0. FOREWORD

0.1 This Inter Plant Standard prepared by the Standards Committee on Personnel Safety Appliances & Procedures, IPSS 1:11 with the active participation of representatives from SAIL plants, TATA STEEL & VSP/RINL and was adopted in February 2006 and first revision done in October, 2014.

1. OBJECTIVE

1.1 Standards Committee on Personnel Safety Appliances & Procedures, IPSS 1:11 identify accident prone conditions common in steel plant working. To avoid accidents in such areas, the Committee formulates standards based on knowledge & experience of Safety experts from various steel plants. Work in Confined Space is a very common occurrence and necessary precautions outlined in this standard, will help eliminate the mishaps.

2. SCOPE

2.1 A confined space in a plant has limited means for entry or exit. It is not designed for continuous occupancy. It is so configured that an employee/ employees can enter and perform only the assigned work in the space within a designated time.

Examples of confined spaces are: pits, excavations, cable tunnels, sewers, vessels, storage tanks, gas holders, inside pipelines, cyclones, dust catchers, electrostatic precipitators, scrubbers, etc.

Some of the hazards frequently encountered in the confined spaces are:

- Oxygen deficiency/ enrichment
- Presence of toxic, flammable or asphyxiating gases
- Entry/ liberation of hazardous material/ gases/ water during work
- Presence of rotating equipment
- Need to work in cramped or un-natural postures
- Dusty environment
- Tripping hazards
- Inadequate illumination
- Fire/ explosion
- Electric Shock

3.0 PRECAUTIONARY STEPS

For safe working inside a confined space, the following must be ensured:

3.1 The owner department/ Executing Authority shall prepare a Safe Work procedure/ protocol after detailed Hazard Identification in conjunction with Safety Officer.

3.2 The site arrangement for safe working must be inspected by Safety officer, owning department and Executing Agency before the workmen are allowed to enter the space.

Entry permit, as in **ANNEXURE- I**, will be signed by all the above representatives and finally approved by the concerned HOD/ Section Incharge of the owning/ executing Authority.

3.3 Ensure that the confined space is thoroughly free of all hazardous or corrosive substance such as gases, all kinds of fumes, chemicals, muck and solid wastes, etc. Also, it must be free from decaying vegetation and animal waste that may release Methane gas.

3.4 For clearing of smeared containments muck, solid waste etc, a safe procedure to be included in the protocol.

3.5 It shall be ensured that the confined space is completely isolated from the connected system with blank plates wherever necessary and separated from all the utility systems such as inert gases, fuel gases, steam, water and other fluid connections.

3.6 Ensure that either natural or mechanical ventilation is provided to the confined space. It must also be adequate to remove fumes generated during various activities. A responsible person from the concerned department must ensure the adequacy of ventilation and rescue arrangements.

3.7 Ensure that all the moving parts or equipment inside the confined space are adequately guarded and the power supply disconnected.

3.8 Ensure adequate illumination inside the confined space. All portable illumination system shall be up to 24 Volt only. (Ref 36A of Factories Act 1948).

3.9 Ensure that all the portable electrical equipment used in a confined space are either grounded or double insulated or equipped with earth leakage cut out safety system. In case there is a likelihood of presence of explosive fumes or gases, all the electrical devices used must be of a type approved for such application.

3.10 A calibrated multi gas detector (CO, O2, LEL) shall be made available with the working people for continuous monitoring of working inside the confined space (with ventilation off) to check for:

a) Oxygen deficiency and Oxygen enriched atmosphere
b) Presence of toxic substances, wherever applicable
c) Explosive concentration, wherever applicable

It shall be ensured that all gaseous, toxic and explosive components are well within the prescribed limit before allowing the people to go inside. [Ref 36.2(a) of Factories Act 1948]

3.11 If the workmen are using oxygen consuming equipment (torches, burners etc) ensure that the confined space is continuously provided with sufficient air to maintain minimum Oxygen concentration of 19.0% to 23% by volume.

3.12 A designated supervisor of the executing agency must be deputed outside the confined space whose sole responsibility will be to watch the safe execution of work, sound an alarm and render assistance immediately, if required.

3.13 There must be a suitable means of voice communication between the workmen inside the confined space and the Supervisor outside. If for some reason, it is not possible to use a voice communication device, a proper signaling system shall be established between the workmen inside and the Supervisor.

3.14 Ensure that the persons working in a confined space are provided with adequate personal protective devices such as Safety Harness**,** gas masks, breathing apparatus, gas detector/ personal sampler with alarm facility, etc as per requirement. [Ref Section 36.2(b) of Factories Act 1948]

3.15 According to the nature of work and the risk involved due to presence of toxic gases and fumes, the working spell shall be interrupted by rest periods during which the person shall come out and breathe in open air. The maximum allowable spell of work shall be recorded clearly in the protocol.

