

STORAGE, INSTALLATION, OPERATION, MAINTENANCE & SERVICE MANUAL OF J.G. PAPAILIAS CO., INC. SINGLE WINDOW SIGHT GLASSES SERIES RS-OB

1.0 INTRODUCTION

Sight glasses are simple devices for the observation of vessels contents can be expected to be extremely reliable if certain criteria are met. They are (1) proper specification for the intended service, (2) avoidance of the imposition of excessive forces through large and rapid thermal changes or external blows, and (3) employment of normal standards of good workmanship in the installation, maintenance and service of the sight glass.

The lens is the critical component of a sight glass. The lens is manufactured from glass which is a brittle material with no yield point. When forces are imposed to create stress levels that the material can not resist it fails by breaking. Lacking the ability to deform, glass under load is extremely sensitive to stress concentrations. Therefore, surface imperfections and the manner in which the glass is loaded become of great importance. These items are easily controlled in the manufacture and assembly of the sight glass during its productions. The critical points in the life of a sight glass are during use and maintenance.

Surprisingly enough, of these two factors improper maintenance is the real culprit. When the J.G. PAPAILIAS Company is made aware of actual service conditions, a proper sight glass can be specified which will perform reliably for many years.

Proper maintenance and normal standards of good workmanship are matters of a completely different level of concern. Most lens failures occur either at the times of glass installation or as soon as the system is pressurized after the lens is installed. These failures have occurred as a result of stress concentrations imposed on the lens or reinstallation of a used lens. Chipped lens edges, warped or dirty lens seats in the upper or lower flanges, use of gaskets with chips or lumps, careless seating of the lens and gasket in their seat and uneven bolting loads are typical causes of stress to avoid. Unfortunately, they are not under the control of the J.G. Papailias Company once the product has been shipped to the user.

Therefore, it is imperative that the user insure that the normal standards of good workmanship and proper

maintenance are employed in order to sustain the reliability designed into the original sight glass.

Adherence to the instructions provided in this manual, will enable the user to maintain properly selected sight glass for long and reliable service.

2.0 STORAGE AND HANDLING

J.G. Papailias Company Sight glasses meet or exceed all applicable specifications when they are shipped from the factory. Sight glasses are to be welded into position then assembled. All individual pieces should be inspected for damage upon receipt in case it may be necessary to submit a claim to the carrier. The pieces should be careful stored where they will be protected from the elements, corrosive fumes and in a secure manner where they can neither fall, nor be struck by other objects while awaiting installation. The lens requires special attention and should not be stored mixed with heavy objects that may damage it. The lens should remain wrapped or boxed until the time of installation.

3.0 INSTALLATION

Sight glasses are welded into a vessel, tank or pipe. Before welding, a metal spacer plate should be installed in place of the lens and gaskets. The plate should be bolted in place securely using the bolt torque values for the particular sight glasses as a minimum. Welding should be done with minimal heat. The seating area should be checked for flatness prior to the assembly with the lens. See section 7.4.

4.0 OPERATION

Sight glasses provide a relatively inexpensive means of visually checking a vessels contents. Sight glasses neither measure nor control flow, but do add a important human evaluation for checking or double checking systems. Operating guides are not required, but it is imperative that the sight glass be installed properly for which it is rated.

5.0 START-UP

Gaskets frequently assume a compression set over a period of time. Some gasket materials tend to compression-relieve or creep. It is recommended that the sight glass have its fasteners re-torque to the proper value before start-up.

CAUTION: DO NOT TIGHTEN ANY FASTENERS WHILE SIGHT GLASS IS IN OPERATION.

The value for torque shown in Figure 1, found at the end of this document, are representative for service conditions less than or as great as 150PSI. Consult the factory if your service conditions are not covered in this chart.

If the sight glass is subjected to heat during operation, the system should be taken to ambient temperature and pressure after a few hours of operation and the fasteners should be re-torqued to proper values in 1 to 3 ft-lb increments.

Check the lens in the unit before start-up, to ensure that there are no chips, scratches or blemished. Use a flashlight or other bright, concentrated light to examine the lens carefully.

If any type of flaw is apparent start-up should be delayed pending the replacement of lens and gasket. (See Section 7.0)

6.0 ROUTINE MAINTENANCE

Periodic visual inspection should be made to ensure that no leaks are evident are that there is no clouding, scratching or blemishing of the lens. In new installations, daily inspection is recommended to establish a routine inspection cycle.

