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Safety, Health and Environment
National Authority

INDUSTRY GUIDANCE NOTE 行业指南

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Guidelines to Confined Space

受限空间指南

Contents 目录

| | |
|---|----|
| 1. Purpose 目的 | 1 |
| 2. Applicable Laws 适用法律 | 1 |
| 3. Scope 范围 | 1 |
| 4. Responsibilities 责任 | 2 |
| 4.1 Authorised Manager / Competent Person 授权管理人/胜任人员..... | 2 |
| 4.2 Confined Space Safety Assessor 受限空间安全评估人 | 2 |
| 4.3 Confined Space Attendant 受限空间监护人 | 2 |
| 4.4 Gas Tester 气体检测人 | 3 |
| 4.5 Workers 作业人员 | 3 |
| 5. Procedure 规程 | 4 |
| 5.1 Permit to Work (PTW) 作业许可票 | 4 |
| 5.2 Risk Assessment 风险评估 | 5 |
| 5.2.1 Oxygen Deficiency - Suffocation 缺氧-窒息 | 5 |
| 5.2.2 Oxygen Enrichment 富氧..... | 8 |
| 5.2.3 Chemical / Toxic Substances 化学/毒性物质 | 9 |
| 5.2.4 Flammability / Fire and Explosion 可燃性/着火及爆炸性 | 9 |
| 5.2.5 Physical Hazards 物理危害..... | 10 |
| 5.3 Information, Instruction and Training 信息、指南及培训..... | 10 |
| 5.4 Confined space attendants 受限空间监护人 | 10 |
| 5.5 Safe Working 安全作业 | 12 |
| 5.6 Isolation 隔离 | 12 |

| | | |
|---|--|----|
| 5.7 | Cleaning 清理 | 13 |
| 5.8 | Purging and Ventilation 吹扫及排放 | 14 |
| 5.9 | Atmospheric Monitoring 空气监测 | 14 |
| 5.10 | Continuous Monitoring 连续监测 | 15 |
| 5.11 | Communications 联络 | 15 |
| 5.12 | Use of Tools / Electrical Appliances 工具的使用/用电..... | 15 |
| 5.13 | Rescue 营救 | 16 |
| 5.14 | Rescue Equipment 营救设备 | 16 |
| 5.15 | Respiratory Protective Equipment 呼吸保护设备 | 16 |
| Sample of Checklist 1 - Work in Confined Space Without Entry of Persons..... | | 21 |
| 检查清单1样本-不进人的受限空间作业 | | |
| Sample of Checklist 2 - Entry into Confined Space Without Breathing Apparatus. 22 | | |
| 检查清单2样本-携带呼吸器具进入受限空间 | | |
| Sample of Checklist 3 - Entry into Confined Space With Breathing Apparatus.... | | 23 |
| 检查清单3样本-不携带呼吸器具进入受限空间 | | |

1. Purpose

目标

Certain procedures are necessary for preparation, entry and restoration of a confined space by any personnel.

Examples of confined spaces may include but are not limited to storage tanks and vessels, underground storage areas, buildings and shacks.

任何人进行受限空间作业准备、进入受限空间及作业后复原受限空间须遵循特定规程。受限空间包括但不限于储罐及容器，地下贮存区域、建筑物及棚屋。

受限空间包括但不限于储罐及容器，地下贮存区域、建筑物及棚屋。

Excavations, including well cellars, which meet the definition of a confined space and are to be entered by personnel may constitute permit-required confined spaces if they have the potential for hazardous atmospheres or serious safety hazards which cannot be eliminated.

坑道，包括井窖，如符合受限空间定义且将进入，如其存在危险气体或严重安全风险，应构成须办作业票受限空间。

The purpose of this document is to describe the safe working methods that are required when working in a confined space.

本文件目的是描述进行受限空间作业时的安全工作方法。

2. Applicable Laws

适用法律

Workplace Safety and Health Order, 2009
2009年工作场所安全与健康法令

Workplace Safety and Health (General Provisions) Regulations, 2014

Workplace Safety and Health (Construction) Regulations, 2014

2014年工作场所安全与健康（总则）条例，2014年工作场所安全与健康（施工）条例

3. Scope

适用范围

A confined space means any infrequently accessed area, any enclosed space, above or

below ground, where a hazard to health may exist due to lack of oxygen, the presence of a suffocating, toxic or flammable atmosphere, or an actual or potentially hostile environment such as:

受限空间是指任何地上或地下因缺氧、存在窒息性、有毒或可燃气体或明确或可能存在恶劣环境而可能对人健康造成危害的不常进入区域、密闭空间，比如

- (a) storage tanks;
储罐
- (b) Silos;
料仓
- (c) reaction vessels;
反应器
- (d) enclosed drains;
密闭排放设施
- (e) Sewers;
污水井
- (f) Pipelines;
管线
- (g) cargo, ballasts and voids on board ships;
货物、压舱物及驳船上的空隙
- (h) deep excavations.
深挖坑道

Others may be less obvious, but can be equally dangerous, for example:
其他不明显但同样危险的受限空间，例如：

- (a) open-topped chambers;
顶部敞口室
- (b) Vats;
缸
- (c) combustion chambers in furnaces etc;
炉子燃烧室等
- (d) Ductwork;
管网
- (e) unventilated or poorly ventilated rooms.
不通风或通风不良空间

4. Responsibilities 责任划分

4.1. Authorised Manager/ Competent Person

授权经理/胜任人

- Responsible to issue the Permit to Work (PTW) if required.
必要时签发作业许可票

4.2. Confined Space Safety Assessor

受限空间安全评估人

- Responsible to inspect the work periodically.
负责定期检查作业过程
- Provide guidance to supervisors and contractors.
向监护人及承包商提供指导
- Ensure a risk assessment has been carried out for the work.
确保作业已进行风险评估
- Cascades health and safety information to the workers using a toolbox talk.
通过工作前安全谈话向作业人员进行健康及安全信息交底
- Ensures an emergency plan is in place.
确保已制定事故方案
- Ensures that the atmosphere in the confined space has been tested prior to entry.
确保已在人员进入前对受限空间内的空气进行了分析
- Ensures that the atmosphere in the confined space is tested at frequent intervals and remains gas free for the duration of any tank entry.
确保定期分析受限空间内的空气，并保证任何入罐作业期间不含有害气体。
- Ensure there is suitable access and egress from the confined space.
确保受限空间出入通道畅通

4.3 Confined Space Attendant

受限空间监护人

Confined space attendants shall be responsible for ensuring that:
受限空间监护人应负责确保:

- The safety of personnel inside the enclosed space is closely and constantly monitored.
密闭空间内人员的安全得到密切监控
- The record of all personnel, tools and materials entering and leaving the confined space is maintained.

进出受限空间人员、工具及材料记录得到维护

- Emergency and rescue services and equipment are available.
事故及救援服务及设备已具备
- All personnel entering the confined space are aware of the relevant safety procedures.

