



SAFETY ASSESSMENT
FEDERATION

Guidelines

Pressure Systems

Guidelines for the application of a safe system of work for entry into a confined space

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1. INTRODUCTION

Engineer Surveyors have been gaining entry into pressure vessels, for completing an examination, since 1854 when the Manchester Steam Users Association was formed.

The associated risks of entry into a confined space have always been clearly understood by the inspection bodies, however it is only in the last few decades that formally documented safe systems of work have been developed to ensure that these risks were reduced to as low as was considered reasonable.

The Confined Spaces Regulations (CSR) 1997 came into force on 28 January 1998 under the Health and Safety at Work etc. Act 1974 and apply in all premises and work situations where that act applies. This document covers subsequent updated editions, (latest revision 2014)

To assist in the development of this document the standard approach or guidance provided by SAFed members has been taken into account along with the views of other interested parties.

2. PURPOSE

To provide a safe system of work for application during entry into a confined space or restricted space e.g. a pressure vessel, boiler, storage tank etc. for carrying out an examination or other related activity.

3. GENERAL WORK ACTIVITIES

All sites/locations and all work activities produce their own levels of risk giving rise to the potential for danger. This safe system of work has been developed to address those risks associated with entry into confined spaces. For other identified risks not associated with entry into confined spaces reference shall be made to the site responsible person.

4. FURTHER GUIDANCE ON SPECIFIC WORK ACTIVITIES

The following guidance relates to the specific work activity that is required to enable the Engineer Surveyor to complete entry into a confined space in a safe manner.

- Confined Spaces Regulations 2014.
- HSC Approved code of practice, regulations and guidance “Safe work in confined spaces”.
- SAFed Guidance PEC02 – Size of access openings in boilers and pressure vessels.

5. ADDITIONAL CONSIDERATION

It should be noted that risk will not be entirely eliminated by the adoption of a safe system of work however it will be controlled in a way that will maintain a safe working environment. Whilst on site every Engineer Surveyor should be aware that their safety is also the concern of the Owner / User.

Under no circumstances should any Safe System of Work, as detailed, be compromised to give rise to danger.

6. GENERIC RISK ASSESSMENT Potential Outcome

The potential outcome (severity) of the harm associated with the identified hazard can be quantified using the following six point scale:

1. Trivial injury
2. Minor injury
3. Major injury to one person
4. Major injuries to numerous persons
5. Death of one person
6. Multiple deaths

Probability

The probability (frequency) of the harm occurring can be quantified using the following six point scale:

1. Highly Unlikely
2. Unlikely
3. Possible
4. Occasional
5. Frequent
6. Common

Risk Ranking

Dependant on the scoring of both potential outcome and probability risk ranking is as follows:

Very Low	1 – 5
Low	6 – 9
Moderate	10 – 14
Substantial	15 – 23
High	24 – 36

This risk assessment addresses the dangers from asphyxiation or intoxication due to ingress of fumes and/or gases or oxygen depletion.

Work Activity	Obtaining entry into a confined space
Persons at Risk	Engineer Surveyor Accompanying Person(s)
Property at Risk	None
Hazard	Asphyxiation or intoxication due to ingress of fumes and/or gases or oxygen depletion.

Prior to Safe System of Work Application		
Probability	Potential Outcome	Risk Ranking
2	5	10 (Moderate)

Control measures:		
Adherence to the Safe System of Work – Entry into a Confined Space		
Safe System of Work Application		
Probability	Potential Outcome	Risk Ranking
1	5	5 (Very Low)

This risk assessment addresses the dangers to an individual within confined spaces suffering a medical emergency e.g. Cardiac arrest.

Work Activity	Obtaining entry into a confined space
Persons at Risk	Engineer Surveyor Accompanying Person(s)
Property at Risk	None
Hazard	Asphyxiation or intoxication due to ingress of fumes and/or gases or oxygen depletion.

