

**CONSTRUCTION STANDARD**  
**FOR**  
**PRESSURE INSTRUMENTS**

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## 1. SCOPE

This Standard covers the requirements and precautions to be considered in installation of pressure instruments in projects construction.

## 2. REFERENCES

Throughout this Standard the following standards and codes are referred to. The editions of these standards and codes that are in effect at the time of publication of this Standard shall, to the extent specified herein, form a part of this Standard. The applicability of changes in standards and codes that occur after the date of this Standard shall be mutually agreed upon by the Company and the contractor:

### API (AMERICAN PETROLEUM INSTITUTE)

RP 500 A/B/C	"Recommended Practice for Classification of Locations for Electrical Installation in Petroleum Refineries"
RP 550	"Manual on Installation of Refinery Instrument and Control Systems Part 1, Section 4, Pressure Instruments"

### ISA (INSTRUMENT SOCIETY OF AMERICA)

RP 12.6	"Recommended Practice for Installation of Intrinsically Safe Instrument Systems in Class I Hazardous Locations"
S 12.4	"Practice for Instrument Purging for Reduction of Hazardous Area Classification"

### IPS (IRANIAN PETROLEUM STANDARDS)

IPS-C-IN-100	"General"
IPS-C-IN-190	"Transmission Systems"
IPS-C-IN-210	"Instruments Protection"
IPS-C-IN-270	"Instrument Impulse Lines"

## 3. UNITS

International System of Units (SI) in accordance with IPS-E-GN-100 shall be used.

## 4. INSTALLATION AND MOUNTING

### 4.1 General

**4.1.1** Unless otherwise specified, instruments shall be accessible for maintenance or removal from grade, permanent platform, deck or permanent ladder.

**4.1.2** Instruments shall be mounted as close as possible to the process connection with a minimum length of process piping lines.

**4.1.3** Instruments shall not be mounted on or supported by process piping, handrails, or equipment subject to vibration.

**4.1.4** Instruments shall be mounted with a clearance of at least 0.75 meter per 40°C from equipment with surface temperature in excess of 90°C.

**4.1.5** A minimum of 0.5 meter clearance for worker access shall be provided around an instrument installation.

**4.1.6** Instruments shall be installed in a manner as to be about 140 cm above the grade or platform, measured from the centre of instrument.

**4.1.7** Pressure Instrument junction boxes shall be mounted in the vertical plane, with unused entry holes blanked.

**4.1.8** The pressure instrument installation and the pressure instrument piping installation drawings are attached to this standard. These drawings shall be used accordingly during pressure instrument installation.

## **4.2 Pressure Gages**

**4.2.1** All pneumatic pressure transmitters and controllers shall have an output pressure gage.

**4.2.2** All indicating pressure instruments shall be readable from the grade, platform or deck as specified by the project drawings.

**4.2.3** Gages up to and including the 150 mm. dial size may be supported by their own pipe connections unless the lines or equipment involved are subject to severe vibration. Larger gages and gages subject to vibration should be supported independently.

**4.2.4** Siphons or "pigtail" condenser seals shall be provided in connections to close-mounted gages in steam or other condensable vapor services to maintain liquid in the siphon and to prevent overheating.

**4.2.5** In applications where pressure can be manually controlled at a control valve, the pressure gage shall be clearly visible from the valve location.

**4.2.6** All process pressure gages shall be equipped with block and bleed valves.

## **4.3 Instruments other than Gages**

### **4.3.1 Supports**

**4.3.1.1** Recorders, transmitters, controllers, or similar instruments shall be supported independently of the pressure connection.

Care shall be taken to avoid the possibility of imposing stresses from the pressure piping, conduit, etc., which may cause malfunction. Pressure instruments (Local controllers, transmitters) shall be mounted on stand-pipe or local panels as specified in the specific project hook-up drawings (Installation and support of instruments on process piping is not permitted).

### **4.3.2 Electronic instruments installation**

**4.3.2.1** Wiring for electronic pressure transmitters or transducers shall be in accordance with IPS-C-IN-190 (transmission systems) standard.

**4.3.2.2** Electronic pressure transmitters shall not be located too close to hot lines, vessels, or other hot equipment, with ambient temperatures in excess of 60°C.

### **4.3.3 Piping construction**

**4.3.3.1** Unless otherwise specified, all pressure impulse piping shall be performed in ½" piping size with minimum schedule 80 pipe and fittings and shall be as short as possible.