进入受限空间的所有人员已知晓相关安全规程

- Raises the alarm when there is any doubt as to the safety of the persons within the confined space.

不能确定受限空间中人员安全时报警

- Communication is established and is always maintained with personnel entering and whilst within the space.

建立联络，并在人员进入受限空间过程中及处于其中时保持该联络

4.4 Gas Tester 气体检测人员

Gas Testers are responsible for ensuring that:
气体检测人员负责

- the equipment they use is:
所用设备
 - (i) suitable for the atmosphere to be tested;
适用于将要检测的气体
 - (ii) of an approved type;
型号经过批准
 - (iii) properly calibrated and maintained;
经过恰当的校准及维护
 - (iv) within its validation period;
处于有效期内
- they are sufficiently knowledgeable to interpret the results correctly;
具备正确解读测试结果的足够知识
- they are aware of the likely contaminants and the appropriate testing regime;
清楚可能存在的有害物及恰当的测试规范
- they will report any concerns or changes in gas free condition to the appropriate supervisor immediately;

及时向有关上级报告任何重要事项或已置换环境条件的变化

- gas testing is done immediately prior to the issue of any document relating to the confined space entry.

在任何有限空间进入许可文件即将签发前进行有害气体测试

4.5 Worker 作业人员

- To follow all instructions carefully and stops the work if he feels it is unsafe.
遵守下列守则，并在认为不安全时停止作业
- Not enter the confined space unless he is confident that it has been adequately tested and is gas free.
除非确信受限空间已得到充分测试且不含有害气体，否则不进入受限空间
- Raise the alarm if there is any concern with the confined space and immediate exit the space if he feels the conditions warrant it e.g. loss of communication with the attendant.
如对受限空间出现任何担忧，报警并在条件允许时立即撤出
- Use all necessary and available equipment to ensure his safety and the safety of others working within the confined space.
使用一切必要且可用设备确保自身及在受限空间中作业的其他人员的安全
- To enter a confined space only if authorised to do so.
仅在获得批准后进入受限空间

5 Procedure 程序

5.1 Permit to Work (PTW) 作业许可票

It is a legal requirement under regulation 10(g) of the *Workplace Safety and Health (Construction) Regulations, 2014* that work involving entry into a confined space is carried out using a Permit to Work(PTW).

《2014年工作安全及健康（施工）条例》第10（g）条要求，进入受限空间作业须持作业

许可票

Such PTW shall be issued by a supervisor of the person who is to enter or work in the confined space. A supervisor is the one who has the correct knowledge, training and experience to authorise the work.

此作业许可票应由将进入受限空间作业人员的主管签发。主管应具备批准作业的所需的知识、培训及经验。

The supervisor must be satisfied that all necessary precautions have been taken and provisions made to secure the safety of those entering the confined space, before signing the PTW.

主管须对确保进入受限空间人员安全的必需预防措施落实情况及应急物资准备情况满意后方可在作业许可票上签字

Confined space entry permit 受限空间进入许可票

A confined space that contains a hazardous atmosphere which cannot be controlled or a serious physical hazard which cannot be eliminated. A confined space attendant must be present, and the confined space attendant, Entry Supervisor and Entrant must complete and all must sign the confined space entry permit form. However, a confined space entry permit may be reclassified as a non-permit Confined Space whenever the hazardous atmosphere or serious physical hazard can be reliably removed. Such a condition would only be permitted and approved by the Supervisor of the site.

含有有害气体而不能控制，或物理危害而不能消除的受限空间，受限空间监护人必须在场。监护人、进入主管及进入人员须完成并在受限空间进入许可证上签字。在危险气体或严重物理伤害可被可靠消除时，必须办理许可票受限空间作业可重新定级为无须办票受限空间作业。此等条件只能由现场主管允许或批准。

Note:

说明Whenever a confined space entry permit is reclassified as a result of an a

atmospheric hazard, continuous monitoring must be performed.

受限空间因有害气体重新定级时，必须进行连续监测。

A Permit shall be reissued every -
重新办票时间

(a) 12 hours, end of shift, end of job, whichever occurs first, or (b) When a new hazard is introduced.

(a) 每12小时，交接班，作业完成，三者中任一情况发生时，或

(b) 引入新危险时

When any emergency condition exists, any existing permit shall be cancelled.
出现任何事故，已有许可应取消

5.2 Risk Assessment 风险评估

Before work commences in a confined space, the following risks shall be systematically assessed for their potential to affect persons involved in the work activities:

受限空间作业开始前，应对以下风险进行系统评估，确定对作业人员造成影响的可能性

(a) Oxygen deficiency;
缺氧

(b) Oxygen enrichment;
富氧

(c) Chemical/toxic substances;
化学/有毒物质

(d) Flammability, fire and explosion;
可燃性/着火及爆炸性

(e) Any adjacent work that might be in conflict with the confined space entry;
任何可能与进入受限空间冲突的临近作业

(f) Introduction of any equipment that may undermine the atmospheric condition within the space;

打通与可能对受限空间内气体环境造成破坏的设备之间的流程

(g) Physical hazards, including those which may affect the means of escape.
物理危害，包括可能对逃生产生影响的物理危害

5.2.1 Oxygen deficiency - suffocation 缺氧-窒息

The ordinary air that we breathe every day contains around 21% oxygen. A fall to 17% brings on the start of ill effects including the loss of co-ordination and concentration, together with abnormal fatigue. A fall to 10% brings on breathing difficulties, unconsciousness and death can follow quite quickly.

我们日常呼吸的空气中含氧量为21%左右。氧含量下降到17%可能导致身体失去协调及失去注意力等不利影响，以及异常劳累感。氧含量下降到10%将导致呼吸困难、昏迷，乃至快速死亡

Oxygen deprivation may be the result of:
缺氧的原因有

- (a) The displacement of oxygen by gas leaking in from elsewhere, or the deliberate introduction of purge gas;
氧气被其他地方泄漏来的气体置换或有意引入的置换气体
- (b) Oxidization, rusting or bacterial growth using up the oxygen in air;
氧化反应，生锈或细菌生长对空气中氧气的消耗；
- (c) Oxygen being consumed by people working and breathing, or by any process of combustion;
作业人员工作及呼吸中消耗氧气，或任何燃烧过程消耗氧气
- (d) Welding;
焊接
- (e) The prior discharge of a fire extinguishing system containing halon or carbon dioxide.
之前触发了包含卤代烷或二氧化碳的灭火系统

It is a legal requirement under regulation 25 of the *Workplace Health and Safety (General Provisions) Regulations, 2014*, that no person is allowed to work in a confined space where the oxygen in air is below 19.5% unless:

《2014年工作场所健康及安全条例（总则）》第25条规定，如不满足以下条件，

任何人不得在氧含量低于19.5%的受限空间内作业

- (a) Suitable breathing apparatus is being continuously worn and used;
or

不间断穿用适当的空气呼吸器；或

- (b) The space has been adequately ventilated and a competent person or certified gas tester has tested and certified the air to be adequate and safe for entry without breathing apparatus.

