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NATIONAL SAFETY INSTRUCTION

UK BP/SE/NSI 21 CONFINED SPACE WORKING

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CONFINED SPACES

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CONFINED SPACES

1 SCOPE

This National Safety Instruction applies the principles of establishing a *safe system of work* for personnel requiring access to *confined spaces* in Electricity Transmission Operational sites. It applies the principles of The Confined Spaces Regulations 1997 and Approved Code of Practice (ACoP), L101.

2 DEFINITIONS

Title	Definition
Confined Space	Any space, including any basement, chamber, tank, vat, silo, pit, trench, pipe, sewer, flue, well of an enclosed or partly enclosed nature where there is a risk of death or serious injury from hazardous substances or dangerous conditions (e.g. lack of oxygen). The HSC Approved Code of Practice (ACoP) and guidance L101 provides details and examples
Safe System of Work	A formal systematic examination of a task in order to identify all the hazards and assess the risks, and which identifies safe methods of work to ensure that the hazards are eliminated or the remaining risks are minimised.
Confined Space Entry Document	This is a formal written system and is required where there is a foreseeable risk of serious injury in entering the confined space. See Appendix D.
<i>Occupational Exposure Limit (OEL)</i>	A long-term or short-term exposure limit to substances hazardous to health expressed as an airborne concentration averaged over a specified period of time. The limits are stated in the Health and Safety Executive Guidance Note EH40.
<i>Link Person</i>	a person nominated by the Person In Charge (PIC) having responsibility for controlling entry to the <i>confined space</i> and for recording access and egress of those entering the <i>confined space</i> (Appendix B in this document contains a list of duties).
<i>Lower Explosive Limit (LEL)</i>	The concentration in air below, which insufficient gas / vapour is available for the cloud to ignite when, exposed to a source of ignition.
<i>Qualified Specialist</i>	Person who is competent through experience and qualification to advise on identified hazards, assess the risks and where practical advice on additional preventative and protective measures.

Terms printed in bold type are as defined in the Safety Rules.

3. EQUIPMENT IDENTIFICATION

Equipment on which work is to be carried out must be readily identifiable. Where necessary a means of identification must be fixed to it which will remain effective throughout the course of the work.

4. DANGERS

4.1 The main **Dangers** to personnel in *confined spaces* are

- flammable substances and oxygen enrichment (can cause fire or explosion)
- toxic gas, fume or vapour
- oxygen deficiency
- the ingress or presence of liquids (including flooding)
- solid materials which can flow
- presence of excessive heat

At normal temperature and pressure the percentage of oxygen in air by volume is approximately 21 per cent. A lowering of this value by a small amount may result in loss of consciousness. A raising of this value will result in an oxygen enriched atmosphere, which is very dangerous, and will result in an increased risk of fire or explosion.

Other hazards can be found when entering or working in *confined spaces* but they are not unique to *confined spaces* working. The precautions for dealing with hazards such as: electricity; mechanical equipment; noise; dust; entrapment and working space, are not specifically dealt with in the Confined Spaces Regulations. Where these hazards are present in a *confined space* the precautions will almost always be more extensive than where they appear outside the *confined space* simply because of the enclosed nature of the space.

4.2 **Dangers** can arise due to work on or near the external surfaces of *confined spaces*. This could be from the application of heat, noise, hazardous substances etc.

4.3 **Dangers** from confined spaces can be present in

- a) tunnels, cable pits, basements, air receivers
- b) oil pits and vessels (switchgear tanks, transformer tanks, conservators or similar)
- c) open topped spaces containing gases of chemicals such as liquefied petroleum, chlorine and certain solvent cleaners, which are heavier than air
- d) sumps, trenches and interceptor pits containing gases heavier than air such as Sulphur Hexafluoride (SF₆)
- e) Inverted, open bottomed, spaces containing a gas such as hydrogen, and methane that are lighter than air.
- f) activities carried out by third parties not directly associated with the project e.g exhaust gases emitted from vehicle engines near to confined spaces.

