



# Engineering Standard

SAES-J-200

22 May 2013

Pressure

Document Responsibility: Instrumentation Standards Committee

## Saudi Aramco DeskTop Standards

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Revised paragraphs are indicated in the right margin

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## 1 Scope

This standard prescribes the minimum mandatory requirements governing the design and installation of pressure and differential pressure (D/P) instruments.

The requirements of this standard are in addition to and supplement the requirements of the Process Industry Practice PIP [PCCPR001](#), “*Pressure Measurement Criteria*” referenced in Section 3 of this standard.

## 2 Conflicts and Deviations

- 2.1 Any conflicts between this Standard and other applicable Saudi Aramco Engineering Standards (SAESs), Materials System Specifications (SAMSSs), Standard Drawings (SASDs), or industry standards, codes, and forms shall be resolved in writing by the Company or Buyer Representative through the Manager, Process & Control Systems Department of Saudi Aramco, Dhahran.
- 2.2 Direct all requests to deviate from this standard in writing to the Company or Buyer Representative, who shall follow internal company procedure [SAEP-302](#) and forward such requests to the Manager, Process & Control Systems Department of Saudi Aramco, Dhahran.

## 3 References

The selection of material and equipment, and the design, construction, maintenance, and repair of equipment and facilities covered by this standard shall comply with the latest edition of the references listed below, unless otherwise noted.

### 3.1 Saudi Aramco References

Saudi Aramco Engineering Procedure

[SAEP-302](#)

*Instructions for Obtaining a Waiver of a Mandatory  
Saudi Aramco Engineering Requirement*

Saudi Aramco Engineering Standards

[SAES-B-068](#)

*Electrical Area Classification*

[SAES-J-003](#)

*Basic Design Criteria*

Saudi Aramco Library Drawings (Non-Mandatory)

[DC-950040](#)

*Instrument Piping Details Pressure Indicators &  
Switches - Locally Mounted*

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<a href="#"><u>DC-950041</u></a>	<i>Instrument Piping Details Pressure Indicators &amp; Switches - Panel or Wall Mounted</i>
<a href="#"><u>DC-950042</u></a>	<i>Instrument Piping Details Pressure Instruments - Blind &amp; Indicating Type</i>
<a href="#"><u>DD-950053</u></a>	<i>Field Mounting Details for Instruments</i>

Saudi Aramco Instrument Specification Sheets (ISS)

<a href="#"><u>SA-8020-200</u></a>	<i>ISS - Pressure Transmitters - Smart (ABS, GAGE, and DP)</i>
<a href="#"><u>SA-8020-212</u></a>	<i>ISS - Pressure and Differential Pressure Gauges</i>
<a href="#"><u>SA-8020-213</u></a>	<i>ISS - Pressure and D/P Switches</i>
<a href="#"><u>SA-2773</u></a>	<i>ISS - Pressure Instruments</i>

3.2 Industry Codes and Standards

International Electrotechnical Commission

<a href="#"><u>IEC 60529</u></a>	<i>Degree of Protection Provided by Enclosures (IP Code)</i>
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National Electrical Manufacturers Association

<a href="#"><u>NEMA 250</u></a>	<i>Enclosures for Electrical Equipment (1000 Volts Maximum)</i>
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Process Industry Practices

<a href="#"><u>PCCPR001</u></a>	<i>Pressure Measurement Design Criteria</i>
<a href="#"><u>PCIDP000</u></a>	<i>Differential Pressure Installation Details</i>
<a href="#"><u>PCIDP100</u></a>	<i>Differential Pressure Transmitter Installation Details</i>
<a href="#"><u>PCIPR000</u></a>	<i>Pressure Installation Details</i>
<a href="#"><u>PCIPR100</u></a>	<i>Pressure Transmitter Installation Details</i>

4 Modifications to PIP [PCCPR001](#), **Pressure Measurement Design Criteria**

The following paragraph numbers refer to PIP [PCCPR001](#) (April 2007), which is a part of this standard. The text in each paragraph is an addition, exception, modification, or deletion to the requirements of PIP [PCCPR001](#) as noted. Paragraph numbers not appearing in PIP [PCCPR001](#) are new paragraphs to be inserted.