空间已充分通风且经过有资质的有害气体检测员检测并提供空间空气充足
可在不穿戴呼吸器情况下安全进入的证明

Where work has to be done inside any chamber, tank, vat, pit, pipe, flue or confined space, in which -

须在以下任何塔器、罐、槽、坑、管线、烟道或密闭空间内进行作业时

- (a) dangerous fumes are liable to be present to such an extent as to involve risk of fire or explosion, or persons being overcome by the fumes; or

可能出现可引起火灾或爆炸的危险火焰的，或对人员产生严重影响的火焰的

- (b) the supply of air is inadequate, or is likely to be reduced to be inadequate, for sustaining life.

空气不充足，或可能减少至不足，以至于不足以维持生命的

It shall be the duty of the occupier of a factory to ensure that there is adequate and convenient means of access and egress from the confined space and a means to frequently and appropriately monitor the quality of air within the space.

工厂运营者有确保受限空间的通道充足且易于进出，且具备对其中空气质量进行连续恰当检测的手段

Any person entering or remaining in the confined space, shall have the following in place -

任何人进入受限空间或在其中停留，应做好以下准备

- (a) wearing of a suitable breathing apparatus;
穿戴恰当的空气呼吸器
- (b) adequately trained and briefed of the hazards, emergency signals and actions to be taken within the space;
接受过受限空间风险、紧急信号及应采取措施的充分培训并得到以上各方面的情况通报
- (c) has been authorised to enter by the responsible person; and
已由负责人批准进入；且
- (d) where reasonably practicable, is wearing a safety harness with a rope securely attached and there is a person keeping watch outside who is provided with the means to pull him out in an emergency.
条件允许时，穿戴安全背带，安全背带应附有牢固的绳索，且应有人在外监护，监护人应具备在紧急情况下将其拉出受限空间的手段

A responsible person shall not certify a confined space under *Workplace Safety and Health (Construction) Regulations, 2014* (see regulation 25

(4)) unless –

根据2014年工作场所安全与健康（施工）条例（见25（4）条），负责人除以下情形外不得出具受限空间证明

- (a) effective steps have been taken to prevent any ingress of dangerous fumes;
已采取有效措施防止任何危险火焰进入
- (b) any sludge or other deposit liable to give off dangerous fumes has been removed and the space contains no other material liable to give off dangerous fumes; and
已清理任何可能释放危险火焰的污泥或其他沉积物；且
- (c) the space has been adequately ventilated and tested for dangerous fumes and has a constant supply of air adequate to sustain life, and he has taken account for the purposes of paragraph
受限空间已充分通风并已进行危险火焰测试且具备维持生命的充足稳定空气源，且负责人应已考虑（b）段中任意沉积物或可能释放大量危险火焰的其他物料

(b) of any deposit or other material liable to give off dangerous fumes in insignificant quantities only and put in place measures for the safety of any persons entering, working within or requiring to exit the confined space.

并采取了保证人员进入、在受限空间内作业或要求离开受限空间时安全的措施

It shall be the duty of the responsible person of a person entering or working in a confined space to ensure that a sufficient supply of suitable breathing apparatus, of safety belts and ropes, life lines and of suitable reviving apparatus and oxygen are -

进入受限空间作业人员的负责人有责任确保充足的空气呼吸器、安全带及安全绳、生命线、适用急救器具及氧气-

- (a) provided and kept readily available;
已准备就位
- (b) properly maintained; and
得到恰当维护; 且
- (c) thoroughly examined by a competent person at least once a month and records maintained.

至少经有资质人员每月检查一次并保留记录

No person shall enter or remain in, and no person shall require, permit or direct any other person to enter or remain in, any confined space in which the proportion of oxygen in the air is liable to have been reduced to below 19.5% by volume unless -

除以下情况外, 任何人不得进入或停留于, 且任何人不得要求、准许或指使任何其他任何人进入、停留于任何空气中氧气体积含量可能已经降低到19.5%以下的任何受限空间

- (a) he is wearing a suitable breathing apparatus and is fully familiar with its use; or
进入人员已恰当穿用空气呼吸器并熟练掌握其使用; 或
- (b) the space has been and remains adequately ventilated and a competent

ent person has tested and certified it as -

该受限空间已经过充分通风并保持良好的通风状态，且经有资质的人员测试且出具该受限空间

- (i) containing an adequate supply of oxygen; and
含氧量充足；且
- (ii) safe for entry without breathing apparatus.
可在不佩戴空气呼吸器的情况下安全进入的证明

5.2.2 Oxygen Enrichment 富氧

Atmospheres containing more than 21% of oxygen by volume shall be considered to be oxygen enriched. Entry into oxygen enriched atmospheres is prohibited at all times and under all circumstances.

受限空间内含氧体积分数超过21%的空气应视为富氧空气。任何时候任何情况下禁止进入富氧空气环境

An oxygen enriched atmosphere is, in itself, a major hazard. Organic materials such as oil and grease become highly combustible and ordinary materials like paper and clothing will burn with exceptional ferocity.

富氧空气环境本身是重大危险源。在富氧环境中，油及油脂等有机材料变得高度易燃，纸及衣物等普通材料会剧烈燃烧

An increase of only 4% oxygen is sufficient to create a hazard and this may occur inadvertently. In oxy-acetylene and oxy propane processes, sometimes not all of the oxygen supplied to a cutting torch is consumed. Some may be released, increasing the atmospheric oxygen above the normal 21%. The oxygen enrichment of atmospheres in confined spaces also results from the practice of using oxygen to sweeten or enrich the atmosphere when it has become oppressive, stale, hot, fume filled or otherwise unpleasant. **This is a very dangerous practice and must be prohibited.**

氧含量提高4%足以形成危险隐患，此情况可于无意中发生。在氧气乙炔焰作业及

氧气丙烷焰作业中，有时割炬供氧未完全消耗，有些泄漏的氧气使空间环境氧含量上升至21%以上。空间富氧也可由于为闷热、腐败、炎热、烟雾缭绕或其他令人不适的环境空气进行增氧作业引起。**此种行为非常危险，应严格禁止。**

Another way in which the atmosphere may become oxygen-enriched is through leakage from torches or hoses during meal breaks or overnight. For this reason, they should always be removed at each break-time. The deliberate kinking or nipping of an oxygen hose while changing a torch does not usually cut off the supply completely and can result in the release of substantial quantities of oxygen.

环境空气富氧还可由于饭间或夜间割炬或软管泄漏导致。因此，每次休息时应将割炬及软管拆下。更换割炬时有意扭折或掐紧氧气软管一般不能彻底切断供氧而引起大量氧气泄漏

If excess oxygen is discovered, the space should be ventilated until normal levels of oxygen are regained. No entry shall be permitted until it is deemed safe to do so by the competent person.