Dangers may also be present in both types of spaces from gases, which are of similar weight to air e.g. nitrogen and carbon monoxide,

4.4 The first three **Dangers** in 4.1 can be removed if a sufficient volume of forced ventilation is provided such that

- a) exposure to toxic substances does not exceed the Occupational Exposure Limit (OEL) as defined in HSE Guidance Document for OELS EH40 and
- b) the concentration of flammable gases in the *confined space* atmosphere is less than 10% of the *lower explosive limit* (See Appendix C).

5 RISK ASSESSMENT

5.1 General Requirements

The Confined Spaces Regulations require that no person shall enter a *confined space* unless it is not reasonably practicable to achieve the purpose without such entry. This means that if the work can be done another way so that entry or work in *confined spaces* can be avoided, it should be. Better work planning, use of technology or a different approach can reduce the need for *confined space* working.

If entry to a *confined space* is unavoidable, a risk assessment must be undertaken and a *safe system of work* identified. This should be based on the requirements of this document, HSC Approved Code of Practice (ACoP) and Guidance L101, and should ensure that suitable and sufficient emergency arrangements are put in place before work starts.

Appendix A in this document contains items to be considered when carrying out the risk assessment and a checklist for the preparation of a *Confined Space, Safe System of Work*.

6 PLANNING AND PREPARATION

6.1 Preparing a Safe System of Work

The General Safety Supervisor (GSS) will ensure a documented *safe system of work* specific to the site where the work is to be carried out is prepared.

A standard *safe system of work* will include as a minimum the following:

- The use of competent staff
- Risk assessment
- Method statement
- Details of the safe means of access and egress
- Details of the structure and the nature of the *confined space*
- Details of the system of communication
- Any Site Specific Approved Procedure (See Section 12)
- The Person in Charge should nominate a Link Person to take charge at the entrance to the *confined space*. His duties should include controlling and recording those entering and leaving the *confined space*, taking charge of communications for the work, and instigating or managing the implementation of the *confined space* emergency arrangements if a rescue operation is required. Appendix B in this document contains a list of such duties.

6.2 Emergency Arrangements

Arrangements for emergency rescue will depend on the nature of the confined space, the risks identified and the likely nature of an emergency rescue.

- To be suitable and sufficient the emergency arrangements should include consideration of:-
 - Rescue and resuscitation equipment
 - raising the alarm and rescue
 - safeguarding the rescuers
 - fire safety
 - first aid
 - public emergency services
 - site emergency plan

7 SETTING PEOPLE TO WORK

All staff shall be set to work in accordance with the requirements of UK BP/SE/310 Setting Staff and Contractors to Work and Work Execution.

The GSS will issue an appropriate Confined Space Entry Document (Appendix D). He will also consider the need for atmospheric monitoring and if required, will ensure that it is carried out (Appendix C and E).

8 PRECAUTIONS ON COMPLETION OF WORK IN A *CONFINED SPACE*

When boxing-up at the end of the work the *Link Person* must ensure that in compliance with the *safe system of work*:

- a) all members of the **Working Party** together with any tools and equipment are withdrawn and personally warned by him not to re-enter the *confined space*
- b) if, owing to the nature of the *confined space*, he considers it necessary to make a final check, all access points except one must be closed and secured. A member of the **Working Party** should enter the *confined space* to check while the *Link Person* guards the one point of access to ensure that no-one re-enters the space while it is being checked.

9 CONTRACTORS

All staff including contractors must be competent for the work to be undertaken. NGT will recognise accredited contractors' training in *confined spaces* achieved through any relevant industry qualification e.g. CITB etc.

Where contractors are carrying out work the NGT **Senior Authorised Persons** will be responsible for ensuring **Safety from the System**. The Contractor will be responsible for ensuring all other aspects of a *safe system of work*, including within the *confined space* within their designated work area.

10 REVIEW

After completion of the work, any Site Specific Approved Procedure(s) shall be reviewed and updated as necessary to take into full consideration any resulting changes.