Keep the lens clean using commercial glass cleaners (including Windex, Glass wax, household detergents, etc.). Cleaning should be done without removing the lens; this may require recirculation of the cleaning material if vessel side of the lens is not accessible. Never use harsh abrasive, wire brushes, metal scrapers, or other things which would scratch the lens. **DO NOT ATTEMPT TO CLEAN THE LENS WHILE THE SIGHT GLASS IS IN OPERATION.**

To examine the lens for scratches, shine a very bright concentrated light (powerful flashlight will suffice) at about a 45° angle. Anything which glistens brightly should be closely examined. Any scratches fingernail' any star-shaped or crescent shaped mark which glistens is cause for replacement. If inner surface appears cloudy or roughened and will not respond to cleaning procedures, this is evidence of chemical attack and is cause for immediate replacement.

Once a lens has been removed from its mounting in process equipment, regardless for reason for removal,

discard it and substitute a new piece. A used lens is proper for the service. Gaskets must always be replaced.

Should leakage around the lens occur, check the lens. If it is not broken, drop the system pressure to zero, and torque the fasteners to the recommended value. If leakage persists after depressurizing, disassemble according to section 7.0 and replace gaskets.

7.0 SERVICE INSTRUCTIONS

7.1 Preliminary Considerations

- (A) Confer with the maintenance supervisor or engineer to be certain that the proper lens and gasket are available for the sight glass.
- (B) A clean area should be available for placing the various component parts after disassembly.

CAUTION: SYSTEM PRESSURE MUST BE DROPPED TO ZERO BEFORE ATTEMPTING TO SERVICE THE SIGHT GLASS. FURTHERMORE, IT MUST BE ASCERTAINED THAT THE PRESSURE CANNOT BE PUT BACK INTO THE VESSEL, EVEN INADVERTENTLY, WHILE SERVICE IS IN PROGRESS.

7.2 Disassembly

- (A) The upper flange used on the sight glass is held in place with studs and nuts. They should be removed by turning them in a counter clock-wise direction. On rectangular sight glasses, loosen the end fasteners first working from alternate ends and sides the center.
- (B) Remove the upper flange, lens and gaskets. All parts should be carefully placed on a clean surface.

7.3 Inspection

The gasket seating surface should be carefully cleaned and checked to ensure that there are no pieces of old gasket material; chips, residue, dirt or other material on the surfaces. Any foreign particles left on the surface could cause high local stresses lens and might cause lens failure.

If the sight glass is being disassembled because of need to replace the lens, an examination of the lens is recommended in order to determine if the service life could be extended through another selection.

Erosion or corrosion of the inner surfaces could indicate chemical or steam attack of the lens by the media in the system. Frequently KEL-F or MICA shields can be used to avoid such attack. Consult the factory for advice.

Cracked lenses may be caused by pressures in excess of the lens rating, high local stresses due to uneven bolt torque or foreign particles on the gasket seating surface, or thermal shock of the lens. Simply putting in a new lens will not alleviate the cause for replacement. Consultation with the factory may greatly extend the life and reliability of the sight glass.

7.4 Reassembly:

(A) General Instruction

Always reassemble sight glasses using a new lens and gasket. The potential of hidden damage makes a used lens a poor safety risk. Check the new lens to ensure that there are no bumps, chips or scratches or other imperfections, and be certain that the gaskets are clean.

The lens and gaskets should be verified as correct for the application. Generally, a direct replacement of the lens and the gaskets that were in the unit prior to disassembly should be correct. Check with the maintenance supervisor rather than take chances.

Use only the gaskets specified by the manufacturer or by the supervising engineer. Ascertain that they are clean and fresh with no bumps or tears.

The sealing gasket, generally the thicker and softer gasket is always placed on the media (pressure) side of the lens in the counter-bore of the lower flange. This forms the seating surface for the lens.

After insuring that all the gasket surfaces on the flanges are clean, assemble the gasket and lens into the seat of the lower flange. Be certain that the gasket is centered

and is completely within the counter-bore provided. Care should be exercised in placing the lens in the seat so that the edges cannot be chipped. Place the upper flange and upper gasket over the lens, again being careful that the lens and gasket are completely seated in the counter-bore. Bring the fasteners to finger snug and slide the lens from side to side, or rotate it in its seat, to be certain that everything is seated properly.

Using a torque wrench, tighten the fasteners in regular pattern to avoid uneven loads on the lens. (Typical tightening patterns are shown in figure 1). Torque individual fasteners in small amounts, moving to the next fastener after each increment of torque. A maximum difference of 3 ft-lbs. Should be maintained on larger sight glasses and less on smaller. Continue tightening until the values shown in Table 1 are attained.

