

Selecting a Pressure Gauge

Pressure Gauge Operating Principle

Most standard dial type pressure gauges use a bourdon tube-sensing element generally made of a copper alloy (brass) or stainless steel for measuring pressures 15 PSI and above. Bourdon tube gauges are widely used in all branches of industry to measure pressure and vacuum. The construction is simple yet rugged and operation does not require any additional power source. The C-shaped or spirally wound bourdon tube flexes when pressure is applied producing a rotational movement, which in turn causes the pointer to indicate the measured pressure. These gauges are generally suitable for all clean and non-clogging liquids and gaseous media. Low pressure gauges typically use an extremely sensitive and highly accurate capsule design for measuring gaseous media from as low as 15 INWC to 240 INWC (10 PSI). Digital gauges use an electronic pressure sensor to measure the pressure and then transmit it to a digital display readout.

Gauge Sizing

The gauge size is typically referring to the diameter of the dial (ANSI) or case (DIN) for bourdon tube or capsule pressure gauges. The dial is the viewing area of the gauge that shows the pressure scale and needle pointer. Gauges are available in a wide range of sizes from 1-1/2" up to 12". Generally, the more accurate gauges are larger and more costly.

Mounting & Connections

Lower mount (LM), center back mount (CBM), and/or lower back mount (LBM) are available for most gauge types. Most of our standard gauges have NPT threaded connections. Many gauges can be panel mounted using either a U-clamp bracket or a front flange option. Pressure gauges should be mounted in the upright position if possible.

Pressure Range

A gauge range of twice the normal working pressure is generally selected. The maximum operating pressure in all cases should be limited to 75% of the gauge range. Where alternating pressure and pulsation are encountered, working pressure should be limited to 2/3 of the gauge range.

Pressure Fluid Composition

Copper alloy (brass) or stainless steel is the standard wetted parts (materials in contact with the pressure process media) available on most pressure gauges. Since the sensing element of a pressure gauge may be exposed directly to the measured medium, consider the characteristics of this media. It may be corrosive, solidify at various temperatures, or contain solids that may leave deposits inside the sensing element. For pressure fluids that will not solidify under normal conditions or leave deposits, a standard bourdon tube gauge may be acceptable. Otherwise, a seal-gauge or gauge with a chemical seal/gauge protector should be used.

Gauge Case & Housing

Stainless steel, black ABS & painted steel are standard case materials. Select a material suitable for your application. Stainless or ABS cases are recommended for outdoor service. Most standard gauges have a dry case (no liquid fill), while industrial and process gauges have a silicone / glycerin fill option available.

Front Ring & Window

The front ring can be made of acrylic, stainless steel, brass, steel, or thermoplastic. The viewing window is held in place

by the front ring. Some rings are a permanent crimp design, while others can be removed providing dial/pointer access for recalibration or repair. Window materials are typically clear acrylic, polycarbonate, flat glass or safety glass.

Temperature & Ambient Conditions

The normal ambient temperature range for most standard dry or silicone filled gauges is -40 to +140 degrees F. The normal ambient temperature range for glycerin filled gauges is -4 to +140 degrees F. The error caused by temperature change is +/-0.3% per 18 degrees F rise or fall, respectively. The correction is for the temperature of the gauge, and not the temperature of the measured medium. Steam and other hot media may raise the safe working limits of the gauge. In these cases, siphons, cooling towers or chemical diaphragm seals may be required. Moisture and weather effects must also be considered. Liquid filled gauges prevent condensation build up. Stainless steel, brass or plastic cased gauges are recommended for outdoor use.

Accuracy

Gauges are available with accuracies from +/-3/2/3% to 0.1% of span (ASME grade B to grade 4A) Gauges with +/-3/2/3% of span accuracy offer a +/-2% of span accuracy over the middle third of the scale and +/-3% of span on the balance of the scale. Generally, bourdon tube gauges with better accuracies are larger and more expensive.

Liquid Filled Option

Liquid filled gauges help absorb vibration and pressure spikes, increasing the service life of the gauge. The dampening action of the liquid reduces pointer flutter and lubricates the internal parts, dramatically reducing wear in the movement. Silicone is our standard fill fluid and provides the best performance in most applications. Silicone has a low viscosity and works well when extreme temperature fluctuation or icing is expected. The fill liquid must be compatible with the gauge application.

Shock, Vibration & Pulsation

Consider liquid filled gauges to enhance the reliability and integrity of the measuring system when operating for long periods under extreme operating conditions. In addition, optional pressure snubbers will reduce pressure spikes and pulsation, pointer flutter and extend the life of the gauge.

Chemical Diaphragm Seals & Gauge Protection

Diaphragm seals are used to isolate pressure gauges and transmitters from clogging and/or corrosive media. Measurement of higher media temperatures can be obtained by adding a seal. Diaphragm seal systems can extend the life of the pressure instruments and reduce the cost of installation and maintenance. Standard diaphragm seal bodies and diaphragms are made of stainless steel (other materials available).

Burst Pressure Rating

WGI pressure gauges are generally designed to withstand up to a 190% overpressure with out damage to the pressure system. The bourdon tube by itself is guaranteed withstand a 30% plus to the nominal range. Under ideal conditions our bourdon tubes withstand an overpressure of three times the nominal pressure, but this cannot be guaranteed. There are too many factors that can influence the performance of the bourdon tube that we do not know. I.e.: Pressure media used, rapidly changing pressures, environmental conditions etc. It is up to the end user to test under realistic circumstances.