如发现环境富氧，应对向空间通风直至氧气回到正常水平。在有资质人员认为安全之前，不允许进入受限空间。

5.2.3 Chemical / Toxic Substances 化学/有毒物质

However much oxygen is present in the atmosphere, if there is also a toxic gas present in sufficient quantity, it will create a hazard. Some of the many toxic gases which may be encountered include:

不论环境空气含氧量多高，如果有害气体量足够，仍将形成隐患。一些可能遇到的有害气体包括：

- (a) Hydrogen sulphide, usually from sewage or decaying vegetation
硫化氢，一般来自污水系统或植物腐坏
- (b) Carbon monoxide from internal combustion engines, or any incomplete combustion, especially of Liquefied petroleum gases (LPG)
来自内燃机或任何不完全燃烧，特别是液化石油气的不完全燃烧的一氧化碳

(c) Carbon dioxide from any fermentation or being naturally evolved in soil and rocks, or coming from the combustion of liquefied petroleum gases

来自发酵过程的、从土壤或岩石自然释放的或由液化石油气燃烧产生的二氧化碳

(d) Fumes and vapours from chemicals such as ammonia, chlorine, sodium and from petrol solvents.

产生于氨、氯、钠及石油溶剂等化学品的烟气或蒸汽

Petrol and diesel engines create carbon monoxide, which is an extremely toxic gas hazard; and liquid petroleum gas engines create an excess of carbon dioxide, which is a suffocating hazard. The use of any form of internal combustion engine within a confined space is prohibited, unless a specifically dedicated exhaust extraction system is operative and it is deemed safe by a competent person.

汽油及柴油机产生的一氧化碳，是严重的有毒气体隐患；液化石油气发动机产生的大量二氧化碳，是窒息隐患。除非投用专门废气排放系统，并经有资质人员认可安全，禁止在受限空间内使用任何形式的内燃机。

5.2.4 Flammability, Fire and Explosion

可燃性/着火及爆炸性

Some gases need only be present in very small quantities to create a hazard. A few of major sources of explosive and flammable hazards are:

有些气体仅需少量存在即可形成隐患。以下是一些主要的爆炸及燃烧风险源

(a) Petrol or liquefied petroleum gas, such as vapour, propane, butane, and acetylene. These are explosive in the range of 2% in air upwards. The hazard is normally created by a spillage or leakage;

汽油或液化石油气，例如油气、丙烷、丁烷及乙炔。它们在空气中的含量高于2%时具有爆炸性。它们的溢出或泄漏形成隐患

(b) Methane and hydrogen sulphide, which are naturally evolved from sewage or decaying organic matter. These are explosive in the range of 4% in air upwards;

污水及腐坏有机物中自然散发出的甲烷及硫化氢。它们在空气中达到4%以上时出现爆炸性

(c) Solvents, acetone, toluene, white, spirit, alcohol, benzene, thinners, etc. These are explosive in the range of 2% in air upwards.

溶剂、丙酮、甲苯、白酒、烈性酒、酒精、苯、稀释剂等。它们在空气中达到2%以上时出现爆炸性

In an explosive or flammable atmosphere, a toxic or suffocating hazard may also exist. Where there is any doubt, entry shall not be permitted until a certified gas tester has tested the atmosphere within the confined space using a multi gas detector or draeger tubes, as relevant.

爆炸或可燃性气体环境中也可能存在有毒或窒息隐患。如有疑问，在有资质的气体检测员对受限空间中的空气使用多用气体探测器或德尔格检测管进行检测之前，不应批准进入。

5.2.5 Physical Hazards

物理风险

Apart from the hazards dealt with above, other dangers may arise from the use of electrical and mechanical equipment, from chemicals, process gas and liquids, dust, paint fumes, welding and cutting fumes.

除上述风险之外，其他风险还可因使用电气及机械设备，由化学品、工艺气体及液体、粉尘、油漆挥发物、焊接及切割烟雾产生

Extremes of excess heat and cold can have adverse effects and may be intensified in a confined space. Further dangers exist in the sheer difficulty of getting into or out of and working in a confined space. The potential hazard of an inrush of water, gas sludge, etc. due to failure of walls or barriers, or leakage from valves, flanges or blanks, must all be considered at the risk assessment stage.

极端炎热及寒冷可造成不利影响，这种影响在受限空间中可被加强。更多的危险由于进出以及在受限空间内作业本身的难度引起。风险评估阶段必须考虑因器壁

或屏障失效、阀门、法兰或盲板泄漏引起的水的突然涌入、气体污泥等潜在风险

5.3 Information, Instruction and Training 信息及培训

The training needs of each of the categories of employees considered for confined space working should be considered:

应把预计将进行有限空间作业的每类员工的培训需求都考虑在内:

- (a) Supervisors
班长
- (b) Employees entering confined spaces
进入受限空间人员
- (c) Gas tester
气体分析人员
- (d) Persons employed as confined space attendants outside confined spaces
受限空间监护人
- (e) Rescue personnel.
救援人员

Some of the roles identified may be carried out by the same person.
某些确定的角色可由同一个人担任

5.4 Confined space attendants 受限空间监护人

Access to confined spaces shall be controlled by a confined space attendant who has been trained and instructed in his responsibilities. Note that in the case of entry into a confined space which is not certified gas free, two confined space attendants are required and must be available at the entrance at all times during the entry.

进入受限空间应由经过相关培训的受限空间监护人管理。注意进入未经确认无有害气体的受限空间时，须由两名受限空间监护人监护，监护人应在进入期间始终处于入口处。

Where there are multiple access points in use, there shall be a confined space attendant at each access.

有多个出入口的受限空间，每个出入口处都应配备监护人

Confined space attendants shall be provided with:

受限空间监护人应配备

- (a) radio or other special means of continuous communication with the persons within the confined space;
无线电或或与进入受限空间人员进行持续联络其他通讯工具
- (b) emergency and rescue equipment and personnel readily available;
应急及救援设备及人员到位
- (c) emergency medical aid readily available;
急救力量准备到位

When air line breathing equipment is being used by the persons carrying out the work in a confined space, the confined space attendants shall ensure that:

受限空间作业人员使用长管呼吸器的，监护人应确保

- (a) air quality has been tested and found acceptable prior to the start of work and at weekly intervals thereafter;
作业开始前已检测控制质量合格，并在之后每周进行该检测
- (b) air receiver pressure is adequate and being maintained;
空气储蓄器压力充足且得到维护
- (c) the integrity and availability of back-up supplies is acceptable;
备用物资完好性及可用性合格
- (d) communication are tested and any physical signals between those entering and the attendants are known and rehearsed;
联络已经测试，进入容器者与监护人之间的全部身体信号已经约定并排练
- (e) air lines are laid such that they cannot be damaged nor impede the movements of the equipment users.
长管已以不破坏或影响设备使用者行动的方式布置

Confined space attendants shall be supplied with and be trained and competent in the use of self-contained breathing apparatus (SCBA) and a lifeline, together with any other equipment necessary to effect the rescue of personnel from inside the confined space.

