'Institut national de recherche et de sécurité (INRS) document ED 6184 Les espace confinés – Assurer la sécurité et la protection de la santé des personnels intervenants a confined spaces in France are defined as being:

1. A totally or partially enclosed space (building, structure, equipment, installation ...) that:
2. has not been designed and constructed to be permanently occupied by or intended to be occupied by persons, but which may from time to time be temporarily occupied for performing maintenance, repair, cleaning, punctual and more or less frequent, or unscheduled operations following exceptional events,
3. and in which the atmosphere can pose risks to the health and safety of people who enter because of:
 - the design or location of the work,
 - either a lack of natural ventilation,
 - the substances, substances or fluids it contains or used therein,
 - the equipment used therein,
 - the nature of the work carried out therein.

United States

According to the Occupational Safety and Health Administration (OSHA) confined spaces in the USA are defined as:

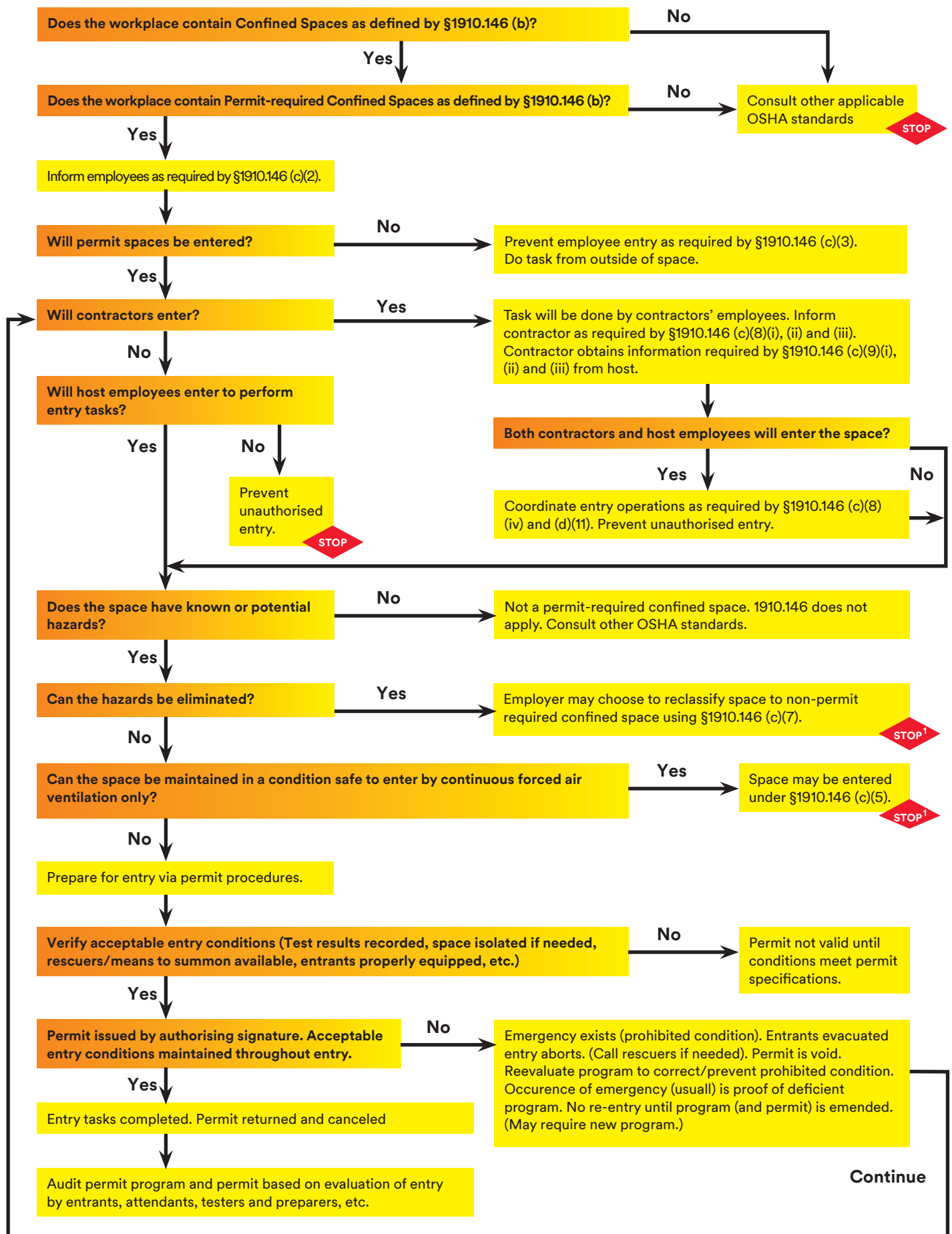
1. Is large enough and so configured that an employee can bodily enter and perform assigned work; and
2. Has limited or restricted means of entry or exit; and
3. Is not designed for continuous employee occupancy.

OSHA also uses the term “permit-required confined space” (permit space) to describe a confined space that has one or more of the following characteristics:

- contains or has the potential to contain a hazardous atmosphere;
- contains material that has the potential to engulf an entrant;
- has walls that converge inward or floors that slope downward and taper into a smaller area which could trap or asphyxiate an entrant;
- or contains any other recognized safety or health hazard, such as unguarded machinery, exposed live wires, or heat stress.

Figure 5 Permit Required Confined Spaces

(Reproduced from US Occupational Safety and Health Administration (OSHA) Appendix A to §1910.146 -- Permit-Required Confined Space Decision Flow Chart) <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.146AppA>



¹ Space may have to be evacuated and re-evaluated if hazards arise during entry

Furthermore, OSHA has published two confined space standards:

- The scope of 29 CFR 1910.146 includes all general industry. It does not apply to construction, agriculture or shipyard.
- The scope of 29 CFR 1926.1200-1213 applies to all of construction, except for certain excavations, underground works and diving. This standard also has five differences from the standard for general industry:
 1. Requires more detailed provisions with regards to coordinated activities when there are multiple employers at the worksite to ensure hazards are not introduced into a confined space by workers performing tasks outside the space.
 2. Requires a competent person to evaluate the work site and identify confined spaces, including permit spaces.
 3. Requires continuous atmospheric monitoring, whenever possible.
 4. Requires continuous monitoring of engulfment hazards.
 5. Allows for the suspension of a permit, instead of cancellation, in the event of changes from the entry conditions listed on the permit or an unexpected event.



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