PACKING COMPRESSION SCREW TORQUE			
Ball Joint NPS	**SH Cap Screw Size**	**Average Torque (ft-lbs)**	**Max. Torque (ft-lbs)**
1	10-24UNC	3	6
2	5/16-18UNC	25	35
3	3/8-16UNC	45	62
4	1/2-13UNC	95	150
6	1/2-13UNC	95	150
8	5/8-11UNC	75	125

Tighten the packing compression screws to "Average Torque" as noted in the table above before pressurizing the ball joint.

Do not over-torque the packing compression screws, as screw failure can occur.

All BlueSky ball joints are designed to have a maximum ASME 2500# rating except for the 8", which has a maximum ASME 600# rating.

Contact Us

Head Office and Manufacturing Plant

BlueSky Process Solutions Ltd.
803 Barton Street
Stoney Creek, ON L8E 5G6 Canada
(905) 643-9600 Phone
(905) 643-5900 Fax
(866) 643-5999 Toll-Free

Anton Marincic, CET, Vice-President of Operations
amarincic@blueskyprocess.com

Corporate Sales Office

(905) 643-9600 Phone
(905) 643-5900 Fax
(866) 643-5999 Toll-Free

Zvonko Milanovic, Vice-President of Product Development
zmilanovic@blueskyprocess.com

Western North American Sales Office

(403) 648-9140 Phone
(403) 648-9139 Fax

Jim Wheeler, Sales Manager
jwheeler@blueskyprocess.com

Eastern North American Sales Office

(905) 643-9600 Phone
(905) 643-5900 Fax

Bob Shrumm, Sales Manager
bshrumm@blueskyprocess.com

blueskyprocess.com

January 2014

INSTALLATION

Installation and Pipe Alignment

All BlueSky FlexBall and RotaBall joints are shipped fully assembled and ready for installation.

To align a pipe with a FlexBall joint, strike the ball end with a rubber mallet until it is properly aligned. After the ball joint is installed in the piping and prior to pressurizing the lines, the packing compression screws must be tightened to the average torque values as per the Packing Compression Screw Torque table.

NOTE: Screws must be gradually tightened to the final torque in 1/3 increments. For example, the screws in a 3" FlexBall need to be tightened to a final average torque of 45 ft-lbs. The torquing procedure involves first tightening all the screws to 15 ft-lbs in an alternating x-pattern. Repeat this sequence to tighten the screws to 30 ft-lbs, and then twice more to 45 ft-lbs to ensure that all screws have been tightened to the final average torque.

PWHT

Post-weld heat treatment (PWHT) should be performed using ceramic couplings applied locally onto each weld only. BlueSky does not recommend stress relieving the whole ball joint inside an enclosed furnace atmosphere. Standard heat treatment procedures should be used for the material grade of the pipe and ball joint.

Test System

Test the joint and piping system according to piping design codes and local requirements.

Maintenance

Although BlueSky ball joints are designed for maintenance-free operation, the packing compression screws should be periodically checked and tightened (if required) to the average torque values in the Packing Compression Screw Torque table.

NOTE: The preferred torquing sequence should be performed in an alternating X-pattern, and should be repeated three or four times until the torque value does not change.

SAFETY FIRST

BlueSky engineers its products according to the highest safety standards. BlueSky can provide training and assistance to engineering, construction, maintenance, and operations personnel as required. Care should be taken when working with any pressure- or fluid-retaining components.

Consideration should be given to the following prior to initiation of the installation:

- Specific site conditions and safety rules.
- Required personal protective equipment (e.g., safety shoes, protective clothing, protective eyewear, and hard hats).
- Procedure to eliminate potential environmental releases and exposure to contents of the system. Pipelines should be appropriately drained, vented, and prepared.

Contact BlueSky if you have any questions about the design and/or installation of our products.

PIPE PREPARATION AND WELDING

The Bluesky FlexBall and RotaBall joints may be integrated with a wide variety of piping systems.

Care should be taken during welding to protect the critical bearing surfaces from any damage, such as scratching and weld spatter. Proper grounding and heat input must be ensured to prevent any arcing between the ball, retainer, and casing. ***Grounding must be on the pipe adjacent to the weld being performed.***

Welding should be performed according to applicable codes and standards.

