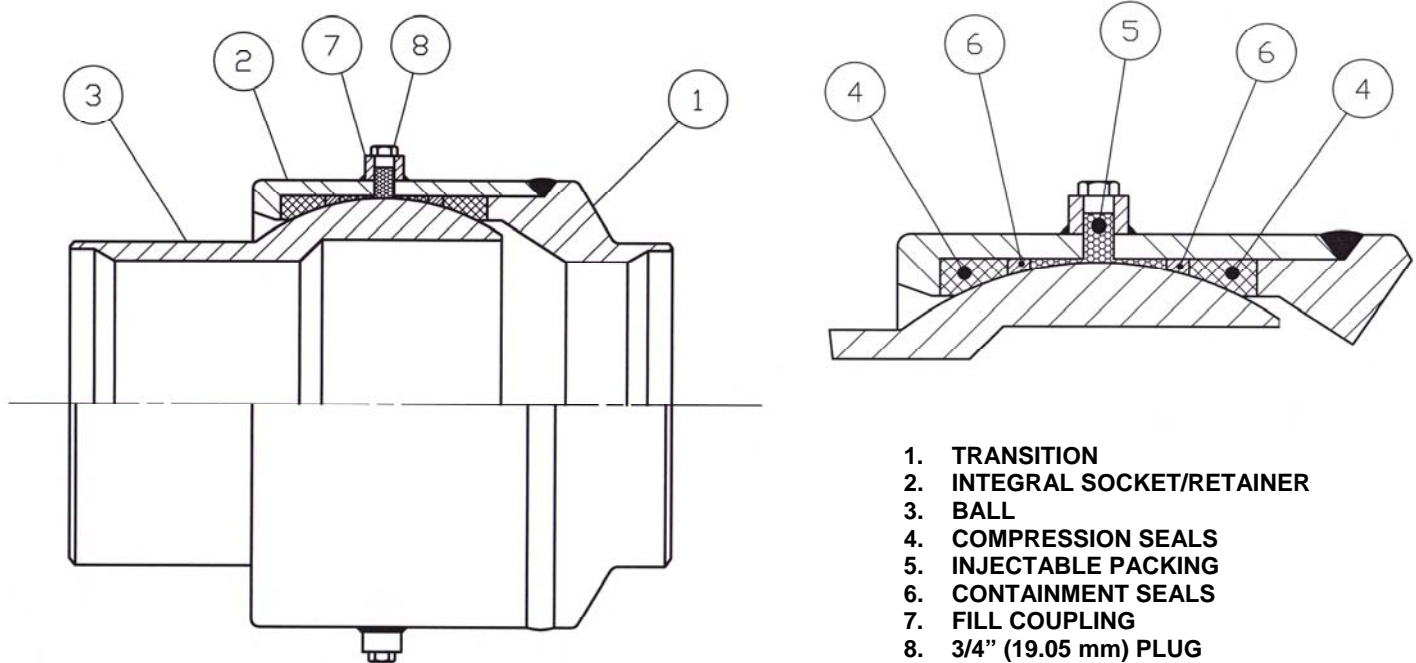




# SOLAR "S2" SERIES FLEXIBLE BALL JOINTS

## INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS



### GENERAL:

1. Prior to installation, verify that the ball joints have been properly cold positioned where necessary.
2. Installation in other than a horizontal attitude should be with the ball nipple facing downward in order to help keep the exposed ball free from contamination. Installation drawings should be reviewed to verify the ball joints are installed in their specified location with proper distance between balls.
3. Three ball joint linkages are not self supporting and must be supported.
4. The ball joint will provide for both angular flex (refer to project drawing for amount of angular flex) and 360° rotation.
5. The ball joint may be hydrostatically tested to 82 bar (1200 psig). The test pressure must not exceed the rating of the adjoining piping.

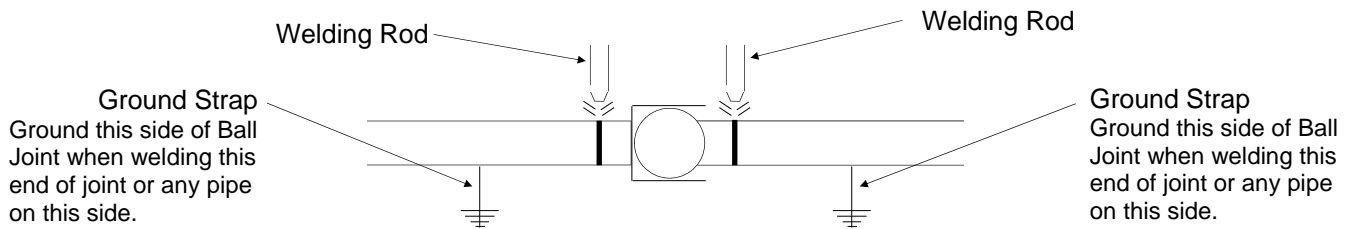
**CAUTION: Do not remove the 3/4" (19.05 mm) plugs from the fill connections located circumferentially about the ball joint socket while the ball joint is pressurized. Removal of these plugs while the joint is pressurized could cause bodily harm.**



## INSTALLATION:

1. The inside of the pipe should be clean of sand, dirt, gravel, scale, etc. as these foreign materials may cause damage to the injectable packing, contaminate the seals and/or damage the plated ball.