**4.3.3.2** All pipes shall be reamed after cutting and blown clean of cutting burrs and other foreign materials.

**4.3.3.3** If a long connection is necessary, the piping shall be sloped properly between the pressure tap and instrument to minimize the number of traps for vapors or liquids.

**4.3.3.4** Where high points cannot be avoided, vents shall be installed; scale traps or drains, or both, shall be provided at low points in the piping. This requirement applies to long impulse lines only when the fluid justifies such a precaution.

**4.3.3.5** Where the shutoff valve is not readily accessible from the instrument location, an additional valve shall be installed at the instrument side.

**4.3.3.6** Impulse piping shall be supported at proper intervals. For details refer to IPS-C-IN-270 (Instrument Impulse Lines).

#### **4.3.4 Enclosures**

**4.3.4.1** Enclosures shall be provided to protect locally mounted instruments from ambient conditions if the manufacturer's standard case is not adequate.

**4.3.4.2** The enclosures must not restrict bleed air from pneumatic instruments nor heat dissipation from electronic devices.

**4.3.4.3** Area classification may require special enclosures to meet appropriate standard requirements.

**4.3.4.4** For tropicalization and/or winterization, reference is to be made to IPS-C-IN-210 (Instruments Protection).

#### **4.3.5 Connections**

**4.3.5.1** The instrument process connection shall be ½", with the first block valve conforming to process piping specifications.

**4.3.5.2** For gas service, the process tap shall be located on the top of horizontal lines so that any liquid in the instrument piping to be "self drained" back into the line.

**4.3.5.3** For liquid and steam service, the process tap shall be located on the side of the line so that any bubbles or noncondensable vapor in the instrument piping to be "self vent" back into the line.

**4.3.5.4** Taps on the bottom of the line shall be avoided because of the possible presence of sediment or scale.

### **5. CALIBRATION**

For general calibration requirements, reference shall be made to IPS-C-IN-100 (General).

#### **5.1 Pressure Transmitters**

**5.1.1** The reference input for a pressure transmitter process port shall be generated by one of the following methods, with proper accuracy;

- Pneumatic calibrator,
- Precision regulator and gage with self-contained air or nitrogen supply,
- Manual hydraulic pump and precision gage,
- Deadweight tester,

**5.1.2** Pressure transmitter output shall be measured by one of the following methods:

- Pneumatic calibrator,
- Precision gage,
- Manometer,
- Milliamp test meter (for electrical output),
- Or any other test and calibration devices, required with proper accuracy.

## **5.2 Local Indicating Pressure Controllers**

**5.2.1** Reference pressure for the local indicating pressure controllers shall be generated as mentioned in 5.1 here-above.

**5.2.2** The reference pressure shall be applied to the local indicating pressure controller input and the indicator value shall be compared to the reference pressure and the output shall be checked to conform to the project specifications.

**5.2.3** The operation modes shall be checked in accordance with the procedures to ensure correct operation.

**5.2.4** If the controller has an auto/manual switch, it shall be placed in the manual position and the operation checked by adjusting the controller from minimum to maximum values and comparing the output with the indicator.

**5.2.5** Necessary adjustments shall be made in accordance with the project test procedures required by the project documentation.

## **5.3 Pressure and Differential Pressure Switches**

**5.3.1** Reference pressure shall be produced as specified under 5.1.1 here-above.

**5.3.2** The pressure switch shall be adjusted to actuate at the setpoint for either a rising or falling signal according to project Data Sheets.

## **5.4 Pressure Gages**

**5.4.1** Direct connected, Bourdon tube pressure gages shall be checked, for accuracy, prior to installation.

**5.4.2** Receiver-type pressure gages shall be calibrated at four points (0, 10, 50 and 90 percent of scale). The gages shall be calibrated with a precision pressure gage, a precision air regulator, or a pneumatic calibrator.

**5.4.3** Diaphragm-type draft gages shall be calibrated at four points: (0, 10, 50 and 90 percent of scale). The gages shall be calibrated with a water column manometer.

**5.4.4** Glass tube manometers and draft gages shall be properly zeroed and filled with the fluid required as specified in project Data Sheets.

## **6. TAGGING AND MARKINGS**

The contractor and installer shall durably and clearly mark all tubing and cabling of the pressure instruments.

The contractor shall check that the tag-plates of instruments to be installed on the pertinent instrument without damage or dirt on it and to correspond to the specified instrument.

## **ATTACHMENTS**

### **General Notes:**

- 1) These drawings are to be considered only as typical. Actual details may differ for different type of applications.
- 2) For material detail of support and foundation refer to pertinent drawings of instrument standard drawings package.