BlueSky
Process Solutions

FlexBall™
RotaBall™

Installation, Operation, & Maintenance Guide

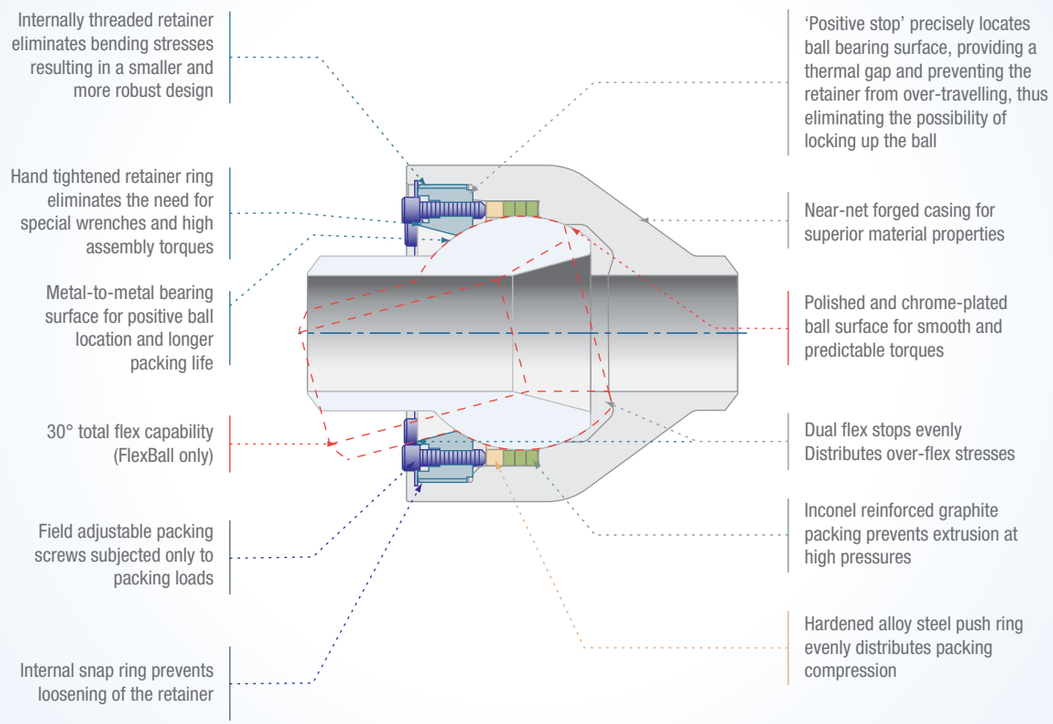
DESCRIPTION

The BlueSky FlexBall and RotaBall joints, suitable for bi-directional flow, are used to dramatically reduce pipe stresses in piping systems that develop high bending loads due to thermal and/or mechanical movement. With a full 360° of rotational freedom and up to 30° total flex capability, these products provide the piping engineer with a tool to solve a variety of challenges.

Conceived for design flexibility, the BlueSky ball joints are available in different design configurations to address the specific engineering challenges of each installation.

The illustration below provides a description of the standard features of the BlueSky FlexBall or RotaBall joints.

FlexBall/RotaBall Joint Features



FLEXBALL/ROTABALL JOINT/SPOOL CONFIGURATIONS

Thermal Cycling

BlueSky ball joints are an effective way of accommodating expansion and contraction in piping systems due to thermal expansion at elevated operating temperatures.

Settlement of Tanks, Vessels, and Equipment

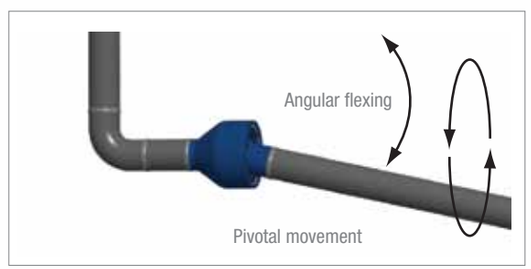
BlueSky ball joints can be used to accommodate equipment settlement during loading or over time to eliminate the potential damage of piping or equipment.

Moving Piping or Equipment

The FlexBall and RotaBall joints can be used to accommodate linear or rotational movements to eliminate potential damage from reactive forces imposed on the system.

Three Joint System

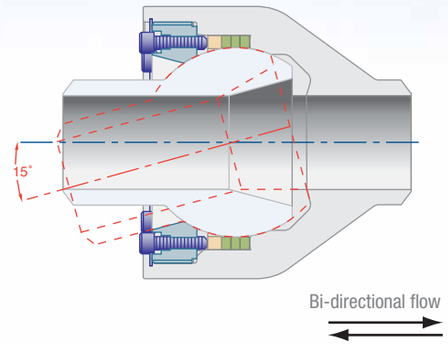
Provides maximum capability to accommodate significant piping system movements. This configuration is typical for SAGD applications.



Pipe Alignment

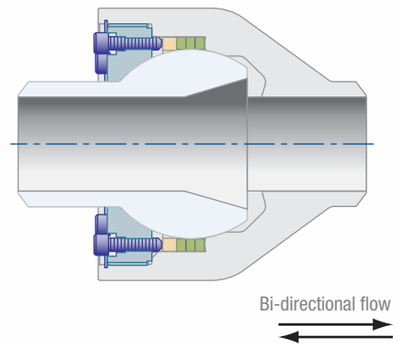
FlexBall can provide effective joining of improperly aligned or offset piping systems.

FlexBall™



The BlueSky FlexBall provides full 360° rotation about the pipe axis, as well as 30° total flex (15° on either side of the pipe axis).

RotaBall™



The BlueSky RotaBall provides full 360° rotation about the pipe axis.

NOTE: Although BlueSky ball joints are designed for bi-directional flow, the preferred flow direction for liquids containing suspended solids is from the casing end to the ball.