**CAUTION: Whenever welding on or near the ball joint, the welding ground must be located on the pipe, adjacent to the weld being performed to prevent a welding arc between the ball and socket. For the remainder of the piping installation, the ball joint cannot be in the welding ground path. Improper location of the welding ground may result in damage to the chrome plated surface of the ball joint and void the warranty.**



2. During welding the exposed portion of the ball should be protected from weld splatter. Upon completion of installation, the protective material between the ball and socket bore should be removed. The exposed area between the ball and socket should be checked to ensure it is free of dirt and foreign debris which may damage the ball joint during operation.

## INITIAL START-UP:

1. Prior to testing or energizing the system, the installer should check that all anchors are secure, and that pipe alignment guides and/or supports are properly located and secured.
2. During the initial energizing of the pipeline, inspect each ball joint and visually examine for leakage. Leakage is defined as “white puffs of smoke”. It is normal to see some leakage at this phase due to the oil in the packing mixture “baking off”. As the oil is baked off the compressed graphite packing will expand and flow around the ball to fill any voids that remain.
3. If after the system has been allowed to reach temperature for several days leakage is still present, it is recommended that additional packing be added to only those ball joints presenting with leakage.
4. See “Addition of Packing” for detailed instructions on adding packing.
5. After the system has been re-energized, perform a visual for leakage. Repeat procedure if necessary.

**Note:** Due to the high viscosity of the heat transfer fluid and the fact that the system is constantly in motion, a small quantity of ball joints may still present with intermittent leakage after the start up phase. This leakage can occur as the system moves/realigns itself. It is not recommended that additional packing be added for this type of leakage.



## **ADDITION OF PACKING:**

*Packing kits containing an English torque wrench, anti-seize compound, graphite gaskets and packing pellets are available upon request.*

1. The ball joints have been designed with 3/4" (19.05 mm) plugged fill connections located circumferentially about the joint's socket. To contain leakage the pipeline **must be depressurized** prior to removing the plugs. Allow system to cool to a suitable temperature to provide for safe handling.
2. Unscrew the plug from the fill connection closest to the leak.
3. Apply a thin coat of anti-seize compound to the threads of the plug.
4. Inspect the graphite gasket for damage - if necessary replace the gasket.
5. Insert (1) graphite pellet into the fill connection. The addition of too much graphite could adversely raise the torque of the joint causing possible damage to the system.
6. Screw the plug back into the fill connection until it is fully seated. The maximum torque to be applied is 80 ft-lbs (110 Nm). Be careful to not apply excessive torque.
7. Repeat steps 2 thru 6 for the remaining fill connection(s).
8. Re-energize the system, giving the graphite sufficient time to reach temperature.
9. It may be necessary to repeat the above procedure if sufficient leakage is still present.

**CAUTION: Packing pellets should only be injected to stop a leak. Any leakage must be stopped as soon as possible by injecting packing pellets. Do not add excessive packing pellets to obtain immediate sealing.**

## **ROUTINE MAINTENANCE:**

1. When the pipeline is properly supported and anchored at installation, routine maintenance of the ball joints is **minimal**. Each ball joint should be inspected for leakage on a regular basis determined by previous performance. A record of each inspection should be maintained noting the ball joint, date, leaks noted and the severity of the leak with the number of packing pellets, if any, injected to contain leakage. (See "**Addition of Packing**" listed above.) Any ball joint requiring packing to contain leakage should be re-inspected to verify the leak has stopped.
2. Twice yearly the fill connection plugs should be removed from the connections and lubricated with an anti-seize compound or equivalent high temperature lubricant.
3. During any system shutdown, the ball joint should be inspected and cleaned of any buildup of packing material or debris. This will assure a more leak-free operation of the joint with less requirements for packing injection.



## **RECOMMENDED SPARE PARTS & ACCESSORIES:**

### **SPARE PACKING:**

CONTAINERS OF 16 PACKING PELLETS, 1 CONTAINER IS RECOMMENDED FOR EVERY EIGHT (8) BALL JOINTS.

### **PACKING KITS:**

(ENGLISH TORQUE WRENCH, ANTI-SEIZE COMPOUND & GRAPHITE GASKETS)

## **OTHER ATS PUBLICATIONS**

ATS publications are now available in PDF format by request.

<b>TP2 Thermal Pak Slip-Type Joints</b>	ATS-TP2-IOM-2010
<b>P2 / S2 Thermal Pak Ball Joints</b>	ATS-P2/S2-IOM-2010
<b>“S” Series Ball Joints</b>	ATS-S-Series-IOM-2010
<b>Anchors, Guides &amp; Supports</b>	ATS-G/A/S-IOM-2010
<b>Injection Packing Instructions</b>	ATS-Packing-IOM-2009
<b>SAF-T-PACKER Instructions</b>	ATS-SAF-IOM-2009