受限空间监护人应配备并经培训掌握自给式空气呼吸器及生命线，及其他从受限空间进行

人员救援的必备装备。

When SCBA equipment is in use by the persons carrying out the work in a confined space, confined space attendants shall ensure that -

受限空间中作业的人员使用自给式呼吸器时，监护人应确保-

- (a) regular checks are maintained on the status of the SCBA sets;
定期检查自给式呼吸器状态
- (b) low pressure audible alarms are tested before each entry;
每次进入前测试压力低声音报警
- (c) communication are tested and any signals between those entering and the attendants are known and rehearsed;
联络方式已经测试，进入容器者与监护人之间的全部信号已经约定并排练
- (d) exposure times are calculated and monitored.
计算并监控接触时间

Confined space attendants shall NOT carry out other tasks whilst they are carrying out their duties as confined space attendants and shall not leave the access point unattended while persons are inside the confined space.

受限空间监护人在进行受限空间监护时不得从事其他活动，有人员在受限空间内时不应离开受限空间入口

When work is suspended, confined space attendants shall ensure that all personnel have vacated the confined space and shall erect barriers and signs to prevent unauthorised access to it. Not permit re-entry unless it is proven and safe to do so.

暂停作业后，监护人应确保所有人员都已退出受限空间，并应设立屏障及标志以免未经批准进入。未证明安全，不得允许重新进入

5.5 Safe Working 安全作业

Safe working in a confined space can only be achieved by the use of a Permit to Work (PTW) system in which each step is planned and all foreseeable hazards are taken into account. Such a system, backed up by adequate rescue facilities,

should enable work to be carried out safely.

落实作业许可证制度，计划每一步骤，考虑全部可预见风险，并结合充分的营救设施，实现受限空间内作业安全。

At the planning stage it will be necessary to determine –
计划阶段须确定–

- (a) Whether an entry into the confined space is required, or whether an alternative method of doing the work exist (see Sample of Checklist 1);
是否有必要进入受限空间，是否可以采用其他办法完成现有工作（参见检查清单样本1）
- (b) Whether an entry is necessary, whether it can be carried out without the use of breathing apparatus (see Sample of Checklist 2);
是否必须进入受限空间，是否可以不佩戴呼吸器进入（参见检查清单样本2）
- (c) Whether the entry must be made with the use of breathing apparatus (see Sample of Checklist 3).
是否必须佩戴呼吸器进入受限空间（参见检查清单样本3）

Once it has been decided that personnel must enter a confined space, a toolbox talk or safety briefing should be held, with all personnel involved and effective lines of authority and communications established and tested, in order to minimize any risk of subsequent misunderstanding.

如确定人员必须进入受限空间，应进行工作前安全谈话及安全简报。所有相关人员都应参与，并应建立并测试命令链及联络，以将后续误解风险降到最低

5.6 Isolation 隔离

The confined space must be isolated from all possible external sources of danger to persons entering it. A full PTW system should be used to record the location and types of isolation and the hazards being guarded against.

受限空间必须与所外部风险源隔离，以免危及进入人员。全面实施工作许可票制度，记录隔离位置、类型及所防范的风险

Electrical isolation must never rely on a switch or fuse. The switch gear or fuse holder must be locked off and the key lodged with a Permit to Work, issued by an authorised person.

电气隔离不可依赖开关或保险丝开关箱或保险丝座必须上锁，钥匙应与经授权人签字的作业许可票挂在一起

Mechanical isolation of pipe work should not rely on a single valve or on a non-return valve; these may lead to and create a hazard. Whenever possible, a section of pipe should be removed or blank or spade should be put into a flange between the valve and the confined space.

管线的机械隔离不应依靠单一阀门或单向阀。条件允许时，应拆除一段管线，或在阀门与受限空间之间的法兰间加盲板或八字盲板

Paddles, stirrers or agitators, whether electrically or mechanically operated, should be physically disconnected by the removal of an operating arm.

搅拌桨、搅拌棒或搅拌器，无论是电力或磁力，应通过拆除操作臂进行物理断开

5.7 Cleaning 清洁

There are a variety of methods of cleaning the inside of confined spaces to remove hazardous solids, liquids or gas. Cold water washing, hot water washing and steaming will remove many contaminants, while solvents or neutralizing agents may be necessary for others. If hot water or steam is used, with or without a solvent, care must be taken to ensure that adequate ventilation exists for steam pressure and that condensation does not build up to unacceptable levels.

清理受限空间内部，去除危险固体、液体或气体的方法有很多。很多污染物可通过冷水洗、热水洗及蒸汽吹去除，其他污染物可能需要溶剂或中和剂。使用热水或蒸汽时，不管使不使用溶剂，要注意蒸汽压力要有充分的泄放手段，且冷凝液不会积累到不可接受水平

If steam is used or water is boiled in a confined space, account must be taken of the vacuum that can be created on cooling.

受限空间中使用蒸汽或热水蒸煮的，必须考虑冷却后形成的真空

When steam or solvents are used, these may in themselves create a toxic, suffocating or flammable hazard; even though a space has been well cleaned, it must not be entered until the atmosphere within the space has been adequately tested and there are suitable arrangements for it to be monitored.

使用蒸汽或溶剂时，可能产生有毒、窒息或燃烧危险；即使空间经过认真清理，在未充分进行测试且安排监测其中空气前，不得进入。

Great care must be taken when dealing with any sludge or heavy deposits which may release hazardous fumes when disturbed.

污泥或重质沉积物可能释放有害烟气，处置时必须特别小心

5.8 Purging and Ventilation

吹扫及通风

Air purging and ventilation may be carried out by removing covers, opening inspection doors, etc. and allowing ordinary air circulation or by the introduction of compressed air via air line. Higher rates of air exchange can be achieved by the use of air movers, induction fans or extractor fans.

可通过移除盖板、打开检查门引入自然风循环或通过空气线引入压缩空气进行空气吹扫及通风。可使用鼓风机、引风机或换气扇等进行空气更换。

It is especially important that when an inert gas (e.g. nitrogen) has been used to purge or render inert a flammable atmosphere, the inert gas itself is properly purged with air.

如使用了惰性气体（比如氮气）吹扫或惰化可燃气氛，特别注意要用空气进行吹扫惰性气体。

When air purging is taking place, the flow of air should be of a sufficient volume and velocity to ensure that no pockets or layers of gas remain undisturbed.

进行空气吹扫时，空气应具备足够体积及速度，以确保没有吹扫不到的气体团或气体层。

5.9 Atmospheric Monitoring 气氛监测

Before an entry is made into a confined space, tests must be carried out to establish the levels of oxygen, toxic gas or flammable gas in the atmosphere. If entry into the confined space is necessary to carry out the tests, breathing apparatus or other respiratory protective equipment must be worn.

