

SCOPE

- I 1.1 This practice covers the design and selection of pressure instruments.
- I 1.2 **An asterisk (*)** indicates that a decision by the Owner's Engineer is required, that additional information is to be furnished by the Owner's Engineer, or that information for the Owner's Engineer approval is to be supplied by the vendor or contractor.

SUMMARY OF ADDITIONAL REQUIREMENTS

- I 2.1 **Table 1** lists the practices and standards which shall be used with this practice.

TABLE 1

PRACTICES	
IP 3-6-1	Piping for Instruments
IP 3-16-1	Flanged Joints, Gaskets, and Bolting
IP 15-6-1	Electronic and Pneumatic Instruments
STANDARDS	
API Standards	
RP551	Process Measurement Instrumentation
ASME / ANSI Standards	
B1.20.1	Pipe Threads, General Purpose (Inch)
B40.1	Gauges - Pressure Indicating Dial Type - Elastic Element

DESIGN

- O 3.1 **Pressure range** shall be such that normal pressure will be in the middle third of the span.
- S,R * 3.2 **Instruments shall have over-range protection** to the maximum pressure to which they may be exposed. **Instruments exposed to vacuum** shall have **under-range protection** to full vacuum.
- S 3.3 **Instruments in flammable or toxic service** shall **not** have pressure containing parts of **low melting materials** such as aluminum or brass.
- R * 3.4 **All wetted and pressure-containing parts** shall meet the material requirements of the process piping to which the instrument is connected. In process streams containing Hydrogen, the use of **gold-plated diaphragms** shall be considered.

INDICATING PRESSURE GAUGES

- R 4.1 **Indicating pressure gauges** shall be **liquid-filled**, and in accordance with **ASME / ANSI B40.1**. **Accuracy** shall be **Grade 2A**. Liquid filled gauges shall have a small vapor space for thermal expansion of the liquid fill. Vapor space shall be adequate to allow gauge to satisfactorily operate without leakage under the full range of ambient and process conditions specified.

Gauges shall be capable of passing the vibration test (A3.10) and the fatigue test (A3.13) specified in **ASME / ANSI B40.1, Appendix A**. A statistically meaningful percentage of all gauges sold shall be sampled to give a confidence factor of at least 90%.
- I 4.2 The minimum dial size shall be 4 in. (100 mm).
- I * 4.3 Pressure gauge measuring elements shall be the C-type seamless Bourdon tube-type. Proposals to use an alternate type shall be reviewed by the Owner's Engineer.
- R * 4.4 **The measuring element** shall be hardened Type 316 stainless steel, unless process fluid requires the use of other materials. It shall withstand over-ranging to a pressure 1.3 times the maximum scale reading without a permanent set that affects gauge calibration.
- I 4.5 The pressure range of the Bourdon tube and the tube material shall be stamped on the socket.
- S * 4.6 The case shall be **solid-front**, weather proof and furnished with a **blow-out back** or **blow-out disc**. All cases shall be made of low-copper aluminum (0.6 percent copper maximum), stainless steel, or phenolic. Other case materials require Owner's Engineer approval.
- S,O 4.7 **A visible stop pin** shall be used to restrict the upper limit of the pointer travel. The stop pin shall be located at the 6 o'clock position on the gauge front.

IP 15-3-1		Pressure Instruments	
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(This practice is appropriate for attachment to Inquiry or Purchase Document)

- S 4.8 **Gauge window** shall be double-strength shatter-resistant safety glass. The window shall be gasketed on the bezel side by means of a resilient gasket and held in place from the case side by means of a threaded retaining ring.
- O,S ♦ *4.9 **Fill fluids used in liquid filled gauges** shall be selected carefully, and account for both process and ambient temperature limits. Glycerine or silicone fill fluids **shall not** be used in applications involving strong oxidizing agents such as chlorine, nitric acid, or hydrogen peroxide, because of spontaneous chemical reaction, ignition, or explosion. Instead, Fluorolube should be specified in these cases. Fill fluid shall be reviewed and approved by the Owner's Engineer.
- I ♦ 4.10 Direct connected **Draft** measurements shall be slack diaphragm type. Where instruments are remotely mounted, draft measurements shall be made using a pressure transmitter and local receiver gage.

PNEUMATIC AIR RECEIVER INDICATING GAUGES

- S,O 5.1 **A stop pin** is required on all pneumatic receiver gauges at zero (0) pressure indication.

PRESSURE SWITCHES

- R 6.1 **Electrical switch** shall have contact rating of 115 Volts 2 amps minimum. Any switch that initiates a device such as an inductive trip coil of a motor starter shall have a minimum inductance contact rating suitable for that service.
- S,R 6.2 **Switch contacts** should be hermetically-sealed.

Revision Memo

9/68	Original Issue of Basic Practice	1/82	Revision 4
1/70	Revision 1	12/90	Revision 5
6/71	Revision 2	12/91	Revision 6
6/74	Revision 3	12/92	Revision 7
3/98	Revision 0 - Original Issue of International Practice		
6/99	Revision 1 Par. 4.9 added safety designation due to filling fluid properties. Par. 410 revised paragraph to cover local and remote mounted draft gages.		

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