STARLINE forged steel ball valves
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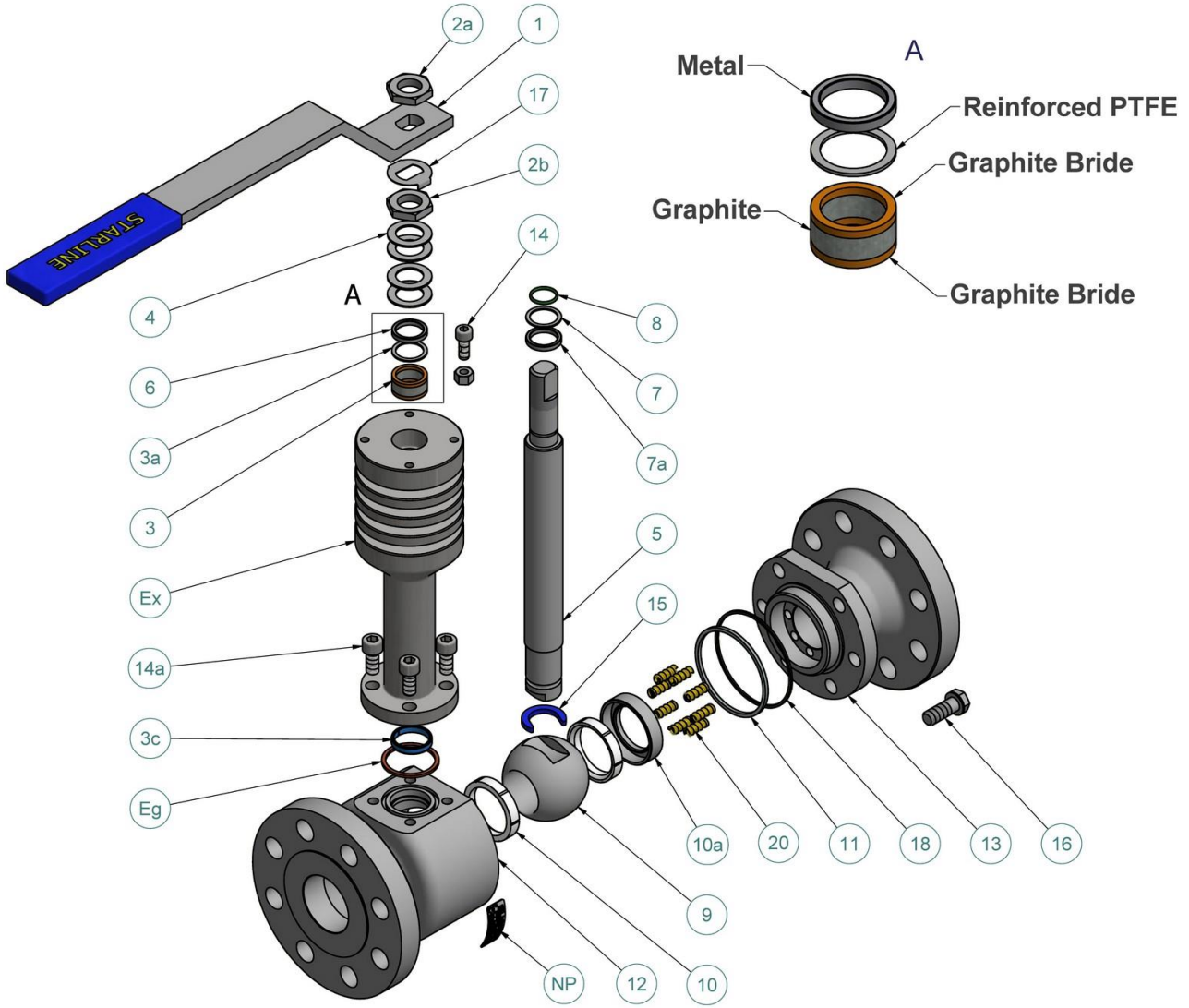
MANUAL INSTRUCTION No.**124-5/08** FOR
STORAGE , INSTALLATION, OPERATION AND MAINTENANCE FOR STARLINE BALL VALVES **CRYO STAR N.5.**

REFERENCE: STARLINE CATALOGUE: Q.A.M. AND PURCHASE ORDER

CRYO STAR N.5.