Prior to Safe System of Work Application		
Probability	Potential Outcome	Risk Ranking
2	5	10 (Moderate)

Control measures:		
Adherence to the Safe System of Work – Entry into a Confined Space		
Safe System of Work Application		
Probability	Potential Outcome	Risk Ranking
1	5	5 (Very Low)

This risk assessment addresses the dangers to an individual within confined spaces suffering a medical emergency e.g. Cardiac arrest.

Work Activity	Obtaining entry into a confined space
Persons at Risk	Engineer Surveyor Accompanying Person(s)
Property at Risk	None
Hazard	Individual within confined space suffering a medical emergency e.g. Cardiac arrest.

Prior to Safe System of Work Application		
Probability	Potential Outcome	Risk Ranking
2	5	10 (Moderate)

Control measures:		
Health Self-assessment by individual entering confined space i.e. The Engineer Surveyor shall not enter a confined space unless he feels well enough to do so.		
Safe System of Work Application		
Probability	Potential Outcome	Risk Ranking
1	5	5 (Very Low)

Justification of stated probability of harm:

SAFed member companies employ approx. 500 Engineer Surveyors who are routinely involved in carrying out examinations within confined spaces i.e. an average of 2 entries / week.

It can be therefore considered that approximately 50,000 confined space entries made per annum.

Since 1980 when records began up to the date of publication, there has been no recorded instances of either of the stated hazards being realised.

Number of entries made since 1980 = 35 x 50,000 = 1,750,000 entries

Therefore 0 instance in 1750000 entries. Probability therefore considered as **Unlikely**.

7. SITE SAFETY ASSESSMENT General considerations

For the purposes of this document

“work” is defined as performing an examination or other related activities.

“confined space” means any place, including any chamber, tank, vat, silo, pit, trench, pipe, sewer, flue, well or other similar space in which, by virtue of its enclosed nature, there arises a reasonably foreseeable specified risk;

“specified risk” means a risk of —

- A. serious injury to any person at work arising from a fire or explosion;
- B. without prejudice to paragraph (a)
 - 1. the loss of consciousness of any person at work arising from an increase in body temperature;
 - 2. the loss of consciousness or asphyxiation of any person at work arising from gas, fume, vapour or the lack of oxygen;
- C. the drowning of any person at work arising from an increase in the level of liquid; or
- D. the asphyxiation of any person at work arising from a free flowing solid or the inability to reach a respirable environment due to entrapment by a free flowing solid;

Requirement

A site safety assessment is to be carried out prior to entry into a confined space.

Note: The fact that a hazard exists should not in itself prevent the entry into the confined space. Consideration should be given to the acceptability of the action taken to mitigate or minimise the risk to a level considered “as low as is reasonably practicable”.

Purpose

The purpose of the site safety assessment is to ensure that any hazard involved in the entry into a confined space is recognised and the appropriate action taken to eliminate or control the risk associated with that hazard.

Findings

The findings of the site safety assessment shall be recorded in examination records.

Scope of assessment

The Engineer Surveyor must consider all points raised whilst undertaking the risk assessment and decide if the confined space is safe to enter. Any areas of uncertainty need to be addressed with the Owner / User to the satisfaction of the Engineer Surveyor before entry is made.

8. ENTRY INTO A CONFINED SPACE — THE SAFED APPROACH

Requirement to enter

The Confined Spaces Regulations state that no person at work shall enter a confined space to carry out work for any purpose unless it is not reasonably practicable to achieve that purpose without such entry. The approach taken by SAFed is that entry should be gained into the confined space, for the purpose of examination, unless it is not considered safe or feasible to do so and a suitable alternative technique exists.

Safe System of Work — Responsibilities

It is the responsibility of the Owner / User to have a suitable safe system of work in place for the entry into the confined space. In all cases an assessment shall be carried out by the Engineer Surveyor to establish that all elements of the Safe System of Work have been complied with.

