

Guidance Note for  
Asbestos Removal in Confined Spaces

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asbestos removal contractors association

## **GUIDANCE NOTE FOR ASBESTOS REMOVAL IN CONFINED SPACES**

### **1. OBJECTIVE**

- 1.1. The objective of this guidance note is to provide guidance to both clients and contractors on the procedures for working safely with asbestos in confined spaces and to provide adequate practical guidance for those undertaking asbestos removal.
- 1.2. ARCA Guidance on Risk Assessment and the standards set by The Control of Asbestos Regulations 2006 should also be taken into account.
- 1.3. This guidance should be read in conjunction with Approved Code of Practice L101 - Safe Work in Confined Spaces (ACoP) and INDG 258 Safe work in confined spaces.

### **2. INTRODUCTION**

- 2.1. At the Health & Safety Executive (HSE) Asbestos Licensing Principal Inspectors (ALPI) conference in 2006 concerns were expressed about the preparedness of some contractors to undertake asbestos removal work in confined spaces. One of the examples considered arose from an HSE inspector visiting a notified asbestos removal project at a local authority building where the contractor was attempting to undertake work in a 100m pipe duct with a single restricted entry/exit point.
- 2.2. HSE ALPI concerns about work in confined spaces include:
  - Whether contractors realise what in practice constitutes a 'confined space' subject to The Confined Spaces Regulations 1997 i.e. a reasonably foreseeable specified risk arises because of its enclosed nature (e.g. flammable substances and oxygen enrichment, toxic gas, fume or vapour, oxygen deficiency, ingress of water or other liquids or solid material that can flow; residues of dangerous substances and excessive heat) requiring specific actions and do they assess the control measures they should put in place.
  - Having only one means of entry/exit makes escape in the event of an emergency (medical/fire/flood) extremely difficult.
  - Arranging an appropriate air flow to enable the 'enclosure' to be held under negative pressure as well as ensuring a sufficient volume/flow of clean air, some underground ducts even appear to be naturally under positive pressure.
  - Arranging sufficient space to allow for the proper use of wet strip and other equipment.
  - Creating an adequate air lock arrangement over the manhole entry point (with sufficient room to vacuum down contaminated work clothing) in what is often a corridor of a school, hospital or office building.
  - Arrangements for moving waste and the possibility of erecting a bag/waste lock to minimise the possibility of spreading contamination (e.g. use of waste skids or trolleys).
  - 'Hot work' whether because of residual heat in the hot water system or because of the restricted dimensions of the work area (measurement of the wet bulb globe temperature within the space and consideration of heat stress and work duration).
  - The level of training for supervisors and operatives i.e. half day confined space awareness training may not be considered sufficient and a standard 2 day session may be required, tailored to address the additional problems of asbestos removal within the confined space.
  - Communications and ability to supervise the way the work is being done.
  - How four stage clearance can be carried out with adequate training and access for the analyst.

### 3. LEGISLATION

- 3.1. Work in confined spaces is subject to the Confined Spaces Regulations 1997 which replaces and extends the requirements in Section 30 of the Factories Act 1961. Work in confined spaces may also introduce additional problems when meeting the requirements of CAR 2006. Such as effectiveness of RPE, sufficiently wetting asbestos material during wet stripping, softening of adhesive tape, etc.
- 3.2. A suitable and sufficient assessment of the risks for all work activities must be carried out for the purpose of deciding what measures are necessary for safety (The Management of Health and Safety at Work Regulations 1999, regulation 3). For work in confined spaces this means identifying the hazards present, assessing the risks and determining what precautions to take. In most cases the assessment will include consideration of:
- The task;
  - The working environment;
  - Working materials and tools;
  - The suitability of those carrying out the task; and
  - Arrangements for emergency rescue
- 3.3 The term “confined space” is defined in the Regulations as “**...any place including any chamber, tank, vat, silo, pit, trench, sewer, flue, well or other similar space in which, by virtue of its enclosed nature, there arises a reasonably foreseeable specified risk**”.
- 3.4 The ACoP includes enclosures for the purposes of asbestos removal as confined spaces if there is a presence of a reasonably foreseeable specified risk.
- 3.5 The definition of “specified risk” in the ACoP includes a risk of:
- Serious injury to any person at work arising from a fire or explosion.
  - The loss of consciousness of any person at work arising from an increase in body temperature.
  - The loss of consciousness or asphyxiation arising from gas, fume, vapour or lack of oxygen.
  - Asphyxiation due to an influx of liquid or free flowing solids or the inability to reach a respirable environment due to entrapment.
- 3.6 The ACoP provides detailed practical guidance on the requirements of the regulations and other relevant legislation including the Management of Health and Safety at Work Regulations 1999. These regulations place duties on an employer in respect of any work carried out by other persons insofar as the provisions relate to matters which are under the control of that employer.
- 3.7 The key requirements of the regulations are:
- Avoid work in a confined space if possible, use alternative methods of working etc., or delay the work until such time that a safe means of access can be achieved, i.e. to coincide with planned major refurbishment or demolition.
  - Risk assessment by a competent person e.g. someone with sufficient experience of, and familiarity with, the relevant processes, plant and equipment so that they can devise the necessary precautions - in complex cases more than one person may be required according to their expertise.
  - Provide a written safe system of work; this should include a “permit to work” system.
  - Make arrangements for management of emergencies, in particular rescue and first aid procedures.

