INTERPLANT STANDARD - STEEL INDUSTRY		
CET/IPSS	**CODE OF PRACTICE FOR PROTOCOL FOR SHUT DOWN WORK ON FUEL GAS PIPELINES**	**IPSS:1-06-044-08**
	NO CORRESPONDING INDIAN STANDARDS EXISTS	

0. FOREWORD

This Inter Plant Standard prepared by the Standards Committee on Pipes, Fittings, Valves and Piping Layout, IPSS 1:6 with the active participation of the representatives of all the steel plants and associated organization in the field was adopted in August 2008.

0.1 Inter Plant Standards for steel industry primarily aim at achieving rationalization and unification of parts and sub-assemblies used in steel plant equipment and accessories, and provide guidance in indenting stores or equipment for existing or new installations by individual steel plants. It is not desirable to make deviations in technical requirements.

1. SCOPE

1.1 This standard covers guideline for preparation of protocol for repair / shutdown of isolated as well as charge fuel gas pipelines only.

1.2 This standard does not cover gas lines for LPG, Propane, Acetylene, Oxygen, etc.

2. INTRODUCTION

2.1 In integrated steel plants, the various by-product gases like B.F. gas, coke oven gas, LD gas and mixed gas are major source of energy. They are also the greatest safety hazards, if not handled with care. Awareness regarding potential hazardous and required safety norms to be abided by, is the first and fore most significant state of protocol.

2.2 The gas line jobs shall be executed under a protocol in order to assign responsibility and effective coordination among various agencies

involved and also to provide checklist to ensure that no important step is over looked.

3. DEFINITION

3.1 Protocol is a procedure / order to be followed for obtaining a shutdown of a unit or a system under operation for restricted period within a specified area.

3.2 It is also a document which lists the activities sequentially for the work to be taken up along with the person responsible for each activity.

3.3 The protocol also lists all safety measures to be taken while shutting down a pipeline during the execution of work and recharging the pipelines after the work are complete.

4. CONTENTS OF PROTOCOL

4.1 Location of work place.

4.2 Nature and necessity of the work to be carried out.

4.3 Time of commencement and expected duration of the work.

4.4 Name of the owner department for the work.

4.5 Name of the chief coordinator for execution of the work and name of the coordinator of each discipline like mechanical, electrical, etc.

4.6 List of preparatory jobs to be completed prior to the commencement of the actual work.

4.7 List of tools and tackles, mobile equipment like crane and any other special equipment required.

4.8 List of safety provisions and facilities like rescue gadgets, ambulance and fire safety equipment.

4.9 Sequence of the activities for carrying out the work with name of person responsible for each activity.

4.10 List of safety precautions to be taken / observed by working personnel with the name of the supervisor.

4.11 A schematic diagram showing the pipelines, interconnection, isolating devices and indicating the location of each activity.

5. SCOPE OF WORK

5.1 A protocol shall be prepared for carrying out maintenance activities for charged or isolated gas lines and associated system as per the format at **Annexure-I**.

5.2 For work within a department, the protocol shall be proposed by the owner department under whose charge the work is to be carried out. It shall be signed by owner department / executing agency, maintenance agency, departmental safety officer and concerned person from the Safety Engg. Department, Energy Management Deptt, Fire Service Agency. Finally, the document shall be approved by the head of the owner department.

5.3 For job covering / affecting more than one department, the signature of their HOD shall be taken and protocol shall have the signature or approval by divisional head/heads.

5.4 For the work covering larger area in interplant, signature of entire affected / involved department shall be taken on the protocol. Such protocol shall be approved by head of the plant/work.

5.5 For the work of the repetitive nature, a standard protocol may be prepared in consultation with all concerned agencies and used every time after revalidation by HOD or head of the division or plant, as the case may be with fresh signature and date.

6. GUIDELINES FOR PREPARATION OF PROTOCOL

6.1 Meeting / discussion shall be held among concerned agencies/department.

6.2 A meeting shall be convened by the owner department for explaining the purpose and scope of work requiring shutdown.

6.3 Head of operation and mechanical maintenance and other representatives of the department getting affected by the shutdown shall be called for the meeting.