ITEM NO.	Q TY.	PART NAME
1	1	Handle
2a	1	Handle nut
2b	1	Lock nut
***3**	3	Packing ring
***3a**	1	Antiextrusion ring
3c	1	Bearing
4	4	Spring washer
5	1	Stem
6	1	Gland packing
***7**	1	Thrust washer
***7a**	1	Thrust washer ring
***8**	1	Slipper
9	1	Ball
***10**	2	Seats insert
10a	1	Seats ring
***11**	1	1st Body gasket
12	1	Body
13	1	End connection
14	1	Stop - pin
14a	4	Extention screw
15	1	Antiblowout Ring
16	*Note 1*	Bolts
17	1	Stop Washer
***18**	1	2nd Body gasket
20	8	Seat ring Spring
Ex	1	Extention
***Eg**	1	Extention gasket
Np	1	Name plate

* Start-up : 5% of ordered quantity

* Suggested materials after 2 years service

Note 1:
For DN15FB to DN20FB n°4 Bolts
For DN25FB to DN50FB n°6 Bolts
for DN65FB N°8 bolts for size.

1.0 SCOPE

This manual is intended as a guide to assist customers or end-users for storage, installation and maintenance of Starline ball valves in the standard arrangements. For this reason subsequent additions and special instructions to the present manual will be provided in case of special ball valves, critical services or customer requirements.

2.0 APPLICABILITY

This manual is applicable to Cryogenic Starline ball valves.

3.0 STORAGE

All valves are cleaned and individually sealed in a polyethylene bag and adequately packed into a strong cardboard case in such a way to avoid any possible damage during transport and storage period before use. All stainless steel valves are pickled and passivated;

If valves are not dispatched for immediate usage, the following cautions should be taken:

a. Leave the ball valves in their own packing cases during the entire period of storage;
b. Leave the valve in open position during the storage period;
c. Do not remove the protective plastic cover on the ends of the valves, in order to prevent any damage.

The valves, and actuators when provided, should be stored in dry, waterproof closed conditions inside a building with an adequate roof.
Valves shall be protected against all the environments, such as humidity, moisture, rain, dust, dirt, sand, mud, salt air, salt spray and seawater;

For fluids like oxygen, hydrogen or chlorine where the contact with oil or grease can create explosions valves that have not been properly cleaned, degreased and sealed in suitable boxes cannot be used. Avoid any kind of contamination till the moment of use.

When the valves are kept in storage for a long period of time, they shall be checked by the quality control personnel every 6 months to ensure that the valves are un-damaged, clean and free from foreign materials. The time period must be every 3 months when valves are actuated. Any rust, dirt and foreign materials will need to be carefully removed by qualified engineers prior to use.

4.0 CAUTION AND WARNINGS

- The end user must have suitable safety and control devices to avoid over pressure and over temperature.
- Due to the many and complex chemical formulas of the mediums, their compatibility with the valve material is not of Starline competence and it always has to be verified by the end
- user. During the design phase Starline has foreseen a corrosion allowance of at least 3 mm for each valve in order to avoid problems due to erosion or corrosion.
- The end user will have to foreseen external factors like: freezing, dynamic effects due to the line vibration, exceptional phenomena like wind, earthquakes, flooding, etc.
- For valves placed in plants in particularly humid areas, in the nearby of the sea or other hostile places the material of the valve will have to be taken in consideration together with external protective painting as far as external corrosion is concerned
- It is forbidden to use the valve for different functions and as a base or/and as a lifting of objects or persons;
- It is forbidden to modify or to apply any additional ancillaries;
- Any valve operation with external elements (pipes, keys, etc.) is forbidden, in order to avoid damages to the valve;
- If the valve is fitted at the ends of a flexible pipe, be sure that the valve is rigidly fixed, before pressurizing the line.
- Valves without Starline locking system cannot be used where it can be dangerous the accidental opening or closing of the valve.
- Valves without cavity filler and special cleaning / polishing should not be used for hygienic service.
- Before opening the drain valve, when available, check that the valve is no pressurized;