3.16 A person who has already worked for 8 hours in a confined space, must not be allowed to work further on the same day.

3.17 If the person working inside is wearing a full body Harness, care must be taken to ensure that he is anchored with lifeline and proper arrangements so that he can be pulled out and rescued immediately in case of emergency. Provision of rescue team shall be kept ready for dealing with such incidents.

3.18 In case of gas cutting and welding in a confined space, ensure that all the hoses are free from leaks. Compressed gas bottles/cylinders are forbidden inside a confined space. The gas torches should be lighted outside the confined space and the space must be tested for explosive atmosphere each time before a lighted torch is taken inside. [Ref Section 37.4 of Factories Act 1948]

3.19 As far as practicable all confined space job are to be planned during day light hour.

3.20 Whenever combustion type equipment is used in a confined space, ensure that the exhaust gases are vented outside.

3.21 Ensure that the warning notices/ caution boards are displayed outside the confined space at appropriate visible locations.

3.22 Each time a man goes in or comes out of the confined space, a proper record of the same must be maintained at site by the supervisor/ executing Authority.

3.23 After the completion of the work, men and material must be removed from the confined space and permit to work shall be returned by the representative of the executing agency to the designated officer of the owning department.

ANNEXURE-I

PERMIT-TO-WORK FOR WORKING IN CONFINED SPACE

(For working in a confined space containing toxic/ inflammable/ explosive gases/ vapors/ chemicals. Valid only for 1-day)

Warning: Working in a confined space is hazardous. Special precautions must be taken)

A. GENERAL (TO BE FILLED IN BY EXECUTING AUTHORITY)

1. Brief description of job: _____

   _____

2. Exact location & name of equipment/confined _____

   Space where work is to be done _____

3. Executing Deptt _____ Name of agency _____

4. Name, designation & Contact No. of Executive _____

   _____

5. All contractor workers taken safety induction training from Safety Engineering Department(SED)? _____

6. Name & designation of observer provided exclusively to keep a watch over persons working inside: _____

7. Adequate system of communication provided between persons working inside and observer? Y/N

8. The personnel entering confined space will use:
   i) Breathing apparatus Y/N
   ii) Safety Harness Y/N

9. Any Fuel Gas & Oxygen cylinders not kept inside the confined space. Yes/ No

   Name: _____ Signature: _____ Designation:_____

   Date: _____ Time: _____ Contact No. _____

B. ELECTRICAL ACTIONS TAKEN

1. Have all equipment connected with Sl.No. 2 been shutdown, fuses removed, earthed and caution tags displayed? _____(YES/ NO)

   ELECTRICAL SHUT DOWN NO._____

2. Are low voltage lamps (24 V) provided at site? _____(YES/ NO)

   Name: _____ Signature: _____ Designation:_____

   Date: _____ Time: _____ Contact No. _____

C. OPERATIONAL ACTIONS TAKEN (TO BE FILLED BY OWNER/ OPERATION DEPTT)

1. Confined space been depressurized and ventilated by opening Manholes, bleeders etc? _____

1. Confined space has been physically isolated by blank plates so as to prevent ingress of toxic gas/ vapors/ chemicals? _____

3. Artificial ventilation provided? _____(YES/ NO)

4. Have adequate numbers of breathing apparatus & oxygen resuscitating equipment been kept at site? Specify quantities of each. _____

5. Name the toxic gases/ vapors/ chemicals expected to be present _____

   _____

6. Have all equipment, connected with Sl. No. 2 been shutdown/depressurized?
   _____

7. Have any special arrangements been made like provision of fire extinguishers, clear water supply for chemical accidents, oxygen resuscitation equipment, fire brigade, ambulance etc _____

8. Any other safety measure taken _____

   _____

   _____

   Name: _____ Signature: _____ Designation:_____

   Date: _____ Time: _____ Contact No._____

D. MEASUREMENT OF TOXIC, EXPLOSIVE GASES & OXYGEN CONCENTRATION (TO BE FILLED BY ENERGY/FUEL MANAGEMENT DEPTT)

1. What is the concentration of toxic gases: _____

2. Is the confined space checked for explosive mixture and found safe? _____

3. What is the concentration of Oxygen in the space and is it safe to undertake the job? (safe limits 19-23%) _____

Name: _____ Signature: _____ Designation:_____

Date: _____ Time: _____ Contact No. _____

E. ISSUANCE OF PERMIT-TO-WORK (TO BE FILLED BY OWNER/ OPERATION DEPTT)

1. In view of the above safety measures taken, permit to work for the equipment at Sl. No. 2 is hereby issued. The executing personnel should use all relevant PPE's like BA Sets, Air line, Full Body Harness, Life line etc.:

This permit is valid for Dt:_____ from _____ Hrs to _____ Hrs

Name: _____ Signature: _____ Designation:_____

Date: _____ Time: _____ Contact No. _____

(To be signed by an Executive)