6.4 Drawing / sketch indicating interconnection with consumer getting affected, location of the valves, water seals, flanges, etc shall be prepared. The sketches shall get vetted by the concerned department.

6.5 Following points shall be taken care of :

- Valves to be closed / blanked
- De-pressurization point
- Water seals to be operated
- Purge in and purge out point.
- Sampling point
- Drains.

6.6 The methology and medium of purging (steam / nitrogen) and its requirement shall be decided in the protocol meeting.

6.7 Single point responsibility by name, designation and phone number for giving clearance for shut down and charging the line after shutdown shall be decided.

6.8 Single point clearance from individual department getting affected for obtaining clearance and giving clearance for line charging.

6.9 Other essential services required shall be decided.

6.10 Do's and don'ts (during shutdown period) for department getting affected by the shutdown and the executing department shall also be decided).

6.11 The protocol shall ensure procedure for proper isolation, purging, ventilation, sampling, clearance and supervision.

7. ISOLATION OF GAS PIPELINE

7.1 The isolation of gas pipelines is done by operation of gate/goggle valve by water filling-in U-Seal or by inserting blank plates at pre-determined location.

7.2 If blanking is done before valve, the valve shall be kept open to release the gas pocket between blank and gate.

7.3 The isolation jobs need special attention – Various preparatory jobs such as size and type of blank, servicing of flange bolt, good working platform / scaffolding, emergency escape route, arrangement for lifting tackles, use of non-sparking tools – required for isolation operation shall be ensured.

7.4 If there is any interconnection of water drainer, bleeders, steam connection and impulse line, pipes of two different gas lines shall be isolated by inserting a blank plate or shall be physically disconnected.

8. STANDARD MAINTENANCE PRACTICES (SMPs) FOR ISOLATED FUEL GAS PIPELINE

8.1 Purge the isolated gas pipelines within the blanks / isolation devices through the end bleeder of the line with steam / nitrogen at adequate pressure for sufficient time.

8.2 After thorough purging of the pipeline, take a sample from inside the pipeline from as many locations as possible to check carbon monoxide concentration inside the pipeline and also test with explosimeter.

8.3 If the sample is as per norms (Oxygen = or < 20.6%, CO = or < 0.05 ppm, the clearance can be given for opening pipeline components. In case cutting / welding jobs are involved, explosimeter reading shall not show any presence of explosive mixture inside the pipeline. On conducting such tests, the testing agency (Gas Safety Section of EMD) shall furnish the test report to job coordinator in writing.

8.4 In case, cutting on pipeline is planned, it is preferable to maintain slight flow of steam / nitrogen while making the first cut. However, in the

enclosed spaces, the use of steam is preferred. Suitable water spray arrangement shall be kept to avoid fire in the vicinity of the gas pipelines due to cutting and welding work.

8.5 In the bigger size of pipes, minimum one round inside and two rounds outside welding shall be ensured. While welding from inside, proper ventilation shall be ensured.

8.6 As far as possible, air ingression inside pipeline shall be avoided by closing manholes/end flanges and putting inert media during cutting.

8.7 While welding new pipe / compensator with old pipe the matching portion shall be free of any deposits.

8.8 During cutting / welding of gas pipeline depending upon conditions, remove muck / deposits from gas line.

8.9 After the completion of repair / replacement work of the pipeline, all opening shall be closed for leak testing.

8.10 Gas pipeline shall be tested with steam / air / nitrogen. In case nitrogen / air are used, soap solution shall be applied. Whereas, in case of steam, **all welded joints are coated with lime.**

8.11 The identified leakages shall be suitable rectified.

8.12 Retesting shall be done after rectification of defects as per 8.10.

8.13 Cutting / welding near isolated gas pipelines shall not be done without permission.

8.14 Localized "bund" can be formed with sand bags /bricks in order to keep the water level maintained inside pipelines in case fire in gas line.