5.0 INSTALLATION

The ball valves can be installed in any position using a standard pipe fitting practices. Before the installation of the valve, the following cautions must be taken:

a. Pipe must be free of tractions, torsions tension and that the valve is in axis with the tube.;
b. Pipe must be flushed to clean the dirt, burrs, calamines, welding residues etc. which would damage ball and seats;
c. The valve must be kept in OPEN POSITION during installation and protective plastic cover must be removed only at the moment of installation;
d. Ball valves normally have a space between ball and inside cavity of the body which could trap the product, care should be taken to drain the cavity;
e. Care should always be taken to install the automated ball valves. Check for a correct actuator rotation and well done electrical connection;
f. The valves are unidirectional: verify and assembly the valve with the flow direction, as indicated on the additional name plate fixed on the valve.

5.1. INSTALLATION OF THREADED ENDS

Use conventional sealant such as hemp core, PTFE, etc.

5.2. INSTALLATION OF WELDED ENDS BALL VALVES

INTEGRAL NIPPLES SW or BW instructions for welding the valves on the line: with valve in open position tack weld in four points on both ends and then complete the welding without dismantling the valve and control for easy operation.

5.3. INSTALLATION OF FLANGED ENDS

Easy fitting on the line with the adequate bolts, nuts and gaskets.

6.0 OPERATION

CAUTION! During the operation, the ball valves must be in either complete OPEN or CLOSED position in order to ensure their smooth and efficient working and long duration of seats. Leaving the ball in half-open position could eventually damage the body seat material.

During the valve closing or opening, be sure that there is no

- Obstacle for the lever operation, in order to avoid personnel accidents or incomplete operations;
- Obstacle for the opening and closing of the ball;

The valve is unidirectional, please verify that the media flow follows the direction indicated on the additional nameplate.

6.1. MANUAL OPERATION

The opening and closing of the valve is done by turning the handle a quarter turn (90°)

a. Valve is in open position when the handle is in line with the valve and pipe line;
b. Valve is in closed position when the handle is across the pipeline.

6.2. AUTOMATED OPERATION

Valve can be automatically operated by:

a. Pneumatic actuators (DA or SR);
b. Hydraulic actuators;
c. Electrical actuators, In this case, no stop is fitted on the valve since it is normally a part of the actuators.

7.0 MAINTENANCE

CAUTION! Before starting, the maintenance be sure that all pressure on the pipe is relieved.

Maintenance has to be made by Starline-authorized people using original repair kits. Starline also recommends a partial maintenance after 2 years of service

- Open and close the ball valve at least once to release the pressure completely also from the valve body.
- The ball valves if correctly used, normally do not need any internal lubrication and maintenance. However, when necessary, ball , or seats can be replaced only by relatively qualified personnel following the instruction of the manual without needs to use any machinery.
- For further information about the recommended SPARE PARTS LIST please check drawing, catalogue or contact the factory.

7.1. STEAM LEAKAGE

If leakage is evident on stem packing area, it can be eliminated by increasing the tightness of the lock nut (Part. n. 2b). In case leakage is still persisting the replacement of the stem packing (Part. n. 3) is recommended. For handle nut and lock nut (Part. n. 2a-2b) tightness see Table 1.

7.2. BODY SEALS and EXTENTION GASKET LEAKAGE

Check for the tightness of the body bolts (Part. n. 16) or extension screws (Part. n. 14a) according to table. In case is still leaking, it is necessary to replace the body seals (Part. n. 11) or Extension gasket (Part. n. Eg).