11 TRAINING and AUTHORISATION

All staff involved in confined space work will be trained and competent in the work they are undertaking.

NGT acknowledge that independent bodies produce training packages that significantly meet the requirements of Confined Space training. Where NGT and contractors staff are able to demonstrate that they have completed such a course and they are a NGC Safety Rule Competent Person they may be authorised under this NSI.

12 SITE SPECIFIC APPROVED PROCEDURES

There are locations where NGT staff will need to enter places considered as *confined spaces* to carry out routine work on a regular planned frequency. Where this occurs then a Site Specific Approved Procedure can be developed and authorised by the Site / Location Manager.

It shall be the Site / Location Manager's responsibility to ensure the Approved Procedure is:

- Communicated to all staff who could enter the *confined space*
- Display the procedure at strategic locations so that all that enter the *confined space* can read it before entering.
- Review it periodically i.e. every 12 months or sooner if circumstances and risks change.

13 APPENDICES

Appendix A	Confined Spaces Safe System of Work Checklist
Appendix B	Example of Link Person duties
Appendix C	Air Monitoring
Appendix D	Confined Space Safety Document
Appendix E	Daily Gas Levels Log
Appendix F	Working Party Daily Control Sheet
Appendix G	Recommended Safety Equipment for use in conjunction with access to or work in confined spaces

APPENDIX A - CONFINED SPACES SAFE SYSTEM OF WORK CHECKLIST

To be considered when carrying out Risk Assessment

- Only carry out tasks in confined spaces if there is no reasonably practicable alternative.
- Is the work necessary?
- Can entry into *Confined Space* be avoided if possible?
- Can work be done from outside *Confined Space*?
- Can optical equipment operated from outside the *Confined Space* be used for internal inspection.?

Factors to be considered during Risk Assessment when entry to *Confined Space* is necessary

- Task
- Working environment
- Materials and tools
- Suitable trained staff
- Emergency rescue

CHECKLIST

Nature of the task

Supervision of the task

Competence of personnel for *confined spaces* working, including relevant training -

Fitness for task

Communications

Testing/monitoring the atmosphere

Gas purging

Ventilation

Removal of residues

Isolation from gases, liquids and other flowing materials

Isolation from mechanical and electrical equipment

Selection and use of suitable equipment (e.g. tools, work equipment, materials etc.)

Personal protective equipment (PPE) and respiratory protective equipment (RPE)

Portable gas cylinders and internal combustion engines

Gas supplied by pipes and hoses

Access and egress

Heat Stress

Demarcation – signs / barriers

Fire prevention

Lighting
Static electricity

Ignition Sources

Brief nominated Link Person of duties and emergency requirements

Emergencies and rescue:

- Rescue and resuscitation equipment
- Raising the alarm and rescue
- Safeguarding the rescuers
- Fire safety
- Control of plant
- First aid
- Public emergency services
- Training

Limited working time

Site Specific Approved Procedures

Third Party activities that could have an impact

APPENDIX B - EXAMPLE OF LINK PERSON DUTIES

The link person is the person designated to have responsibility for controlling entry to the *confined space* and for recording access and egress of those entering the *confined space*. He shall complete the *confined space* access checklist (where one has been developed as part of the *safe system of work*) and Working Party Daily Control Sheet for each entry into the *confined space*.

The link person duties shall include the following:

- a) Where necessary to achieve **Safety from the System**, maintain communications with Operations and Trading and the Network Operations Centre (NOC). This is to ensure that they are aware that personnel are within the *confined space* and that they have a duty to inform the link person of any system abnormality that may require the *confined space* to be evacuated, such as cable oil pressure alarms.
- b) Maintain communications and know the location of all of the working groups within the *confined space*. Evacuate all personnel in the event of a communication system failure.
- c) Maintain communications with secondary link persons at other entrances, where there is more than one entrance to the *confined space*.
- d) Maintain an accurate log of all personnel in the *confined space* using Appendix F
- e) Check the operation of all the *confined space* systems and monitor and operate local alarm and control panels ensuring that lighting, sump pumps, ventilation fans, temperature monitoring equipment and air quality etc. before entry and remain serviceable during *confined space* access periods.
- f) Monitor the environment outside the *confined space* and around the entrance(s) to it, to ensure that traffic and the general public do not interfere with the work in the *confined space*. Also ensure that vehicle / mobile plant exhausts are directed away from the *confined space* entrance points and any ventilation intake points.
- g) Be aware of activities being carried out in the confined space and their possible interaction. Eg A contractor painting the inside with solvent and another contractor carrying out welding activities. Inform the **General Safety Supervisor** of any concerns.
- h) The link person must not enter the *confined space* himself.
- i) The link person must prohibit unauthorised access and monitor the activities of third parties, (e.g. vandalism, stray animals etc.) where applicable.
- j) The link person must be familiar with the emergency precautions, as documented in the emergency plan. In the event of an emergency, if required the link person must sound the warning and call the emergency services. He shall also inform Operations and Trading, the Network Operations Centre (NOC) and local management of any incident.
- k) The link person shall assist in emergency rescue activities, without compromising his link person duties or putting himself in danger.

APPENDIX C –AIR MONITORING

- a) The risk assessment will determine whether the atmosphere within a confined space needs testing for hazardous gas, fume or vapour or to check the concentration of oxygen prior to entry.
- b) Testing will be needed where the risk assessment indicates that the atmosphere might be contaminated or to any extent unsafe to breathe, or where any doubt exists as to the condition of the atmosphere. The atmosphere will need to be checked after ventilation or purging processes.
- c) The findings of the risk assessment may indicate that testing should be carried out on each occasion that the *confined space* is re-entered, even when the atmosphere was initially found safe to breathe. Regular monitoring of the atmosphere may be required where there is a known possibility of adverse changes in the atmosphere the work. The atmosphere should be continuously monitored when for example forced ventilation is being used, and where the work activity could give rises to the change in atmosphere.
- d) The choice of testing/ monitoring equipment will depend on the circumstances and knowledge of possible contaminants. Testing equipment should be in good working order and where necessary calibrated and checked in accordance with the intervals and recommendations accompanying the equipment.
- e) Testing should be carried out by persons who are competent to use the equipment and who have been instructed and trained in the risks involved. They must be able to interpret the results and take necessary action. Records should be kept of results and findings.
- f) The atmosphere can often be tested from outside, without the need for entry, drawing samples through a long tube. It is important that enough samples are taken to be representative of the air in the confined space. If it becomes necessary for the tester to enter the *confined space*, then consideration must be given to the person entering the *confined space* wearing an approved breathing apparatus (must be trained). A safe system of work must be set up, including emergency arrangements before this person enters the confined space.
- g) If the outcome of the air monitoring indicates that it is necessary to remove substances or to clear deposits from the *confined space*, the documented *safe system of work* must be reviewed and revised accordingly. The person, in preparing any report that may be required, must consider that, although the atmosphere may initially be free from contamination, the work may produce noxious substances. This must be incorporated into the revised *safe system of work*.
- h) Following the above work, confirmation must be obtained by the Person In Charge of the **Working Party** that adequate clearance of substances or deposits has been achieved.

APPENDIX D - CONFINED SPACED ENTRY DOCUMENT

ONLY TO BE ISSUED BY GENERAL SAFETY SUPERVISOR

NAME OF CONFINED SPACE AND LOCATION		Associated Safety Document No
Link Person (name)	Person In Charge On Site:(Name)	
Mobile Phone Number:	Mobile Phone Number:	
THIS DOCUMENT EXPIRES ON (maximum duration 5 consecutive days):		
ACCESS POINT(S) (ATTACH DIAGRAM IF APPLICABLE):		
WORK TO BE CARRIED OUT:		
METHOD STATEMENT NUMBER FOR ACCESSING CONFINED SPACE	RISK ASSESSMENT NUMBER FOR ACCESSING CONFINED SPACE	
EACH PERSON MUST CARRY:	EACH WORKING PARTY MUST CARRY:	
ADDITIONAL EQUIPMENT:		
OTHER APPARATUS AND PLANT IN CONFINED SPACE		
Issued by (PRINT):	Signature:	Date:
(GSS)		
Received By (PRINT):	Signature	Date:
(PIC)		
Cleared by (Signature):	Signature	Date:
(PIC)		
Cancelled by (Signature):	Signature	Date:
(GSS)		
A WORKING PARTY DAILY CONTROL SHEET AND A GAS LEVELS LOG SHEET (if applicable) MUST BE ISSUED WITH THIS CONFINED SPACE SAFETY DOCUMENT FOR EACH DAY OF ITS DURATION		