3.8 The Construction (Design and Management) Regulations 2007 and the Management of Health and Safety at Work Regulations 1999 require Clients to consult with, and provide information to, contractors regarding existing site hazards and site health and safety procedures. This should include any existing information and arrangements for confined space working.

#### **4. WHAT IS A CONFINED SPACE?**

4.1 A confined space is any space of an enclosed nature where there is a risk of death or serious injury from hazardous substances or dangerous conditions (e.g. lack of oxygen). Some confined spaces are fairly easy to identify, e.g. enclosures with limited openings, such as:

- Storage tanks
- Silos
- Reaction Vessels
- Enclosed drains
- Sewers
- Underground ducts

Others may be less obvious, but can be equally dangerous, for example:

- Open topped chambers
- Vats
- Loft spaces
- Basement boiler rooms
- Lift shafts
- Combustion chambers in furnaces etc.
- Ductwork
- Trenches
- Unventilated or poorly ventilated rooms

4.2 It is not possible to provide a comprehensive list of confined spaces. Some places may become confined spaces when work is carried out, or during their construction, fabrication or subsequent modification, e.g. construction of an enclosure for asbestos removal works.

#### **5. HAZARDS WHICH MAY BE ENCOUNTERED DURING ASBESTOS REMOVAL**

##### **5.1 Oxygen enrichment and flammable substances**

A risk of fire or explosion can arise from the presence of flammable substances. There can also be a risk of fire and explosion from airborne flammable contaminants such as aerosol propellants released from spray glue canisters during enclosure construction, or methane produced from decaying organic matter.

5.1.1 There are substantial risks if the concentration of oxygen in the atmosphere varies significantly from normal (20.8%) for example oxygen enrichment will increase the flammability of clothing and other combustible materials, i.e. fractured oxygen pipes particularly in hospital ducts.

##### **5.2 Oxygen deficiency and toxic gases fumes and vapours**

5.2.1 Fumes may be produced from the work carried out in a confined space, for example, welding, flame cutting or the use of solvent based sealants and adhesives. Fumes may also be drawn into the enclosure from outside by the application of negative pressure. Plant failure can also be a source of fumes, for example, from the build up of a leaking service pipe. RPE may be insufficient to provide adequate protection and may give a false sense of security.

- 5.2.2 Plant, e.g. generators, or vehicles fuelled by diesel, petrol or natural gas should not be used within or adjacent to a confined space. Exhaust fumes produced by plant, vehicles, and boilers; contain carbon monoxide as result of incomplete or inefficient combustion.
- 5.2.3 Care should be taken to ensure that plant or vehicles outside of the contractor's direct control do not discharge exhaust fumes into or adjacent to the confined space.
- 5.2.4 A small reduction in the oxygen content can lead to impaired mental ability. The effects are rapid and generally there will be no warning. Very low oxygen concentration, below 18%, can lead to unconsciousness or death.
- 5.2.5 Oxygen deficiency may result from:
- Naturally occurring biological processes consuming oxygen (e.g. decay of vegetation).
  - Burning operations and work such as welding or grinding.
  - Displacement of air by gases from fire extinguishers, fire extinguishing systems, exhaust fumes or during pipe freezing operations
  - A gradual depletion of oxygen as operatives breathe within confined spaces
- 5.2.6 Toxic gases, fumes or vapours may arise from previous processes, as a result of previous storage, or from sludge or other deposits disturbed, for example, during cleaning. They may also enter the confined space from adjacent plant which has not been effectively isolated or from fumes, gases or vapours adjacent to the airlock system.

