PRODUCT INFORMATION

BOURDON TUBE INFORMATION FOR HEISE® DIAL PRESSURE GAUGES

The "Bourdon Tube" is the sensing element found in most dial mechanical pressure gauges. Invented in 1832 by French engineer Eugene Bourdon, the Bourdon tube is simply a bent or curved tube with a sealed end which begins to straighten when pressure is applied into the open end. In a dial mechanical pressure gauge, the pointer rotates as a result of the movement of the pinion and sector gears which are connected to the sealed end of the Bourdon tube which deflects under pressure. Its success depends upon its ability to achieve a linear motion and repeat its position at a specific pressure point during both upscale and downscale excursions.

Bourdon tubes can be made in a variety of shapes ("C" shaped, helical, spiral) and can be manufactured in a variety of metals as well as quartz. The configuration and choice of materials along with the manufacturing techniques are the determining factors as to the degree of accuracy the tube will be able to achieve. Obviously, the more accuracy that is required, the more difficult and more expensive it will be to produce the appropriate tube.

At a rated accuracy of ±0.1% F.S., the Heise® gauge is the most accurate dial mechanical pressure gauge available. In order to achieve this accuracy, the Bourdon tube must employ optimum design, material and craftsmanship. The Heise® Bourdon tube incorporates many unique features which result in the finest Bourdon tube manufactured today. These features include:

1) **Unitized Design:** Unlike other pressure gauges, the Heise® gauge incorporates a "one piece" Bourdon tube which requires no socket or welds. The advantages include controlled stress distribution and the elimination of "traps" which might inhibit the ability to thoroughly clean the tube free of foreign matter.

2) **Seamless Tube Stock:** Helps to further control stress distribution and lessens the possibility of rupture during overpressure.

3) **Heat Treating:** Improves elasticity of the metal, thereby yielding improved hysteresis and repeatability characteristics.

4) **"C" and Multi©Coil Designs:** Although the model CC uses a "C" shaped tube, the models CM and CMM utilize a multi©coil design which allow these gauges to yield longer pointer travels. In addition, the multi©coil design allows the Heise® gauge to be offered in ranges of up to 100,000 psi.

5) **Bleeder Port:** All Heise® Bourdon tubes include a bleeder port for purging of trapped gases and easy cleaning.

In addition to the features identified above, the Heise® Bourdon tube is available in 3 different tube materials. The specifics regarding each of these materials are as follows:

403 Stainless Steel

The standard tube material on all models from 50 to 100,000 psi.
Also available as an option on ranges from 12 to 45 psi.
The only Heise® tube material that will attract a magnet.
Hysteresis may exceed 0.1% of span on ranges equal to or greater than 75,000 psi.

Beryllium Copper

The standard tube material on all models from 12 to 45 psi.
The recommended tube material for hydrogen use.

Available Model (psi)	Available Ranges (psi)	Hysteresis Guaranteed in Only These Ranges
CC	50 thru 10,000	50 thru 4,000
CM	50 thru 10,000	50 thru 4,000
CMM	50 thru 5,000	50 thru 3,000

Also available as an option as follows:

Hysteresis characteristic may exceed 0.1% and therefore is not guaranteed in ranges other than those listed.

316 Stainless Steel

Available as an optional tube material for the model CC only from 12 to 5000 psi.
Hysteresis on all ranges may exceed 0.1% and is not guaranteed.
Used with highly corrosive pressure media such as hydrazine (rocket fuel)

REPLACEMENT BOURDON TUBES

As you know, replacement Bourdon tubes are available for Heise® dial gauges. However, there are many cases where these tubes are not considered "field replaceable." Gauges in which Bourdon tubes are not field replaceable are:

Any gauge with a "nonlinear" dial, such as:

- All CMM gauges
- Gauges calibrated in the horizontal or nonvertical position
- All absolute gauges 75 psi and under
- All compound and vacuum gauges
- Any gauge originally equipped with a "crescent tail" pointer
- Some dual scale gauges

Any temperature compensated gauge (because temperature compensators are specifically matched to the performance characteristics of the corresponding tube).

Also, Bourdon tubes and most other replacement parts are no longer available for obsolete model gauges such models "A," "B" and "C," or any gauge with a serial number beginning with "H."

When ordering a replacement Bourdon tube, please be sure to specify the model type, pressure range, the tube material (if no tube material is specified, we will provide the standard material for that range) and whether the tube is for a back or bottom inlet gauge. Also, please be sure to request that the tube be supplied with the tip assembly installed.