INTERPLANT STANDARD - STEEL INDUSTRY		
IPSS	**SPECIFICATION FOR GAS ANALYSIS SYSTEM** Corresponding IS Does Not Exist	**IPSS: 2-07-090-13**

0. FOREWARD

0.1. Interplant standardization: Standardization activity in steel industry is being pursued under the aegis of Steel Authority of India Limited (SAIL). This Interplant Standard has been prepared by the Standards Committee on Instrumentation and Automation IPSS 2:7, with the active participation of representatives from the steel plants, other concerned organizations and established manufacturer in the field, and was adopted on September 2013.

0.2. Interplant standards on design parameters primarily aim at achieving rationalization and unification of parts and assemblies of process and auxiliary equipment used in steel plants and these are intended to provide guidance to the steel plant engineers, consultants and manufacturers in their design activities

0.3. Objective of this standard is to give specification of gas analysis system to help selection of the same for the purpose of measurement of percentage composition of gas / gas components at various locations in the steel plant. A description of such system is given in the Appendix-I.

1. SCOPE

1.1. This standard covers the details of requirement of gas analysis system to enable the users for proper selection of gas analysis system & its auxiliary components.

2. GENERAL

The gas analysis system shall be complete with the following units:

2.1. Sampling system comprising gas sampling probe, complete with filters, isolation valves, ring heaters, insulator jackets etc, as required. Dual probes shall be used, wherever required as per process criticality.

2.2. Gas preparation & conditioning system including sample conditioning, pumping, cooling, cleaning, drying etc. as applicable along with filter panels, scavenging panels complete with valves, tubing, fittings, accessories etc, as required.

2.3. Gas analyzer panel with analyzer instruments, monitoring devices viz, flow, pressure, temperature etc, tubing, fittings, accessories, as required.

2.4. UPS & non-UPS type electrical power supply for the complete gas analysis system, complete with isolation transformer, Circuit breakers, MCBs, relays, 24 V DC regulated power supply units, earthing system etc, as required for efficient performance of the analyzer system.

2.5. Calibration equipment with calibration gas cylinders. Facility for both automatic & manual mode of calibration shall be provided. Cross sensitivity correction shall be provided wherever applicable.

3. SELECTION OF GAS ANALYSER

The gas analysers shall be chosen on the basis of the following:

a) Range & applications
b) Accuracy
c) Place of installations
d) Ambient Conditions
e) Required response time
f) Output & Display

3.1. **Range and applications** are to be decided by the type of analyzer/sensor.Table-1 gives the recommended ranges for proper accuracy & speed of response.. Response time of the Analyser system shall be designed to comply with process requirements.

3.2. ACCURACY

Accuracy requirement will depend upon the process. Accuracy of analysers shall be defined as percentage relative error and generally lies 2% of the scale range or better. Unless otherwise specified, accuracy of analyzers shall be within ±1% of span. Repeatability of analyzers shall be within ± 1%

3.3. PLACE OF INSTALLATION

a) Separate analyser room shall be provided in the vicinity of gas sampling points. However, storage of calibration gas cylinders shall be arranged outside the analyser room. Room CO monitoring unit shall be provided in the analyser rooms.

b) Analyzers in explosion hazardous area shall be installed in ex-proof shelters.

c) Exhaust tubing shall be provided for the sample gas after analysis and will be either vented into atmosphere at safe elevation/ distance, or fed back into the process stream. Gases containing hydrogen shall have separate outlets.

d) Analysis system of Hydrogen & other explosive gases shall bear the approval of statutory body.

e) Wherever analysis of harmful gases has to be done, unmanned gas analyser room with proper air conditioning` facility shall be planned. At least one inert gas and / or steam purging point with flexible hose connection and isolation valve shall be provided at the entry point of this room.

f) In analysis of explosive gases (or gases forming an explosive mixture), approval of design and installation of analyser system shall be obtained from competent authority.

g) Poisonous and explosive gas detection systems shall have safety-limit alarm annunciation. Safety limits of different gases shall be as per OSHA norms.

h) Normally, Different types of gas detectors / sensors shall be used. However, type of sensor shall be selected, depending on the application: (Refer Table- 1)

3.4. Ambient Conditions

Should be as per Analyser and Site Arrangements

3.5. Required Response Time

TABLE-1

Sl.no.	Type of analyzer/sensor	Accuracy (%)	Applicable gases	Response time (Max)
1.	Electro-chemical cell	2%	H_2S,Toxic gases	6 sec
2.	Semiconductor/solid state cells	2%	-do-	6 sec
3.	Thermal conductivity	1%	H_2	5 sec
4.	Paramagnetic	1%	O_2	10 sec
5.	Zirconium based analyser	1%	O_2 – in situ	7 sec
6.	Catalytic	2%	Toxic gases	6 sec
7.	Non-dispersive Infra-red radiation type	1%	CO,CO_2,SOX,NOX	10 sec

3.6. OUTPUT & DISPLAY

Suitable display unit with key-board/ switches shall be provided on the analyzer panel front for monitoring & display of different parameters, status of analyser & sample conditioning equipment etc. For Output Signals, Display & Interfacing, Specification of related Analyser shall be referred.

4. ACCESSORIES

4.1. Condensation monitors, complete sampling system shall be designed & supplied by the analyser manufacturers only. All components & fittings of the analyser & sample conditioning system shall be from OEM/ OEM Authorized Representative.

4.2. Before the filter unit, SS isolation valves shall be provided for each probe to facilitate online changing of the filter unit. Sample gas coolers shall be provided with redundant sample gas path & peristaltic pumps.

4.3. Sampling of dusty, hot, dry, cold or wet gases shall be done using dual probes with automatic switchover and with intermittent purging facility.

4.4. Analyser shall be microprocessor-based and the analyser PLC shall do all related sequencing & logic functions. Analyser PLC shall have protocol for Communicating with PLC/ DCS, as applicable.

4.5. System & application software for configuring and diagnostics of the analyser PLC shall be provided.

4.6. Where there is a possibility of choking of analyser inlet filters, automatic inert gas purging facility initiated by the analyser PLC shall be provided.

4.7. All solenoid valves used in gas analysis system shall have manual override.

5. CALIBRATION

Each analyzer shall be calibrated using standard test gas cylinder. At least two point calibration shall be employed. A test certificate from OEM will accompany the analyzer.