进入受限空间前，应通过检测确定气氛中氧气、有毒气体或可燃气体含量。需要进入受限空间进行检测的，应佩戴呼吸器或其他呼吸系统保护设备。

The tests applied should take account of what the space is known to have contained, including any inert gas used to purge a flammable atmosphere which may itself produce toxic hazards or the risk of asphyxiation. Account must also be taken of hazards arising from other sources such as materials used for cleaning. Methane, hydrogen sulphide and carbon dioxide can all evolve naturally due to the decomposition of organic matter or, in some cases, by the effect of rain water percolating through certain types of ground. It is necessary to test the atmosphere of a confined space at both high and low level as well as in any corners, etc. where pockets of gas may exist. Instances have occurred of carbon dioxide displacing oxygen below ground level, while a normal oxygen level continues to exist above.

甲烷、硫化氢及二氧化碳可因有机物降解或有时因雨水渗入某些类型的土地而自然释放。开展测试须考虑空间中含有什么，包括用来吹扫可燃气氛的任何惰性气体，他们本身也可产生毒性危害或窒息危险。还应考虑其他风险来源，包括清洁用材料。必须对受限空间的高层、低层及任何角落进行检测，这些地方可能存在气团。已经发生过二氧化碳置换了地面以下的氧气而地面以上氧气浓度依然正常的事例

The sense of smell must never be relied upon to detect gases. Some gases are odourless and hydrogen sulphide, in particular, can paralyse the sense of smell to such an extent that even fatally high concentrations of the gas cannot be detected. It is essential to rely on instruments to detect gases. Some gases have no smell, and hydrogen sulphide can lead to olfactory failure, and in severe cases even fatal concentrations of hydrogen sulphide are difficult to detect.

detected. In any case, the sense of smell varies from person to person and deteriorates with age.

况且，味觉因人而异且随年龄增长退化

A wide range of portable gas detection equipment is available for flammable and toxic gases; some are specific to one gas (e.g. hydrogen sulphide), while others can sample a range of different gases. Such instruments need to be properly calibrated.

可燃及有毒气体检测可用的便携式气体检测设备有很多；有些为某种气体专用（如硫化氢），有些可取样检测一系列不同气体。此类仪器须进行适当校准。

5.10 Continuous Monitoring 连续监测

The initial monitoring and testing must establish that the confined space is safe to enter. Monitoring should then be carried out at intervals to ensure the continued safety of personnel. Tests should be repeated after any breaks, such as lunch or overnight, or after the time limit set out in a PTW has expired. 初次检测需能证明受限空间安全可进入。之后应定期进行监测，以保证人员安全。午餐、夜间工作中止后，或作业许可票中规定的时限过期后应重新进行测试。

5.11 Communications 联络

Adequate, effective and regular communications must exist between those inside and those outside the confined space, so that, in the event of an incident, a warning can be given and the space evacuated or those inside rescued. The system needs to be 'fail safe', ensuring that if a reply is not received or a scheduled call not made, the procedure for rescue starts immediately. Where there is a breakdown of communications, any work within the confined space entry should be immediately stopped and persons which exit the space and entry should not be permitted until it is safe to do so.

受限空间内外部人员应保持充分、有效及例行的联络，以便在事故发生时，可以发出警

告、撤离空间或营救内部人员。整套体系应该具有“失效保护”性。确保没有回应时，或没有进行预定的呼叫时立即启动救援程序。通讯中断时，进入受限空间作业须立即停止，人员应退出受限空间，在安全以前人员不得进入受限空间

5.12 Use of Tools / Electrical Appliances

工具/电气设备的使用

If there is any possibility of flammable gas existing in a confined space, even below the lower explosive limits (LEL), all tools must be of a non-sparking material and all lighting and electrical equipment must be appropriate for use in confined spaces. Smoking and naked lights must be strictly prohibited and care must be taken to avoid the generation of static electricity with the consequent risk of sparks.

受限空间中有可能存在可燃气体时，即使在爆炸下限以下，应全部采用防爆工具，及适用于受限空间的照明及机械设备。严禁吸烟及明火，并注意产生静电以致火花危险

Regulation 42 of the *Workplace Safety & Health (Construction) Regulations, 2014* requires electric hand-held tools and inspection lamps and lights are operated at a voltage not exceeding 55 volts between conductor and earth.

《2014年工作场所安全与健康（施工）法规》要求电动手持工具及检查灯具及照明的导体对地电压应不超过55V

5.13 Rescue

营救

If a person is INJURED in a confined space which has been certified safe to enter without respiratory protection, an entry can be made to rescue and remove them immediately.

如有人于已被证明可不佩戴呼吸保护器具进入的受限空间内受伤，可马上进入对其抢救并抬离

When a person COLLAPSES in a confined space and the cause is not the known, *irrespective* of whether or not the confined space was certified fit for entry without respiratory protection, no person shall enter unless he is wearing a bre

athing apparatus and he is familiar with the rescue plan. The collapse may have been due to deterioration in the atmosphere within the confined space or the in-rush of a toxic or suffocating gas from outside. The first duty of any rescuer is to ensure that he does not become a casualty himself.

如有人员因不明原因在受限空间中倒下，不论受限空间是否被证明过适合不佩戴呼吸保护器具进入，任何人在不穿戴呼吸器具及熟悉救援方案的情况下进入。人员倒下可能由于气氛恶化或有毒或窒息性气体从外部流入。营救人员首先应保证自身不成为伤员。

5.14 Rescue Equipment

营救设备

Every person entering a confined space wearing a breathing apparatus must also wear a safety harness. The harness must be attached to a lifeline, attended by a person outside the confined space. This equipment forms part of a safe system of work for any entry into a confined space. Properly used, it may enable a rescue to be carried out successfully without the need for a rescuer to enter the confined space.

每位进入受限空间的人员除穿戴呼吸器具外还可穿戴安全背带。安全背带应系到生命线上，并应有一人在受限空间外监护。此设备是各种进入受限空间作业的安全工作方案的一个部分。使用得当，救援人员可不必进入受限空间即成功完成营救。

Rescue equipment must include some means of lifting or pulling a person up from a confined space, since it is virtually impossible for the average person to achieve this solely by muscular effort. There are a variety of tripods, winches, blocks and tackles which, when used in conjunction with a safety harness, enable a person to be lifted quickly and safely out of a confined space.

营救设备应包含将人员从受限空间内提起并拉出的功能，因这点仅凭平常人的肌肉发力基本做不到。与安全背带搭配使用某些三脚架、绞盘、滑轮组及滑车可将伤员快速安全吊离受限空间

5.15 Respiratory Protective Equipment

呼吸保护设备

A wide range of types of respiratory protective equipment is available from va

rious manufacturers. The equipment functions on the basis of two distinct principles outlined below -

各种厂家提供多种型式的呼吸保护装备，这些设备基于下列两个明确的工作原理

(a) By purifying the air breathed. The air inhaled is drawn through a filter or medium that removes the harmful substance or pollutant. The nature of the filtering agent depends on the type of pollutant to be dealt with. These types are commonly called *respirators*.