8.15 Smoking is strictly prohibited near gas line.

9. STANDARD MAINTENANCE PRACTICE FOR CHARGED FUEL GAS LINES (ONLINE REPAIRS OF CHARGE GASLINE)

9.1 If leakage is observed, it shall be plugged with taper wooden plug and area sample shall be ensured for safe working. Wherever possible, the gas line network shall be regulated, if required.

9.2 Prepare half clad /patch as per the profile of the gas line.

9.3 Pipeline thickness of defective area shall be measured before the start of job. This will help in arranging proper size of clad / patch. Besides this, it will also help in proper regulation of current.

9.4 While welding, low current is preferred. Therefore, welding transformer shall be checked for proper regulation of current. Welding transformer should have double earthling.

9.5 Only experienced and trained welder shall be allowed to work as the line will be in charged condition.

9.6 As the gas line is charged, job shall be done only during day light hours.

9.7 Clad / patch shall be properly positioned and welded without excessive hammering on gas pipeline. As far as possible clad shall be welded to the fully welded ribs.

9.8 Wherever possible, saddle supports of gas line shall be temporarily supported and then saddle shall be removed for welding of clad. After complete welding of clad, saddle supports shall be repositioned.

9.9 While positioning of clad at the temporarily plugged leakage point, steam nipple shall be welded to the clad for supply of steam. This will help in avoiding fire.

9.10 As far as possible, minimum no. of clad shall be used and all clads shall be properly welded. It is generally seen that gas flows from one clad to another. Avoid edge of clad at the leakage point. If it is unavoidable, weld the leakage point first before proceeding for cladding.

9.11 Places where complete welding is not possible, clad shall not be positioned.

9.12 Minimum two rounds of welding shall be done on clad and weld shall be free from all defects.

9.13 After the completion of jobs, all temporarily connection shall be removed and the scrap shall be properly disposed.

9.14 All welding and earthing connection shall be removed from spot on completion of work.

9.15 Running steam hose shall be made available near the place of work.

9.16 Welding work on charged gas pipelines shall be done very cautiously without any haste.

10. PURGING OF FUEL GAS PIPELINES

10.1 All steam and nitrogen points and valves shall be pre-checked for proper working.

10.2 As soon as blanking is over, the purging point and blank shall be opened and all condensate shall be drained out.

10.3 Purging shall be done from the blanking point to the pipe end.

10.4 Special arrangements and care shall be taken to purge the gas trap area.

10.5 During nitrogen purging, no person shall stand near the bleeder / manhole. No person shall be allowed to enter any confined place during nitrogen purging. If entry to confined to be allowed, then the confined place to be purged with air till oxygen is more than 20%.

11. VENTILATION OF FUEL GAS PIPELINES

11.1 After proper purging, if necessary, all the manholes and end flanges shall be kept open so that natural circulation of air is well stabilised from one end to other end.

12. SAMPLING AND CLEARANCE

12.1 Sample shall be taken from the bleeder and shall be tested and analysed for gas composition.

12.2 After satisfactory test results, final clearance for the job including cutting / welding shall be obtained in a prescribed proforma from the proper authorized department as per **Annexure-II**.

13. SUPERVISION OF WORK

13.1 The overall supervision shall be under one officer earmarked for the job by concerned department.

13.2 Specific task shall be assigned to particular person by name wherever possible and designation in all cases.

13.3 A log book shall be maintained to record progress of work. All important operation connected to the shutdown shall be logged.

14. GAS SAFETY PRECAUTIONS

14.1 Fire brigade shall be on stand-by duty for gas pipeline repair job.

14.2 All life line repair work shall preferably be carried out in day light only.

14.3 Safety appliances as prescribed by Safety Engg. Department (SED) shall be used by the working personnel.

14.4 If required, additional structural support / steel scaffolding shall be provided for repair / maintenance work.

14.5 All the lifting devices, slings, ropes, etc shall be properly pasted and ensure before using them.

14.6 All welding transformers shall be properly earthed and jointing of cables shall be avoided. If unavoidable, joints shall be properly insulated.

14.7 Proper working platform with emergency escape route shall be pre-constructed for carrying out the jobs safely.

14.8 Clearance from gas safety shall be taken for start of work.

14.9 Before start of work, all working persons shall be explained the safety precautions and they shall be made aware of escape route and other safety provisions.

