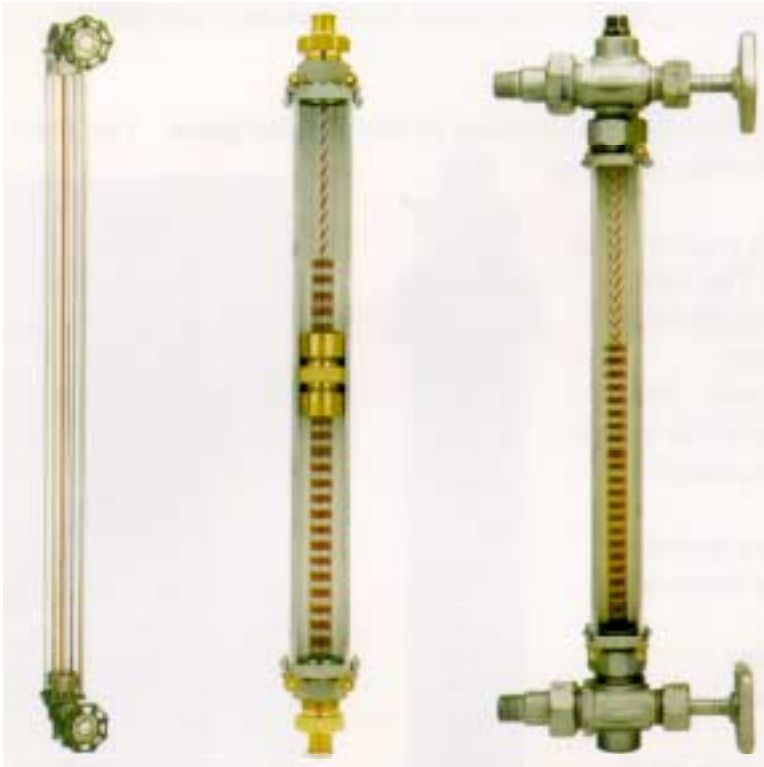


## PENBERTHY®

### Technical Data Tubular Glass Gages



Penberthy Tubular Glass Gages are used to register liquid levels in low to medium pressure applications. They are externally mounted to the vessel and use tubular glass to provide direct visual verification of the liquid level present. The transparent glass also provides an excellent means to optically inspect fluid characteristics.

Liquid enters the gauge through the lower tank connection. The meniscus present in the glass tube corresponds to the liquid level in the tank. Available accessories allow you to customize each gage to your specific application requirements. These options can also provide enhanced level indication and protection for the tubular glass.

#### Tubular Glass

Penberthy uses annealed borosilicate glass in either 5/8" or 3/4" OD for its standard material. Both sizes are available in three different styles; High Pressure, Heavy Wall, and Red Line. Other sight tube materials are available upon request.

Tubular glass length is based upon the center to center dimension of your vessel connections. The maximum length for a single piece of glass is determined by the pressure/temperature rating for the style of glass specified.

#### Valves

Penberthy offers both straight and offset pattern valves for use with Tubular Glass Gages. These valves are available in several different pressure/temperature ranges including ANSI rated models. For additional information on individual valves refer to Bulletins 2250 through 2255.

#### Packing Material

The standard packing material for the valve is Grafoil®. Optional materials are available upon request.

Valve	Offset	Straight	ANSI Rating (pounds)
N2	◆		300
K2	◆		300
K3	◆		150 & 300
N6		◆	125
N7		◆	150
780	◆		1500

## Protectors

Tubular glass is susceptible to damage. To counteract this condition, Penberthy offers a group of protectors. These protectors prevent damage to the glass but do not restrict level indication capability. In some cases the protector actually enhances it.

**Guard Rods** - Two or four metallic rods placed next to the glass tube

**Plastic or Wire Glass** - A transparent box surrounding the tubular glass constructed from either clear plastic or wire glass.

**Sheet Metal** - Two pieces of sheet metal formed to protect both sides of the tubular glass. The front and back are left open to facilitate easy viewing

**Refractive** - An extruded aluminum channel with your choice of either a polymer or glass cover. The interior is a white anodized finish with 45° angle red stripes on the back wall. As the gage fills, liquid passes in front of the stripes. The refractive nature of the liquid changes the stripe angle and indicates the level of the vessel.

If water is the liquid used, the stripes become horizontal. Liquids with a refractive index less than water will alter the angle less. Liquids with a refractive index greater than water will alter the angle more.

The refractive protector is only intended for use with High Pressure glass.

Refractive and plastic or wire glass protectors can be adapted to fit most major manufacturer's valve patterns.