### **5.3 The ingress or presence of liquids.**

- 5.3.1 Liquids can flow into a confined space, for example from flash flooding or the removal of pipe work or vessels by the "wrap and cut" method as a result of inadequate isolation and drain down. This can create additional hazards due to the possible corrosive or toxic nature of the contents of the pipe as well as the potential for drowning or scalding.

### **5.4 Presence of excessive heat.**

- 5.4.1 This can lead to a dangerous rise in core body temperature and can be made worse as a result of PPE being worn, in extreme cases heat stroke and unconsciousness can result.
- 5.4.2 This can typically occur where work is taking place in hot conditions for example where plant has not been turned off or has not been allowed to cool before entering the enclosure,
- 5.4.3 The effectiveness of RPE will be reduced as a result of the operatives perspiring and breathing heavily.

### **5.5 Free flowing solids**

- 5.5.1 This is a particular hazard associated with working in excavations. Free flowing solids, such as soil, sand or arisings can submerge a person preventing breathing or escape.

### **5.6 Other hazards**

- 5.6.1 Consideration should be given to:
- Hazards associated with poor quality services such as electrical wiring or gas pipes
  - Biological hazards such as leptospirosis, psittacosis, tetanus
  - Vermin such as rodents, wasps and bees
  - Sharps, such as discarded hypodermic needles
  - Noise and vibration
  - Becoming trapped

- Head injuries owing to lack of headroom or overhead obstructions e.g. pipe work
- Fragile floors or concealed drops
- Insufficient lighting

## **6 ENTRY AND EXIT ROUTES**

- 6.1 The ACOP states that the minimum size of opening to allow access with full rescue facilities including self contained breathing apparatus is 575mm diameter; however experience has shown that this is not usually adequate. Enclosures should be designed to ensure that there are adequate emergency exit points of sufficient size to allow a quick evacuation of the enclosure. All exit points should be clearly marked and lead as quickly as possible to the open air.
- 6.2 Where necessary the enclosure wall can be marked as an emergency exit and a suitable means of cutting the enclosure material provided, such as a craft knife. Exit routes should be kept clear at all times.

## **7 ENSURING SAFE WORKING PROCEDURES**

### **7.1 Risk Assessment**

- 7.1.1 This is the first step and must be carried out by a competent person experienced in all aspects of the work.
- 7.1.2 The client and any other contractor on the site must provide details of any substances or processes used in or adjacent to the proposed confined space which may affect the respirable air quality within the confined space.
- 7.1.3 The employer would need to determine that the duct or chamber is a safe place to work, free from potential or existing hazardous gases, vapours or fumes, with adequate oxygen levels. If this cannot be achieved then the work should not proceed until the hazards have been eliminated.
- 7.1.4 The competent person needs to be satisfied that there are suitable arrangements for access and egress particularly in the event of an emergency, normally there should be two means of access and egress. If that is not practical, it may be feasible to delay the project to coincide with major refurbishment or demolition. If the work must proceed without good access and egress there should be a suitable alternative for safe recovery of anyone working in the confined space, for example operatives working on trolleys attached to lines or winches.

### **7.2 Testing**

- 7.2.1 The risk assessment will determine the requirement for testing. Testing of the confined space shall be carried out before it is certificated as being safe to enter or before precautions to be taken on entry are specified. In any confined space the first check must be on the adequacy of oxygen level, tests shall also be carried out to detect the presence of gases or fumes using a suitably calibrated multi-function meter.
- 7.2.2 All tests and risk assessments should be carried out by a competent person or organisation who has adequate appreciation of the asbestos removal process. Initially the tests must be carried out by remote means, if these are satisfactory further investigation by a competent person must be carried out using breathing apparatus.