9. SAFE SYSTEM OF WORK

The Engineer Surveyor should satisfy themselves that the safe system of work provided by the Owner / User is suitable or where a safe system of work has not been prepared, and the Engineer Surveyor wishes to proceed with the examination then reference shall be made to the guidance in 9.1 to 9.23.

9.1. Local Supervision (of Confined Space entry)

The Engineer Surveyor shall establish that an appointed responsible person is present whilst the work is being undertaken. This person will also undertake the role of “stand by man”.

9.2. Training

The Engineer Surveyor shall not enter a confined space unless appropriate training has been undertaken.

9.3. Stand by man

The Engineer Surveyor shall establish that the appointed “stand by man” understands his responsibilities and the action that is necessary in the event of an emergency.

The role of the ‘stand by man’ will include, but not restricted to, the following:

- To raise the alarm in the event of an emergency.
- To maintain communication with those working within and those outside the confined space.

Under no circumstances must the stand by man enter the confined space or otherwise leave or be distracted from his position whilst work is being carried out within the confined space.

9.4. Communication

The Engineer Surveyor shall establish that an agreed adequate communication system, between those within the confined space and those outside, is in place at all times whilst his examination is being undertaken within the confined space.

9.5. Testing the atmosphere

The Engineer Surveyor shall establish that the User / Owner has taken appropriate steps to ensure that the atmosphere within the confined space is safe to enter. This may require the atmosphere to be tested as a one off exercise or as a continuous operation as deemed necessary. In confined spaces in which a hazardous gas, fume or vapour may exist then the atmosphere shall be tested, by the Owner / User, to ensure that that the confined space is safe to enter. If this is not carried out then entry shall not be undertaken.

9.6. Gas purging

Purging is the responsibility of the Owner / User and shall be carried out with inert gas where the gas is flammable. Following purging with inert gas the confined space must be adequately ventilated and the atmosphere tested for concentration of oxygen prior to gaining entry.

It may be necessary to provide forced ventilation to remove the inerting gas and in the case of removing toxic fumes. Care should be taken to ensure that no pockets of inert gas remain.

Following purging of toxic gases with air it will be necessary to carryout tests to ensure that the concentration of toxic gases and oxygen are acceptable.

9.7. Ventilation

Where the risk assessment or the testing of the atmosphere within the confined space identifies that it is enclosed to the extent that mechanical ventilation will be required to provide sufficient fresh air to replace the oxygen as it is being used up by those working in the confined space etc. then such ventilation shall be provided taking into account the size of the vessel and the time to be spent inside. In circumstances where this is necessary then the fresh air should be drawn from a point where it is not contaminated either by used air or other pollutants.

Continuous testing of the confined space will be required in this case.

9.8. Removal of residues

The User / Owner shall ensure that the confined space is clean and free from all residues that will either impede the examination or present a danger.

9.9. Isolation from gases, liquids and other flowing materials

The Engineer Surveyor shall establish that all systems, to which the confined space is attached, are isolated to prevent the ingress of any substance that could present a risk. Consideration should be given to the use of blanking plates or complete disconnection.

Note: Single valve isolation is generally not considered sufficient.

9.10. Mechanical & Electrical isolation

The Engineer Surveyor shall establish that any electrical or mechanical equipment which could affect safety in the confined space (not associated with the examination activity e.g. lighting, drive motors on rotating equipment, stirrer gear, burner motors) is suitably isolated from all sources of power. Equipment that is free to move should be suitably secured. Consideration should be given to use of a suitable lock off kit and appropriately worded notice to prevent operation etc.

9.11. Other Considerations

Some equipment may be fitted with level controls or other equipment emitting ionising radiation or microwaves etc. These system should be suitably prevented from operation during entry.

9.12. Suitability of equipment

The Engineer Surveyor shall establish that any equipment provided for use in the confined space is suitable for its purpose e.g. to prevent electric shock the use of separated extra low voltage (SELV) equipment.

Note: see BS 7671: latest edition for the full definition.

