PENBERTHY ANSI CL300 & 600 SIGHT FLOW INDICATORS

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Before installation, these instructions must be read carefully and understood.

Introduction

Sight flow indicators can provide years of reliable service if: (1) properly specified for the application service
(2) installed to avoid large and rapid thermal changes or external blows, and (3) installed and maintained to standards of good workmanship.
Glass is the key component of the assembly for observation. Glass is a brittle material with no yield point. When forces are imposed to create stress levels that glass cannot resist, it fails. Lacking the ability to flow or deform, glass under load is extremely sensitive to stress concentrations. Eliminating surface imperfections and the controlling the manner in which force is applied to the glass are vital. These are easily controlled in the manufacture and assembly of the unit. The pivotal points in the life of these process indicators are during use and maintenance. Adherence to this manual, will enable the user to maintain properly selected sight glasses for long and reliable service.

Storage and Handling

Inspect all items for damage upon receipt as it may be necessary to submit a claim to the carrier. Units should be securely stored where they will be protected from the elements and corrosive fumes, where they can neither fall, nor be struck by other objects. Care should be taken to protect the connections from damage. Under no circumstances may the glass have objects placed on it.

General Installation Instructions

1. Using a flashlight, examine the glass carefully for any indications of scratches or cloudiness. If any type of surface flaw is apparent, do not install until the glass has been replaced. Inspect all items to ensure that they contain no foreign matter, and that the end connections are clean, undamaged, and in line with the adjoining pipe.
2. Prepare proper supports to ensure that pipeline stresses will not be transmitted to the sight glass. Misalignment between adjacent connections must be corrected rather than forcing a fit-up. Large, heavy units should be independently supported to avoid piping stress. Ensure the installation location provides access for viewing and maintenance, as well as precluding damage by external forces.
3. Units are designed to withstand thermal stresses caused by temperatures indicated on the nameplate. Poor installation location may impose conditions of thermal shock; such as rapid heating or chilling, where the stress values approach twice those caused by temperature alone and are added to mechanical stresses caused by pressure and bolting loads.

CAUTION: Prior to start-up, the nameplate information should be compared with the proposed service conditions of the system. Should any discrepancies be noted, immediately contact the factory for advice.

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Start-up

1. Gaskets and seals frequently assume a compression-set over a period of time. The unit shall be re-torqued to the proper value before start-up. (See torque table on page 2)

   CAUTION:
   Do not tighten or loosen fasteners while equipment is in operation.

2. The values for torque are in the table on page 2 and represent most styles and usual service conditions encountered by Penberthy sight flow indicators. Please consult the factory if your unit or service conditions are not covered in the chart.
3. If the unit is subjected to heat during operation, the system should be taken to ambient temperature and pressure after a few hours of operation. Retorque the fasteners to the proper values, in 3 to 5 ft-lb (4-6 N-m) increments. Check the glass in the unit before start-up, to ensure that there are no chips, scratches or blemishes. Use a flashlight or other bright, concentrated light to examine the glass carefully. If any type of flaw is apparent, start-up should be delayed pending the replacement of glass and gaskets. (See "Inspection")

Service Instructions– Preliminary Considerations

1. If service is required on the sight glass, nameplate information should be compared to the actual service conditions. If there is any doubt as to the proper unit being utilized for the actual service conditions, consult the factory.
2. Verify that the proper glass and gaskets are available for replacement.
3. A clean area should be available for placing the unit if it is to be removed from the line, and the various component parts.

Routine Maintenance

1. Periodic visual inspection should be made to ensure that no leaks are evident and that there is no clouding, scratching, or blemishing of the glass. New installations should be inspected daily until a routine inspection cycle is established.
2. Keep glasses clean using commercial glass cleaners. Cleaning must be done without removing glass; this may require recirculation of cleaning material if process side of glass is not accessible. Never use harsh abrasives, wire brushes, metal scrapers, or anything that may scratch the glass. Do not attempt to clean glasses while equipment is in operation. Inspect for scratches, shining a bright concentrated light (flashlight) at an angle. Any scratch that glistens and catches a fingernail, or star or crescent-shaped mark visible is cause for replacement. Surfaces appearing cloudy or roughened after cleaning is evidence of chemical attack and is cause for replacement.

   IMPORTANT: Glass, shields and gaskets that have been removed, MUST BE REPLACED. Used parts may contain hidden damage NOT visible to the naked eye.