### **7.3 Control Measures**

- 7.3.1 Work methods should be designed to prevent the creation of additional hazards and take into account the existing environmental conditions. Appropriate controls should be put in place to control the risk, examples include:

<b>Activity / Environmental Condition</b>	<b>Hazard</b>	<b>Control</b>
Metal cutting	Metal fume and sparks	Use hydraulic shears, reciprocating saws and disc cutters and avoid flame cutting
Use of aerosol adhesives / foam	Flammable and toxic gases and vapours	Substitute for less hazardous products. Otherwise use sparingly in a well ventilated area.
Exposing contents of pipes, vessels or flues	Flammable, toxic, corrosive, explosive, biological, radiation	Drain down, purge, flush and test and remove carefully
Working in a hot environment	Heat stress, loss of effectiveness of RPE and less effective wetting during wet stripping work	Avoid hot work where possible, isolate source of heat
Flood risk or ingress of materials	Drowning or suffocation	Complete isolation and drain down of services, outside man posted and good communication

7.3.2 The risk assessment should specify the control measures that are required for the work to be undertaken safely. It must be emphasised that powered respirators used for asbestos removal only filter the surrounding air; they do not provide respirable air where none exists. Contractors using airline breathing apparatus must ensure that the operatives do not disconnect the air supply to their face-piece and rely on the supplementary filter when inside the enclosure.

7.3.3 It is recommended that the best way to control the above is by adopting a suitable permit to work procedure.

7.3.4 Adequate task and emergency lighting are essential.

7.3.5 Consideration should be given to gas monitoring of the work area.

7.3.6 Where there is a foreseeable risk of explosion intrinsically safe equipment should be employed.

## **8 PERMIT TO WORK PROCEDURE**

Where the risk assessment dictates, a permit to work should be drawn up stating the management systems and safety measures to be taken and the precautions for entry into the confined space together with a time limit for expiry of the permit.

### **8.1 Certification**

8.1.1 The competent person who has carried out or directed the risk assessment and testing must determine:

- Whether purging or ventilation is required.
- Whether the confined space is safe for entry without breathing apparatus for a specified period.
- Confirmation that emergency arrangements are in place.
- The duration of the permit to work (it is suggested that it is restricted to one shift and reissued if necessary).
- Any other precautions that are required.

## **8.2 Cancellation**

- 8.2.1 A permit to work must be cancelled once the operation to which it relates is completed or the specified time has elapsed. If a new one is to be issued the measures must be reconsidered.

## **9. EMERGENCY PLAN**

In all cases an emergency escape and rescue plan is required. This needs to include a fully assessed and tested method of extricating personnel or casualties from the working space, considering the physical characteristics of the personnel. (E.g. size, weight and fitness). This may involve the use of safety lines, harnesses and winches. The fire service should not be used as a substitute for an adequate site based rescue plan.

Any persons working in the confined space must have a good means of communication to outside supervisors who are competent and equipped to affect the rescue safely, the chosen signalling method should avoid the possibility of misinterpretation. In all cases the rescue plan must ensure that rescuers are not put at risk. It is unlikely that vision panels will be practical therefore CCTV is the only real alternative.

In the event of an accident, the plan will be required to show how casualties will be recovered and given first aid, the provision of first aid equipment will depend on the risks identified. A written procedure for alerting the appropriate emergency services will also be required.

## **10. TRAINING**

All operatives required to enter the confined spaces must be adequately trained in addition to their asbestos removal training, paragraph 92 of the ACoP L101 gives the minimum standards.

## **11. REFERENCES**

The Health and Safety at Work etc Act 1974  
The Factories Act 1961  
The Management of Health and Safety at Work Regulations 1999  
The Control of Asbestos Regulations 2006  
The Construction (Design and Management) regulations 2007  
Safe Work in Confined Spaces - Approved Code of Practice L101  
The Confined Space Regulations 1997  
The Health and Safety (Safety Signs and Signals) Regulations 1996  
HSE Guidance Note IND(G)258 Safe Work in Confined Spaces