INTER PLANT STANDARD – STEEL INDUSTRY		
IPSS	**GUIDELINES FOR SAFETY OF INSTRUMENTS USED IN STEEL PLANTS** *(Second Revision)*	**IPSS:2-07-007-11**
	Corresponding IS does not exist	Formerly: IPSS:2-07-007-97

0. FOREWORD

0.1 This Interplant Standard (second revision) was prepared by the Standards Committee on Computerization and Automation, IPSS 2:7 with the active participation of the representatives of the steel plants and reputed consulting organizations and was adopted on March 2011.

0.2 Interplant Standards for steel industry primarily aim at achieving rationalization and unification of safety requirements for equipment and devices used in different sections of steel plants, and provide guidance in indenting stores or equipment for existing or new installations by individual steel plants. For ensuring requisite safety for men and plant and applicability of common safety standard out of available safety standards; it was felt advisable to select a standard and define its applicability. It is advisable not to make deviations in technical requirements.

0.3 Indian Electricity Rules, 1956, and other provisions, statutory regulations of the Government of India and the State Governments shall be complied with, as and wherever applicable.

0.4 This standard was first published in 1987. The Second revision has been carried out for re-arranging the contents methodically and updating the standard.

1. SCOPE

1.1 This Interplant Standard covers the guidelines for safety as applicable to instruments used in the steel plants.

1.2 Use of hand held analytical instruments is beyond the scope of this standard.

2. TERMINOLOGY

2.1 For the purpose of this standard, the following definitions in addition to those given in IS 7204 (Part 1):1974 `Specification for stabilized power suppliers, dc output: Part 1 Terms and definitions' shall apply.

2.2 **Safety Device** - An apparatus, device, instrument, equipment or circuit used to:

- inform
- protect
- draw attention
- cause a state by an operator/supervisory interlinked sequence/steps initiated by mechanically/automatically or by computer.

which setright abnormal/undesirable states.

2.3 Abnormal State - A condition of a

- process
- parameters
- state of thing

that which is undesirable for the health of process, production or plant.

2.4 **Intrinsic Safety** - Technique that achieves safety by limiting the ignition energy and surface temperature that can rise in normal operation or under certain foreseeable fault conditions, to levels that are insufficient to ignite an explosive atmosphere.

2.5 **Hazardous Location** - Where possibility of suffocation, explosion, due to explosive mixture of air with gas, vapour, dust or other material, metal coming in contact with water, entrapped water in metal pool, exists.

Class I Division I hazardous locations are which have hazardous concentration of flammable gases or vapour continuously, intermittently or periodically present under normal operating conditions.

Class I Division 2 locations are which have volatile flammable liquids or flammable gases present, but normally confined within closed containers of systems, from which they can escape only under abnormal operating or fault conditions.

2.6 **Alarm** - A device that signals the existence of an abnormal condition by means of an audible or visible discrete change, or both, intended to attract attention.

2.7 **Tripping** - A signal or action of a safety device which initiates a chain of action resulting in sudden stoppage of a machine or system.

3. SAFETY REQUIREMENTS

3.1 The equipment shall conform to the safety requirements of IS 8945:1978 `Specification for electrical instruments for hazardous atmospheres', IS 9858:1981 `Safety requirements for electronic measuring apparatus' and IS 616:1981 `Safety requirements for mains operated electronic and related apparatus for household and similar general use (first revision)'. Wherever Indian Standards do not exist, ISA, IEEE or NEEMA standards or the ones laid down hereafter, be followed. Devices should be intrinsically safe for hazardous locations only.

3.2 Environmental Safety Requirements - The safety devices shall be safe and operable under environmental conditions A, B, C, D or E as laid down in IPSS:2-07-001-87 `Application classes for testing and reliability data' in all or any one condition. For hazardous locations, these shall conform in construction and safety standards to Factory Mutual Standard Class I Division 2, Group E, F and G, Class I Division 1, Group B, C and D.

4. CLASSIFICATION OF SAFETY DEVICES

4.1 A classification of safety devices shall be grouped as follows:

4.1.1 Safety device for the process

a) Pressure switches, high, low alarm, tripping;
b) Flow regulating switches, high, low, alarm, tripping;
c) Temperature status alarms, high, low, dangerous, tripping;
d) pH value status alarms, high, low, normal;
e) Differential pressure switches;
f) Proximity switches;
g) Differential pressure transmitters for flow maintenance;
h) Indicating secondary instrument alarms'
j) Level switches.

4.1.2 Safety devices for the plant

a) Speed limiters;
b) Hot and cold metal detectors;
c) Longitudinal movement and vibration alarm and trippers;
d) Actuator movement limiters;
e) Safety relief valves;
f) Safety shut off valves;

g) Micro-switches generating electrical pulse for end limits or signalizer;
h) Trace analyser;
j) Smoke and flame detecting alarms.

4.1.3 Safety devices for environment and pollution control

a) Pollution detectors specially air and water pollution alarms.

4.1.4 Safety devices for radiation hazards

5. SELECTION OF SAFETY DEVICES

5.1 It should be based on status of location, flammable nature of environment, class of environment, etc. In highly flammable area like Class I Division I, electrical instruments and devices should be housed in explosion proof casings. A cluster of instruments in 4 mm to 5 mm pressurized cabin/control room be housed. Electrical devices/printers should preferably be located in separate rooms/pressurized cabins/explosion immune enclosures. Level, pressure, flow measurement in tanks containing flammable liquids should be done through non-reactive/inert medium. Usage of pneumatic instruments in open places in flammable areas is recommended.

5.2 Selection of actuator and control element for a process be based on fail-safe principle, that is on the failure of actuating energy, the final control element/actuator should either stay in a condition as is where is state or open full or close full as to ensure safe condition of the process.

5.3 Following standards shall also be referred for additional information:

IS 5571 Guide for selection of electrical equipments for hazardous areas.
IS 5780 Intrinsically safe electrical apparatus and circuits.
IS 8240 Guide for electrical equipment for explosive atmosphere
IC61508 Functional Safety of electrical/ electronic/ programmable electronic safety related systems.

5.4 Contacts should be rated for 10^6 operations. Average rating should be better than:

Class 1, Division 1 - 1A, and voltage 230 + 10 per cent.
Class 1, Division 2 - 1A, and voltage 230 -15 per cent.

6. GUIDELINES FOR SAFE PRACTICES

6.1 Use of appropriate Zeener barrier is recommended for protection of equipment and avoidance of explosion in hazardous locations.

6.2 Instrument power supply should be from a separate cable in a conduit pipe and it should not be from power feeding cables.

6.3 For electrical actuators/motors, supply of electrical power is recommended through phase sensitive overload and under voltage protection tripping relays and short circuit protection elements.

6.4 A block of electrical instruments should be supplied power through individual electrical switches and from a separate step-down transformer which shall be protected by fast acting over voltage, over load protection and phase sensitive relays or automatic switch incorporating these features.

6.5 Low voltage dc supply shall be used for all contact making devices in hazardous location.