通过净化吸入空气保护。吸入空气通过滤纸或去除有害物质或污染物的介质。过滤剂的性质取决于要处理的污染物类型。此类保护设备一般成为呼吸器

The simplest form of respirator is the 'Nuisance dust mask', a preformed cup made of filtering material which fits over the nose and mouth to filter out nuisance dust. These masks give no protection against harmful or toxic materials.

最简单的呼吸器形式是“防滋扰粉尘面罩”，由过滤材质预制成型，佩戴于口鼻位置过滤滋扰粉尘。此类面罩对有害及毒性物质不具防护作用

More complex types have filter cartridges that may be general for various types of dust or fumes or specific to a particular substance.

一些较复杂的型式拥有各类粉尘或烟气通用或某种物质专用的滤盒

(b) By supplying clean air. The air can be supplied straight through an airline via a pump or compressor or, alternatively, the person may carry compressed air in cylinders. These types are known as *breathing apparatus*.

直接提供清洁空气。空气可直接通过泵或压缩机经送气管线提供，也可由人员背负压缩空气罐，即呼吸器提供

Preparation
准备

In a preparation for entry, a Confined Space Entry Permit shall be initiated and completed according to the following procedure:

进行受限空间进入准备时，应按以下程序发起并完成受限空间进入许可票

1. Each space must be inspected and evaluated by a qualified individual (Entrant, Attendant, or Entry Supervisor) prior to entry and periodically thereafter to ensure that conditions remain consistent with the permit. Evaluation will include atmospheric condition tests and a serious physical hazard assessment.

各受限空间均应由有资质人员（进入人、监护人或进入主管）在进入前检查评估，并在进入后定期检查评估，以确保其中条件与作业许可票一致。评估包括环境气氛检测及认真的物理风险评估

2. Signs and/or barricades shall be posted outside confined spaces to notify unauthorised personnel that entry is in progress. Personnel entering the area shall read and adhere to all precautions, signs and permits. If they are not assigned to assist with the entry, they are not to enter the area. If the confined space is left unattended, access to the space is to be secured.

应在受限空间外张贴标志并设立屏障，提示无关人员受限空间进入正在进行中。进入人员应阅读并遵守全部注意事项、标志及许可证。与进入空间无关人员不得进入该区域。受限空间无人看管时，应保护入口

3. The confined space must be properly isolated utilising blinding, line disconnection, and lockout/tag out.

通过加盲板、断开管线及上锁挂签对受限空间进行恰当隔离

4. Communication equipment and arrangements should be tested and available prior to any entry being permitted.

在允许任何进入作业前，应测试联络工具及联络方式

5. Atmospheric tests for oxygen, explosive and toxic gases and vapors shall be performed and recorded on the confined space entry permit form immediately prior to entry.

气氛中氧气、爆炸性及有毒气体及蒸汽应在进入前测试并在进入前于受限空间进入许可证上记录

6. After work breaks or interruptions in the work procedure or at periodic intervals, the continuing safety of workers in the space is to be ensured. At a minimum, the following atmospheric hazards shall be tested and be within these acceptable levels:

应在作业间隙或作业暂停后，或定期检查确认受限空间中作业人员的连续安全。至少应该测试以下气氛中有害物质处于以下可接受水平：

- Oxygen = 19.5% - 23.5%
氧含量 19.5% - 23.5%
- Lower Explosive Limit = <5%
爆炸下限 ≤ 5%

Note:

说明

If other atmospheric hazards exist, then appropriate air monitoring must be conducted. Example:

Hydrogen Sulfide, Carbon Monoxide.

如存在其他空气危险物，则应进行恰当的空气监测，比如：硫化氢、一氧化碳

7. If the test indicates a hazardous atmosphere, efforts to control the condition are to be made utilizing ventilation controls. Forced air ventilation or an explosion-proof electric fan is required, if explosion gases or vapors are present. If other conditions exist, the space must be purged, steam washed, etc. to sufficiently free of all possible contaminants.

如经检测，气氛有害，应采用通风手段来调节空气环境。如有爆炸性蒸汽或气体，需采用强制通风及防爆风扇。如存在其他不利条件，应对空间进行吹扫、蒸汽洗涤等，以充分去除污染物

8. Where flammable or combustible gases or liquids are present, all sources of ignition shall be eliminated or controlled. Fire extinguisher(s) and other fire fighting equipment shall be available.

存在可燃气体及液体时，应消除或限制全部点火源。应准备好灭火器及其他消防设施

9. Safety hazards are to be eliminated or controlled.
消除或限制安全风险

10. Forced air ventilation and other equipment must be properly grounded or bonded to prevent static sparks. Lighting equipment must be explosion proof and have a ground fault circuit interrupter (GFCI).

强制通风及其他设备必须恰当接地或连接以防止静电。照明设备必须防爆且应包括接地故障断路器

11. If the confined space's atmospheric tests are beyond the acceptable limits, the space is classified as a permit required confined space and must have a confined space attendant and an Entry Supervisor trained to perform these duties. The confined space attendant is to be stationed outside the confined space to remain in indirect communication with the worker(s) inside. The Entry Supervisor may serve as the confined space attendant provided they are trained to do so.

如受限空间气氛测试超出可接受范围，该空间应归类为须许可票的受限空间，作业时必须有受限空间监护人及进入主管。监护人应在受限空间外面守候并保持与内部工作人员的间接联络。

12. Rescue equipment including lifelines, harnesses, air supply systems and hoists must be in use when entering all permit required confined spaces. A trained rescue team is to be available when personnel are required to enter a Confined Space.

进入须许可票的受限空间时，救援设备包括生命线、安全背带、供气系统及葫芦应投入使用。要求人员进入受限空间作业，必须具备一支有经验的营救队伍

13. First aid and CPR training is required for rescue personnel and recommended for confined space attendant/Entry Supervisors. First aid supplies are readily available on site.

救援人员必须接受过急救及心肺复苏培训，同时建议受限空间监护人或进入主管接受该培训。急救物资已在现场备用

Entry 进入

1. Entry may be made by authorised personnel after preparation requirements have been met and a Confined Space Entry Permit form has been signed, issued and posted at the entry of the confined space. Authorised personnel designated to enter the space should review the provisions of the permit and sign the Permit.

准备要求满足以后，且受限空间进入许可已经签字、开具且在受限空间入口张贴经授权人方可进入受限空间。被指派进入受限空间的人员应核对许可证条款并在上面签字

2. The confined space atmosphere should be tested regularly during entry to ensure a safe work environment. Consideration should be given to continuous monitoring when permit conditions change. Records of all such tests to be maintained.

进入期间，为确保安全，应对受限空间气氛进行定期测试。许可条件改变后应考虑是否进行连续监测。应保留此类全部测试记录

Restoration 现场复原

When work is complete and the confined space is ready to be returned to service, the Permit should be used as a checklist for proper restoration of the space. Additional points to consider include:

作业完成且受限空间具备重新投用条件，应以许可票作为检查清单以妥当恢复受限空间。
还应考虑

- Are all personnel out of the space?
人员是否全部退出受限空间？
- Are all blinds removed, vents closed, etc. per the list compiled during preparation?