3. Should leakage around the glass occur after rebuilding the unit with new glass and gaskets, check the window. If it is not broken, drop the system pressure to zero, and torque the glass retainer to the recommended value. If leakage persists after re-pressurizing, disassemble as noted below and replace the gaskets. If the torque value is less than 75 ft-lbs, the glass does not need to be discarded provided the glass was new and was only used in this test.

   CAUTION:
   If assembling a unit in line, the system pressure **must be relieved and locked out** before attempting any sight glass service.

Disassembly

1. Flange type glass retainers are held in place with from 4 to 8 nuts, depending on the model. They should be removed by turning them in a counter-clockwise direction. Loosen fasteners evenly in reverse of the pattern shown on page 2.
2. Remove the glass retainers, cushion gaskets, glass, and sealing gaskets. All parts should be carefully placed on a clean surface. Any internal indicators such as flappers, flutters, gas indicators, rotors, drip tubes, or balls need not be removed, but could fall out once the glass is removed, so be sure to account for them.

Inspection

1. The glass seating surfaces in the body and retainer (Figure 2) must be carefully cleaned and checked to ensure there are no pieces of old gasket material, chips, dirt or other material on the surfaces. Foreign particles left on the surface may cause local stresses in the glass, and may cause failure.
2. If the unit is being disassembled to replace damaged glass, inspect the glass to determine if the service life can be extended through another selection. Erosion or corrosion of the inner surface of the glass could indicate chemical attack of the glass by the media. FEP, PCTFE (formerly Kel-F), or mica shields may be used to avoid such attack. Another form of shielding, UniShield® Window Protection, can be supplied on any sight flow window. PFA is bonded to the glass, making it suitable for vacuum service. Consult the factory for advice.
3. Cracked glass can be caused by reusing glass already bolted into a unit, pressures in excess of the glass rating, high local stresses due to uneven bolt torque, foreign particles on the glass seating surface, or thermal shock of the glass. It is important to determine the cause of the glass damage. Check your operating conditions against the ratings on the nameplate. Should there be any question about the applicability of the unit for the service intended, do not proceed without verifying the unit with the maintenance supervisor or engineer. Consult the factory for advice.

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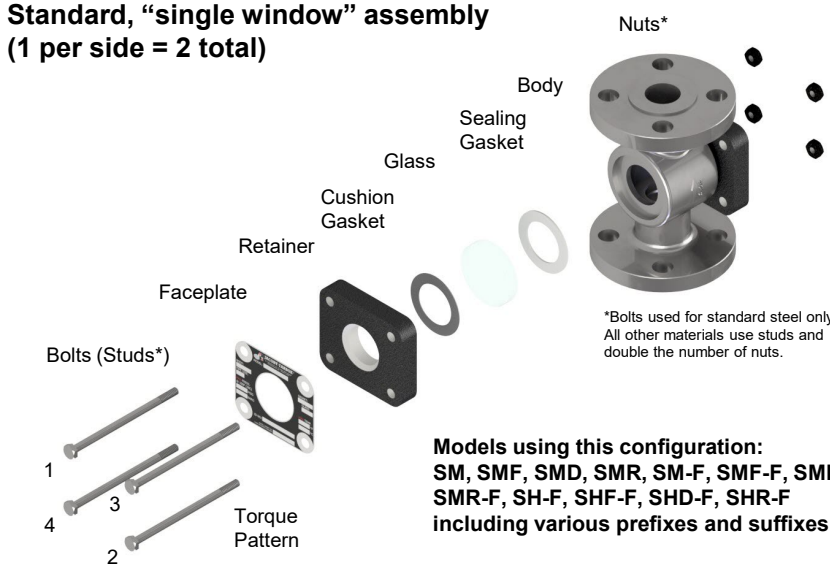
Standard, "single window" assembly (1 per side = 2 total)



*Bolts used for standard steel only. All other materials use studs and double the number of nuts.