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- 2.2 (Modification Exception) Delete all references to ISA specification forms and replace with reference to Saudi Aramco Instrument Specification Sheets.
- 3 (Delete complete paragraph)
- 4.1.1.3 (Modification Exception) Delete all references to ISA specification forms. The minimum data set shall be in accordance with Saudi Aramco Instrument Specification Sheets.
- 4.1.12 (Additional Paragraph) All instruments and their accessories shall meet the relevant requirements of [SAES-J-003](#) pertaining to ambient conditions. Locally mounted instruments and their accessories shall meet the relevant electrical area classification requirements of [SAES-B-068](#).
- 4.2.2 (Addition) Add the word “*Process*” before the word “*pressure*”.
- 4.2.3 (Modification Exception) Pressure gauges shall have safety glass. Plastic lenses (acrylic or polycarbonate) can only be used if they are the standard window material for gauges supplied as part of a package unit. Lenses, when used, are to be compatible with the surrounding process and ambient environments.
- 4.2.7 (Addition) Add the following sentence at the end of the paragraph: “siphons shall also be used for process fluids with a temperature over 250°C (480°F) when the gauge is above the tap connection.”
- 4.2.8 (Additional Paragraph) Standard ranges shall be selected such that the normal operating pressure falls between 30% and 70% of the scale range.
- 4.2.9 (Additional Paragraph) Gauges supplied by vendors as part of other pneumatic devices such as current to pneumatic converters, instrument air supply regulators, valve positioners, piston actuators, and similar devices shall be vendor standard unless otherwise specified.
- 4.3.5 (Additional Paragraph) Switch Process side connections shall be ½ inch NPT. Connections for pneumatic tubing shall be ¼ inch NPT female, minimum. Electrical conduit connections shall be ½ inch or ¾ inch NPT.
- 4.3.6 (Additional Paragraph) Electric switch contacts shall be snap acting, single-pole, double-throw (SPDT) as a minimum. The contact rating shall be sufficient to operate solenoids, relays, or other devices as specified in the data sheet without the need for additional or interposing relays. Hermetically sealed switch contacts are preferable.
- 4.3.7 (Additional Paragraph) Switch actuation, as the result of increasing or decreasing pressure must be specified.
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- 4.4.1 (Addition) For gas and vapor services, pressure transmitters and instruments shall be mounted above and as close to the pressure taps as possible. Pressure taps shall be connected to the process piping at the 12 o'clock position.
- 4.4.2 (Addition) For liquid or condensing services pressure transmitters and instruments shall be mounted below the pressure taps. Pressure taps shall be connected to the process piping at the 3 o'clock or 9 o'clock position. Alternative pressure taps connected at the 12 o'clock position shall only be used when the 3 o'clock or 9 o'clock locations cannot be used.
- 4.4.6 (Additional Paragraph) Pressure transmitters shall be Smart.
- 4.5.3 (Additional Paragraph) Differential pressure transmitters shall be Smart.
- 4.6 (New Paragraph) **Recorders**
- Direct-connected, field-mounted recorders shall have a 300 mm diameter chart, and a 24 hour or 7 day chart drive. Only recorder pens with felt tip, or capillary inking systems are acceptable.
- 4.7 (New Paragraph) **Accessories**
- 4.7.1 All pulsation dampeners (or snubbers), siphons, diaphragm seals and similar accessories shall be shown on P&IDs.
- 4.7.2 Snubber design shall allow easy disassembly to facilitate cleaning. Snubbers shall not be used on switches in critical (e.g., ESD) service. Pulsation dampeners using a restriction orifice or a moving piston are acceptable. Capillary tube-type snubbers are not acceptable.
- 4.7.3 Gauge savers protecting instruments against pressures that are very high compared to the operating range may be used, except on switches in critical (e.g., ESD) service.
- 5 (New Section) Installation Requirements
- 5.1 Branch connection up to and including the first block (root) valve shall meet the applicable Saudi Aramco piping codes. If more than one instrument are sharing a common root valve, means to isolate each instrument independently shall be provided.

*Commentary Note:*

*The device manifold is acceptable to provide the required isolation at the end-use device in clean/non-plugging services when multiple devices share a common root valve connection.*

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- 5.2 Process connections for direct-mounted instruments shall be located where line vibration is negligible.
  - 5.3 For low-pressure service, e.g., furnace draft, the instrument is to be mounted at the same elevation or above the pressure tap.
  - 5.4 All pressure instrument installations shall be equipped with vent/drain valves.
  - 5.5 For additional details of typical pressure instrument installations refer to the referenced Saudi Aramco Library Drawings and PIP [PCIPR000](#), [PCIDP000](#), [PCIPR100](#), and [PCIDP100](#).
  - 5.6 Local recorder enclosures shall be NEMA Type 3 or IEC IP 44 as a minimum. Pressure and D/P switch enclosures for indoor use shall be NEMA Type 1 or IEC IP 22. For outdoor installation NEMA Type 4 or IEC IP 65 enclosures are required as a minimum.

#### **Revision Summary**

22 May 2013      Minor revision as the pressure transmitter tap locations were clarified to reduce confusion and rework.  
Revised the "Next Planned Update."