Size	# Bolts	EPDM, Buna-N Silicone	Expanded PTFE & FKM	Comp NAS Fiber, Graphite
2X12	14	12	16	14
3X12	18	13	17	15
4X12	20	14	18	16
2X18	22	13	16	15
3X18	24	14	17	16
4X18	24	15	18	17

**TABLE 1
BOLT TORQUE VALUES IN FT-LBS.**

PLEASE CONTACT THE J.G. PAPAILIAS CO. WITH ANY QUESTIONS REGARDING YOUR INSTALLATION:

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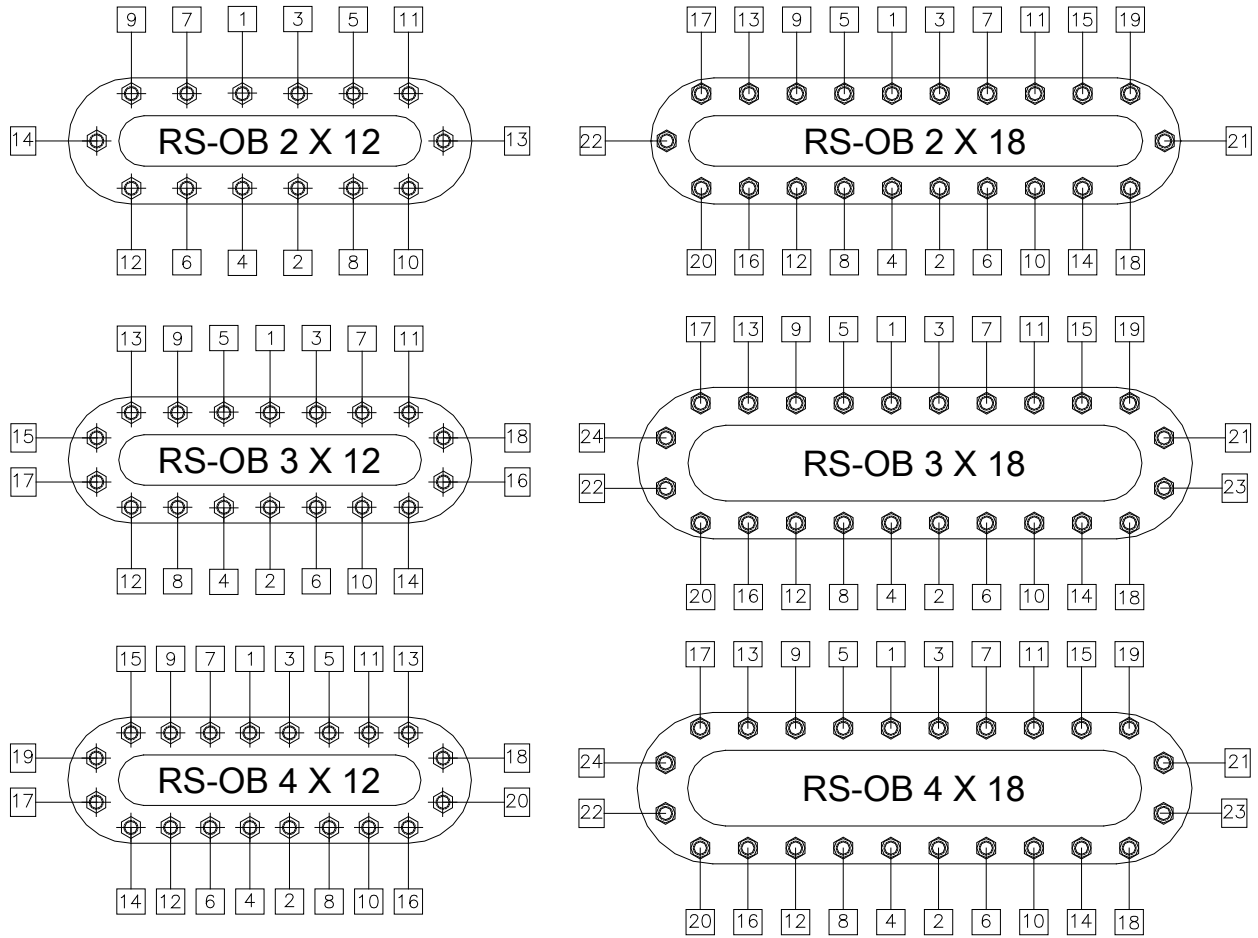


FIGURE 1 - BOLT TORQUE SEQUENCE