PENBERTHY application report

Section 2000
Application Report 2771.1
Issued 05/05
Replaces 12/01

For: GAGE FEATURES

CHAMBER – The part of a level gage that retains the process fluid and around which the glass and cover are secured with bolts.

Connections – Machined or fabricated openings in or on the chamber where gagecocks, tees or other connections are joined to link the gage to a vessel.

Location – two or more chamber openings may be made in three places (or a combination there of):

End Connected gages that are the least costly. The maximum visible length is less than the vessel center to center dimension. Mechanically the most stable gage system.

Side Connected gages offer maximum visible length for a specific vessel center to center distance. The cost is more than end connected gages due to additional machining. Ends are plugged or used for vent and drain connections.

Back Connected gages (reflex only) are used where space is limited and have the same advantage as side connected gages. Ends are plugged or used for vent and drain connections.

Type and Size – Available in six types with a range of sizes:

NPT (female only) 1/2" or 3/4" openings are the industry standard. Optional larger sizes are directly available for large chamber only or via swaged fittings or reducers.

Flanged connections offer easy installation and dissassembly from the vessel. They decrease the visible length on end connected gages more than non-flanged gages, and are more costly than NPT connections. Sizes available: (in raised face, weld neck, ring type joint and lap joint) from 1/2" and up in 150# to 2500# ANSI pressure classes. System is pressure rated to it's lowest component.

Socketweld connections provide a leakproof seal, but are permanently attached making dissassembly difficult.

Weld Pad gages are welded directly to vessel wall. This provides viewing directly into vessel and requires no gagecocks or fittings. Initial installation is more involved and gage cannot be isolated from vessel for servicing. Flat pad and radius (2" to 12") oad available. Radius pad allows installation on curved surface. Also available with isolable valves.

Expansion Loops allow for thermal expansion and contraction between gage assembly and vessel while offering maximum visible length.

Stuffing Box Adapters allow for thermal expansion and contraction. This offers less visible length for a determined vessel center to center than expansion loop method. Sizes available 5/8" and 3/4".

Vision Slots – Milled in chamber and covered with glass for liquid observation. Tie bars in the vision slot are left unmilled for added design strength of the chamber in transparent gages. Glass sizes are 3, 4, 5 and 6 have one tie bar; size 7, 8 and 9 have two.

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Section 2000
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For: **GAGE FEATURES**

GASKETS – The material compressed between the glass and chamber thatcreates a seal and prevents glass/metal contact. (See applicable installation instructions for operating ranges of various gasket materials).

Grafoil® – Penberthy's standard gasket material is a pure natural graphite ribbon that results in a fluid sealing material that is flexible, compressible and resilient with excellent heat and chemical resistance characteristics over a wide range of temperatures. Available with a Mylar insert (standard) or 316 stainless steel insert.

Elastomers/Polymers – Optional gasket materials used in applications for their specific properties. For example, a nitrile rubber, such as Buna-N might be used for gas service, since it acts as a dynamic seal. Teflon® (PTFE) is often used for its chemical corrosion resistance.

Fiberous – Optional gasket material used in applications for their specific properties. Nobestos® and Garlock® are examples of fiberous gaskets used in place of asbestos.

SHIELDS – Optionally used between gasket and glass on transparent gages for chemical resistance. They reduce visibility somewhat.

Mica – Protect the surface of the glass from the corrosive effects of hot alkaline or acidic solutions.

PCTFE – Specified for its particular properties of chemical resistance. (e.g. to protect flat gage glass from phosphoric, chromic or hydrofluoric acid) Formerly called Kel-F®.

TEMPERED GLASS – Along with gaskets, the glass retains the fluid. It is the component of greatest importance, since it is the functional part of a liquid level gage. Tempering adds strength in to outer layer. Scratches or irregularities on its surface greatly reduce its pressure retaining capabilities.

Borosilicate – (up to 600°F) has the best chemical corrosion resistance to acidic solutions, but is less resistant to alkaline solutions.

Aluminosilicate – (up to 800°F) since its chemical structure is more stable than borosilicate, it has a much higher temperature rating. Its rate of corrosion is greater than borosilicate in acids, but less in alkaline solution.

Quartz – (up to 800°F) made by fusing quartz at high temperatures. This provides a harder and more abrasive resistant material than glass. It is also very resistant to thermal shock, but quartz is more brittle than glass.

CUSHIONS – Placed between glass and cover to secure position of glass and prevent glass/metal contact. Cushions must always be of the same material as the gaskets or a harder material.

COVERS – Not in direct contact with the process fluid but is the component that transmits comprehensive force to the glass and gaskets on the chamber. When the gage is pressurized, the cover undergoes additional stress.