## Internal Tubes

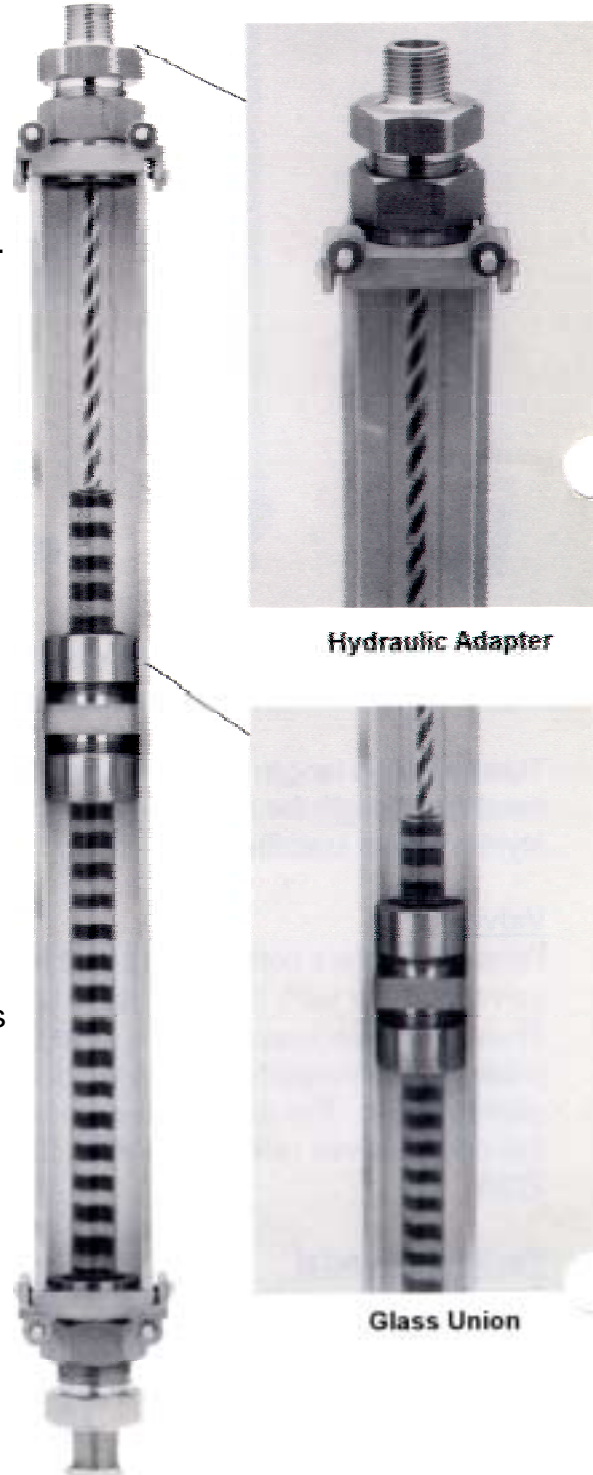
A stainless steel internal heating or cooling tube that passes through the inside of the gage. It is used in conjunction with an offset pattern valve and High Pressure glass.

## Glass Union

Intended for use in gages over 48" in height. It allows you to join two pieces of glass within the same gage. This increases the length of the gage, yet maintains the same pressure/temperature rating as the individual pieces of glass. Glass Unions should be used in conjunction with the refractive protector to provide mechanical stability.

## Hydraulic Adapters

Hydraulic adapters are used in place of valves for connecting the gage to your vessel. They attach directly to the tubular



glass and provide you with a 1/2" NPT male connection. This allows you to incorporate most standard hydraulic connections currently available.

<b>Pressure/Temperature Ratings For Gages With A Single Piece Of Tubular Glass (Both 5/8" and 3/4")</b>						
<b>Center To Center Distance For Vessel Connections</b>	<b>No Corrosion Up To 150°F</b>			<b>Steam Boiler Service Up To 425°F</b>		
10	410	600	340	310	345	275
15	385	600	310	280	325	265
20	355	600	285	265	315	260
25	300	580	260	250	300	250
30	275	550	230	<b>Not Recommended</b>		
35	240	500	200			
40	210	420	180			
45	200	360	170			
50	180	n/a	160			
55	150	n/a	140			
60	140	n/a	120			
65	125	n/a	100			
70	100	n/a	90			

Using secured Glass Unions and multiple pieces of tubular glass will increase the pressure/temperature rating over that of an equivalent length of single glass.

<b>Temperature Ratings For Typical Packing Material</b>	
<b>Packing Type</b>	<b>Maximum Temp Rating (°F)</b>
Grafoil® (Standard)	425
Teflon®	425
Neoprene®	300
Viton®	400

<b>Material Specifications For Glass Unions And Hydraulic Adapters</b>			
<b>Part</b>	<b>Steel</b>	<b>Brass</b>	<b>316 STS</b>
<b>Glass Union</b>	◆	◆	◆
<b>Hydraulic Adapters</b>	◆	◆	◆

<b>Options Available For The Different Types Of Tubular Glass</b>							
<b>Glass Type (Both 5/8" and 3/4")</b>	<b>Valves</b>	<b>Hydraulic Adapters</b>	<b>Guard Rods</b>	<b>Plastic, Glass, or Wire Glass Protector</b>	<b>Sheet Metal Protector</b>	<b>Refractive Protector</b>	<b>Internal Tube</b>
<b>High Pressure</b>	◆	◆	◆	◆	◆	◆	◆
<b>Heavy Wall</b>	◆	◆	◆	◆	◆		
<b>Red Line</b>	◆	◆	◆	◆	◆		
<b>Glass Union</b>	◆	◆				◆	◆

## Information Required For Ordering

- 1) Center to center dimensions of the vessel connections. (NPT end to end dimensions when using Hydraulic Adapters)
- 2) Vessel connection size
- 3) Tubular glass style and OD
- 4) Valve style or Hydraulic Adapters
- 5) Stuffing box packing materials
- 6) Options
  - Protector style
  - Quantity of glass unions per gage
  - Internal tube

## Other liquid level gages available from Penberthy

### Reflex and Transparent

Flat glass gages for direct visual indication of process level and saturated steam/water service

### MULTIVIEW™

Magnetic liquid level meter



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