9.13. PPE & RPE

The Engineer Surveyor shall establish that personal protective equipment and/or respiratory protective equipment to be used is suitable for its purpose, in good condition and worn at all times.

9.14. Petroleum or gas fuelled equipment

Petroleum or gas fuelled equipment shall not be used in or near a confined space. The User / Owner shall check installed gas equipment (including pipelines) local to the confined space for gas leaks before gaining entry to the confined space.

9.15. Gas supplied by pipes etc.

Engineer Surveyors shall avoid gaining entry into confined spaces where others are using pipes and hoses for conveying oxygen, flammable or oxygen depleting gases for the purpose of welding and burning etc. unless additional precautions are taken.

9.16. Access and egress

The Engineer Surveyor shall establish that safe access and egress is provided. The size of the opening into the confined space shall be adequate. The use of rescue harnesses, especially when attached to a safety line, may impose additional hazards i.e. snagging or catching on internal fittings and attachments preventing free movement within the confined space.

Consideration should also be given to obstructions or restrictions on both sides of the opening which may impede access or egress.

9.17. Size of Openings

With the exception of certain special cases, the designs of boilers and confined spaces have normally incorporated manholes substantially smaller than the guidance given in the Confined Spaces Regulations. For entry into these items of plant, safe systems of work can be devised using conventional openings and the fitting of larger openings is generally not considered necessary.

Additional guidance is provided in SAFed Guidance PEC02 – Size of access openings in boilers and pressure vessels.

Should the size of opening not be of sufficient size to allow entry then the Engineer Surveyor shall consider the points raised in Section 8 — Requirement to Enter.

9.18. Fire prevention and static electricity

The User / Owner shall ensure that no flammable or combustible materials are within the confined space before entry is gained. Entry into a confined space, in which an explosive atmosphere exists, shall not be made without a detailed risk assessment being carried out in support of the development of a suitable permit to work.

9.19. Lighting

The Engineer Surveyor shall establish that adequate lighting is provided for the purpose of safe access and egress as well as for the purpose of the examination being undertaken and that the electrical supply is from an SELV system.

9.20. Smoking

Notwithstanding that smoking is no longer permitted in the workplace, smoking will always be prohibited within a confined space.

9.21. Health

The Engineer Surveyor shall not enter a confined space unless they are in good health. Refer to Risk Assessment BO2, the risk assessment should determine entry requirements.

9.22. Emergencies and rescue

The arrangement for the rescue of persons in the event of an emergency needs to be suitable and sufficient. Arrangements for emergency rescue will depend on the nature of the confined space, the risks identified and the likely nature of an emergency rescue.

Unless specified risks (as defined in Regulation 1 of the Confined Spaces Regulations 2014) are foreseeable then, as a minimum, the rescue arrangements shall be the provision of a suitably trained stand by man. It is acknowledged that it could be difficult to remove someone from the confined space in a medical emergency therefore consideration should be given, by those affecting the rescue, to provide treatment in-situ, providing it is safe to do so.

9.23. Temperature

There are no specific limitations to working temperature however 35°C is considered by SAFed members to be the maximum temperature that should exist in a confined space although this will vary depending on the size of the confined space, the access/egress facilities, the length of time anyone will be inside the confined space and the nature of the work being carried out. Consideration should also be given to forced ventilation and cooling.

9.24. Limiting working time

The Engineer Surveyor shall consider the length of time that work within the confined space will take. Temperature and restriction of movement shall also be considered.

10. PERMIT TO WORK SYSTEM

The use of a permit to work system does not, itself, make the job safe. It supports a safe system, providing a ready means of recording findings and authorisations required to proceed with the entry. It is considered best practice for an effective permit to work system to be in place however in the event of a system not being in place the Engineer Surveyor shall ensure that this Safe System of Work is implemented and that, to the best of his knowledge, sufficient precautions have been taken to ensure that no other activity shall be undertaken on site that may impair their safety.

11. APPENDIX A – FLOW CHART Application of a safe system of work for entry into a confined space