14.10 Running steam points shall be made available near the work spot.

14.11 For emergency purpose, all leakage arresting tools such as yellow clay, wooden plug, M-seal shall be available at the working spot.

14.12 Only experienced persons and welders shall be deployed for gas pipeline job.

14.13 Oxygen and DA cylinder shall be kept properly so that while cutting / welding of pipe etc, spark shall not fall on them.

14.14 Standard maintenance practices (SMP) for isolated gas line / live gas lines shall be properly followed.

14.15 Non-sparking tools to be used for execution of work.

14.16 Electrical continuity to be maintained across the blanking flange.

14.17 Power supply to bus-bar etc to be disconnected during gas line job.

14.18 No cutting / welding job to be allowed within a radius of 20 meters.

15. INSTRUCTION FOR EMERGENCY RESCUE

15.1 In case of gas poisoning :

- First remove affected person to fresh air and loosen his clothes.
- Contact Gas Safety Department for first aid at the spot.
- Call ambulance for medical aid.

15.2 In case of explosion / fire

- Inform Fire Brigade department, Energy Centre, Gas Safety Station and Main Medical Post for burn injury etc.

- Inform head of the concerned department, EMD, plan control and controlling officer.
- Cordon off the area around injured person with the help of CISF.

16. REFERENCE FOR GENERAL SAFETY PRECAUTION

16.1 1-11-001-98 Definitions of terms related to Safety

16.2 1-11-005-98 Safety Procedure for working at heights by contractor's workers

16.3 Procedure for permit to work.

ANNEXURE – I

DEPARTMENT
(Initiating the protocol)

Approved By

(Departmental Head /Head of works]

Heading (Write down the main heading for which the job is planned}

Duration of work Commencement of work _____
Completion of work _____

Time frame Time of commencement _____
Time of completion _____

A. Purpose of shut down: Mention in short the necessity of above job.

B. Affect of shutdown :

C. Preparatory job :

D. Special condition: Technological regime to be followed.

E. Major activities: Broad description of work.

F. Chief coordinator of the job - (Name and department)

SL. No.	DESCRIPTION	RESPONSIBILITY (BY NAME)
1	PREPARATORY WORK	With names and designation of persons responsible for execution
i)		
ii)		
2	ACTUAL JOBS	Details of operation in sequence with name and designation of persons responsible/section responsible.
i)		
ii)		
3	SAFETY PRECAUTIONS	All safety precautions including fire prevention and rescue steps to be taken.
i)		
ii)		

F. SIGNATORIES :

Signature of all the persons connected with the jobs to be mentioned here with names, designation and department.

ANNEXURE-II

WORK PERMIT

A. Work permit for gas cutting / welding on gas pipelines and equipment after purging and ventilation.

Date : ____________ Location __________________

It is certified that the gas line and equipment has been isolated.

Date : ____________ Signature __________________

Time : ___________ Name & Designation __________

* *

B. Chemical analysis report of samples drawn from gas pipelines by gas safety department after purging.

Date : ____________ Time : ___________

SL. No.	TIME	LOCATION	CO	O2	CO2	Explosimeter Test
1.						
2.						
3.						
4.						
5.						
6.						
7.						

(Safe limit : CO $\leq$ 0.05 mg/lt, O2 min. 20.6%)

Sample drawn by ______________ in the presence of _____________

Signature : ______________

C. Certificate for purging and ventilation of gas pipelines by concerned agency

Date _____ Time _____

1	2	3	4	5
Executive of shop	Executive of EMD	Executive of Executing agency	Executive of SED	Representative of other concerned deptt as applicable

SIGNATURES

D. Clearance to be obtained from Electrical Section for isolation / earthing, electrically operated equipment

E. On the basis of certificate, A, B, C D, clearance for gas cutting/welding work as pre protocol is permitted to the executing agency.

(TO BE FILLED UP BY CONCERNED DEPARTMENT)

DATE _____ TIME _____

SIGNATURE _____ _____

NAME & DESIGNATION _____