APPENDIX E - DAILY GAS LEVELS LOG

<u>DATE</u>		GAS READING TO BE TAKEN AT TIME OF ENTRY AND THEN EVERY MINUTES (as per safe system of work)							Associated Safety Document No
		Gas Monitor Serial Number				Calibration Date			
			ENTRY LEVEL						
TIME	→								
	LEL	0-10%							
	H₂S	10ppm							
	CO	30ppm							
	O₂	19-23%							

APPENDIX F - WORKING PARTY DAILY CONTROL SHEET

DATE:		NAME OF Link Person				Associated Safety Document No			
CONFIRM PRESENCE OF PERSONS BY TIME IN THE APPROPRIATE COLUMN									
PRINT NAMES		1ST OCCASION		2ND OCCASION		3RD OCCASION		4TH OCCASION	
NO.	NAME	ENTRY	EXIT	ENTRY	EXIT	ENTRY	EXIT	ENTRY	EXIT
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									

NEW PAGE EACH DAY

APPENDIX G - RECOMMENDED SAFETY EQUIPMENT FOR USE IN CONJUNCTION WITH ACCESS TO OR WORK IN CONFINED SPACES

EQUIPMENT	DESCRIPTION	STANDARD
Tripod and Winch, Lifeline	A self supporting tripod with a dual purpose winch, man riding and equipment raising / lowering with an operator brake and free wheel facility. The lifeline offers protection from falls and can be used to pull a person from a confined space in an emergency.	
Safety Harness	A nylon webbing rescue harness with front and rear attachment points for ascent & descent	CE Marked
Respiratory Protective Equipment – Escape Set	A personal use chemical oxygen generator escape set, worn on a belt which provides breathable oxygen for 30 mins for an active escape or 100 mins for a passive casualty	
Respiratory Protective Equipment –Breathing Apparatus		
Gas Levels Monitor	A gas monitor which measures: Oxygen, Carbon monoxide, Hydrogen sulphide and Lower explosive limit levels	Equipment should be CE Marked.
High Intensity Light Stick	An intrinsically safe chemical light source which is activated by bending the light stick to break an internal capsule to release the activating chemical	
Torch	A small, waterproof, high intensity beam hand torch which can also be fitted to a safety helmet.	
Intrinsically safe portable lighting	Portable handlamps designed to be used in potentially explosive atmospheres. If the equipment fails it should fail safe and not create an ignition source.	
Stretcher	A semi-rigid roll-up man portable stretcher or, A rigid metal frame stretcher with bottom skids enabling it to be dragged along on most surfaces. An optional, removable centre mounting cycle wheel is available so that two people can support & wheel a casualty to a point of evacuation	
First Aid Kit	A Travelling First aid Box	
Personal Movement Detector	A device which monitors the movement of the wearer. It is worn on the belt (or other part of the body). Its alarm facility is activated by a removing a key. It emits a warning of alarm after 20 secs. of non-motion, for 8 seconds followed by a high frequency audible alarm which can only be switched off by the insertion and operation of the removed key.	

Equipment should be purchased by National Contract or hired from a Specialist Company.

ALL PEOPLE WHO WILL BE EXPECTED TO USE SAFETY EQUIPMENT MUST HAVE BEEN TRAINED TO DO SO.

The site specific risk assessment will determine the exact safety equipment required for a specific activity. This table may be used as a guide