按照准备阶段编制的清单，盲板是否全部拆除，排放是否全部关闭等。

- Are all equipment and tools removed?
全部设备及工具是否移除？
- Are all entryways and flanges closed and sealed?
入口及法兰是否全部关闭并密封？
- Have start-up procedures been reviewed?
投用规程是否经过审核？

Sample of Checklist 1 – Work in Confined Space Without Entry of Persons
检查清单1样本-不进人的受限空间作业

| | Item 项目 | Check 检查 |
|----|--|-------------|
| 1. | Ensure that entry into the confined space is totally prohibited 确保彻底禁止进入受限空间 | |
| 2. | Ensure that the isolation of services and processes is carried out as necessary 确保进行必要的系统及工艺隔离 | |
| 3. | Wash, clean and purge the workplace, as appropriate, for work to be done 进行完成作业所必须的工作场所清洗、清理及吹扫 | |
| 4. | Ensure that there is a safe system of work for persons concerned 确保相关人员具备安全工作方案 | |
| 5. | Ensure that other persons know that work is going on 确保其他人员知晓作业正在进行 | |
| 6. | Authorise work to commence only on the issue of a Permit to Work (PTW) 仅在作业许可票签发后才授权开始作业（作业许可票） | |

Sample of Checklist 2 – Entry Into Confined Space Without Breathing Apparatus
检查清单2样本-携带呼吸器具进入受限空间

| | Item 项目 | Check 检查 |
|-----|---|-------------|
| 1. | Commence a Permit to Work (PTW) procedure 开始作业许可票程序 | |
| 2. | Withdraw the confined space from service 将受限空间退出系统 | |
| 3. | Isolate the workplace from electrical, mechanical, chemical, heat and all other sources 将作业场所与电源、机械源、化学源、供热源等隔离 | |
| 4. | Check that no inward leakage of gas, steam or liquids 检查确认没有向内部泄漏的气体、蒸汽或液体 | |
| 5. | Clean, drain and purge the workplace as necessary for the types of work to be carried out and entry to be made 清理、排放及吹扫作业场所，为将进行的作业及进入做准备 | |
| 6. | Test atmosphere for oxygen, flammable gas, toxic gas 检测气氛中的氧含量、可燃气体、有毒气体 | |
| 7. | Carefully check any sludge or deposit that may harbour gas 认真检查污泥或沉积物中是否潜藏气体 | |
| 8. | If necessary, clean, purge and ventilate the workplace again until the atmosphere is safe to enter 必要时，再次清理、吹扫工作场所并对其通风，直至其中气氛安全可进入 | |
| 9. | Ensure that all tools and equipment are safe to use in the area 确保全部工具及设备在作业区域内可安全使用 | |
| 10. | Check the provision of protective clothing, harness, lifelines, rescue equipment, rescue personnel 检查防护服装、安全背带、生命线及救援设备、救援人员是否到位 | |
| 11. | Ensure that rescue personnel are trained in the use of equipment and capable of using it 确保救援人员接受过装备使用培训并具备使用装备的能力 | |
| 12. | Brief all personnel on what is to be done, arrange and test communications 向全部人员通报工作任务，确定方案并测试联络方式 | |
| 13. | Issue the Permit to Work (PTW) and authorise entry. Fix a time scale within which the work should be completed 签发作业许可票并授权进入。确定完成作业时的时段 | |
| 14. | Constantly monitor the workspace and communications 持续监控作业场所及联络 | |
| 15. | If the task is completed within the time scale, advise all concerned, to cancel the Permit and return the confined space to service 如作业在预定时间段内完成，通知所有有关人员取消许可票并将受限空间恢复到系统中 | |

| | | |
|-----|--|--|
| 16. | If the work is not completed in time, withdraw all personnel and st art commence the Permit to Work (PTW) procedure again 如作业未能如期完成，撤出所有人员并重新开始作业许可票程序 | |
|-----|--|--|

Sample of Checklist 3 – Entry Into Confined Space With Breathing Apparatus
检查清单2样本-携带呼吸器具进入受限空间

| | Item 项目 | Check 检查 |
|----|---|-------------|
| 1 | Commence the Permit to Work(PTW) procedure 开始作业许可票程序 | |
| 2 | Withdraw the confined space from service 将受限空间退出系统 | |
| 3 | Isolate the workplace from electrical, mechanical, chemical, heat, etc. sources 将作业场所与电源、机械源、化学源、热源等隔离 | |
| 4 | Check there is no inward leakage of gas, steam, liquids, etc. possible 检查确认不存在流向内部的气体、蒸汽、液体等的泄漏可能 | |
| 5 | Clean, drain and purge the workplace as necessary for the type of work and entry 清理、排放及吹扫作业场所，为进入及作业做准备 | |
| 6 | Test the atmosphere for flammable gas, toxic gas, oxygen, etc. 检测气氛中是否存在可燃气体、有毒气体、氧气等 | |
| 7 | Decide on which type of breathing apparatus is to be used 确定将采用何种型式的呼吸器 | |
| 8 | Ensure that the personnel involved have a current valid certificate for the type and use of breathing apparatus 确保有关人员具备现时有效的相应呼吸器使用证书 | |
| 9 | Ensure that all tools and equipment are safe for use in the work area 确保全部工具及设备在作业区域内可安全使用 | |
| 10 | Check the provision of protective clothing, harness, lifelines, rescue personnel, etc. 检查确认防护服装、安全背带、生命线、救援人员等的是否准备到位 | |
| 11 | Ensure that rescue personnel are adequately trained in the use of rescue equipment and are capable of using it correctly 确保救援人员接受了充分的救援装备使用培训并具备正确使用救援装备的能力 | |
| 12 | Brief personnel on what is to be done, arrange and test communications 向全部人员通报工作任务，确定方案并测试联络方式 | |
| 13 | Issue the Permit to Work (PTW) and authorised entry into the workplace. Fix timescale within which the work should be completed 签发作业许可票并授权进入。确定完成作业时的时段 | |
| 14 | Constantly monitor the workspace and communications 持续监控作业场所及联络 | |
| 15 | If the task is completed within the time scale, advise all concerned, to cancel the Permit and return the confined space to service 如作业在预定时间段内完成，通知所有有关人员取消许可票并将受限空间重新并入系统 | |

| | | |
|----|---|--|
| 16 | If the work is not completed in time , withdraw all personnel and st art commence the Permit to Work (PTW) procedure again 如作业未能如期完成，撤出所有人员并重新开始作业许可票程序 | |
|----|---|--|

It must be stressed that all personal protective equipment (PPE) in general and respiratory protective equipment in particular must have been specified by a competent person, who is clearly aware of all of the circumstances surrounding its use.

必须强调全部一般个人防护用品特别是呼吸保护装备必须由充分明确该装备使用环境的胜任人员指定

END