Figure 1: Marking

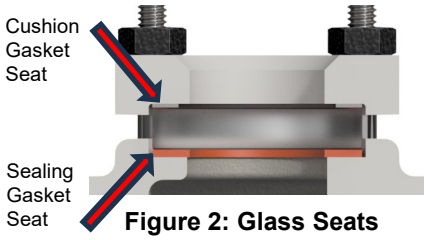
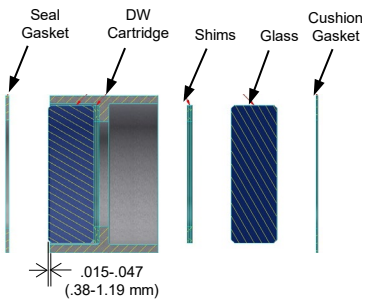
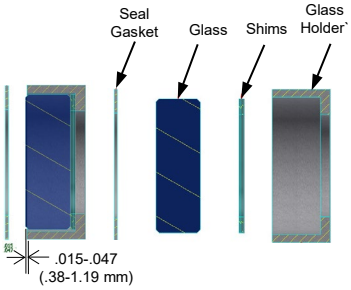


Figure 2: Glass Seats

Models using this configuration:
SM, SMF, SMD, SMR, SM-F, SMF-F, SMD-F, SMR-F, SH-F, SHF-F, SHD-F, SHR-F including various prefixes and suffixes



"Dual window" assembly
(2 per side = 4 total)



Quartz assembly "single window"
(1 per side = 2 total)

Models: SM-F, SMF-F, SMD-F, SMR-F, SM, SMF, SMD, SMR, SH-F, SHF-F, SHD-F, SHR-F

	Size		Torque	
	Inch	DN	Ft-Lb	N-m
CLASS 300	1/4 & 3/8	5 & 10	5	7
	1/2 & 3/4	15 & 20	5	7
	1	25	5	7
	1 1/2 & 2	40 & 50	20	28
	2 1/2 & 3	65 & 80	80	109
	4	100	95	129
	6 & 8	150 & 200	85	116
CLASS 600	1/4 & 3/8	5 & 10	10	14
	1/2 & 3/4	15 & 20	10	14
	1	25	10	14
	1 1/2 & 2	40 & 50	25	34
	2 1/2 & 3	65 & 80	110	150
	4	100	140	190
	6 & 8	150 & 200	125	170

Torque values are "minimums" and may be exceeded by the lesser of 50% or 20 Ft-lb (27 N-m).

Increase base torque values 25% (1.25 times table), when Dual Window or Quartz holders are used.

Important: ***Upon disassembly, the used glass and gaskets MUST BE DISCARDED AND REPLACED. DO NOT place removed parts back into the unit.***

Used parts may contain hidden damage. Induced stress in glass and de-tempering are NOT visible to the naked eye. Verify the replacement glass is proper for the service.

Assembly

1. Always reassemble sight glasses using new glass and gaskets. There is potential of hidden damage in used glass. Use only glass and gaskets that are supplied by Penberthy.
2. Glass and gaskets must be verified for the application. Generally, a direct replacement of the glass and gaskets that were in the unit before disassembly will be correct. Inspect new glass to ensure that there are no bumps, chips, scratches or other surface imperfections, and that the gaskets are clean and fresh with no bumps or tears.
3. Tempered borosilicate glass is marked on the edge (perimeter) with a black dot (•) or a "T". Annealed borosilicate is unmarked. The nameplate indicates "T boro" or "A boro." (Figure 1) UniGlas, glass with a metal ring in one piece, has the ring material stamped in the OD.
4. The sealing gasket, the thicker and often the softer gasket, is placed on the process side of the glass, in the body counterbore, forming the glass seating surface. A cushion gasket must be placed between the glass and the retainer. Ensure that all surfaces in the body and retainers are clean and assemble the gaskets and glass into their seats. Ensure the gaskets are centered and are completely within the counterbore provided. Care must be exercised in placing the glass in the seat so that the edges will not be chipped. Place the cushion gasket and retainer over the glass, using care that the glass and gasket are completely seated in the counterbore. Place a small amount anti-sieze on each fastener before threading on the nuts. Finger tighten fasteners, and slide the glass from side to side, or rotate it in its seat, until all parts are aligned and seated properly. (Figure 2)
5. Using a torque wrench, tighten the fasteners in a regular pattern shown in the drawing to avoid uneven loads on the glass. Torque individual fasteners in stages, moving to the next fastener after each increment of torque. A maximum difference of 5 foot-pounds (7 N' m) between fasteners should be maintained on larger units, and less on smaller ones. Continue torquing until the values shown in the table are attained.
6. In placing units back into the line refer to "Installation" on page 1.

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