7.3. IN LINE OR SEATS LEAKAGE

Check that valve is in fully closed position if so and the leakage is persisting the valve must be disassembled to replace damaged parts.

7.4. SAFETY PRECAUTION BEFORE REMOVING THE BALL VALVE FROM THE LINE FOR DISASSEMBLE

a. Check that all pressure is exhausted from the line (upstream and downstream) and half open the ball to ensure that no pressure is trapped in the body cavity. In other words it must be drained of all fluid/gas and pressure;
b. Remove the valve from the line and cycle valve at minimum 1 full cycle to ensure that any pressure trapped is released;
c. **CAUTION!** If the fluid in the line and into the valve is toxic, inflammable, corrosive or damaging for any other reason, it is advisable to take following precaution during the valve repairing:
    - Use protective eye mask or glasses;
    - Use gloves, overalls and suitable footwear;
    - Ensure that running water and fire extinguisher is easily available at any moment.

8.0 VALVE DISASSEMBLY TO INSPECT AND/OR REPLACE BODY SEALS, SEATS, PACKING AND BALL

a. Set the valve in open position and remove handle nut (Part. n. 2a), handle (Part. n. 1), stop washer (Part. n. 17), lock nut (Part. n. 2b), spring washer (Part. n. 4), gland packing (Part. n. 6);
b. Take out all extension screws (Part. n. 14), remove extension (Part. n. Ex). Remove packing rings and anti-extrusion ring (Part. n. 3a, 3) from extension;
c. Remove extension gasket (Part. n. Eg) from body;
d. Take out all body bolts (Part. n. 16) and complete body (Part. n. 12) from end connection (Part. n. 13);
e. Close the ball and remove ball (Part. n. 9), first body seals (Part. n. 11), second body seals (Part. n. 18) and seats insert (Part. n. 10), be careful not to damage the ball;
f. Push down the stem (Part. n. 5) and remove anti-blowout ring (Part. n. 15) from stem;
g. Remove Stem (Part. n. 5), remove slipper (Part. n. 8), thrust washer (Part. n. 7) and thrust washer ring (Part. n. 7a) from stem;
h. Take out seat ring (Part. n. 10a), disassemble the seat (Part. n. 10) and remove the seat ring springs (èart. n. 20).

At this point the valve is completely disassembled and you can proceed to replace all the parts as suggested at page 1 of this manual.
Please take into consideration that all these operations should be performed as much as possible in clean conditions.

9.0 INSPECTION AND REPLACEMENT

With the valve completely disassembled, clean and examine all the following components;

a. Surface of the ball: any surface defect, particularly in the seating area will be extremely detrimental to the performance of the valve and therefore the ball should be replaced if found defective;
b. Seats: replacement of seats is recommended;
c. Stem seals, extension seal and body seal: also to be discarded and replaced by a new one;
d. Remaining components of the valve: after cleaning it is required a careful examination for wear, corrosion and mechanical, damages particularly on threaded components. If components are found defective, they should be replaced.

10.0 VALVE RE-ASSEMBLY

Clean all the components surfaces.

a. Insert the stem (Part. n. 5) into the body and install anti-blowout ring (Part. n. 15) on stem;
b. Place the stem in closed position, install seat insert (Part. n. 10) and ball (Part. n. 9) in the same position inside body, install the second body gasket (Part. n. 18) and turn the stem in open position;
c. Insert the seat ring springs (Part. n. 20), seat ring (Part. n. 10a) and seat insert (Part. n. 10) inside end connection and install the first body gasket (Part. n. 11);
d. Put the body (Part. n. 12) on the end connection (Part. n. 13) and tight bolts (Part. n. 16) firmly (See values given in table);
e. Install extension gasket (Part. n. Eg), replace thrust washer ring (Part. n. 7a), thrust washer (Part. n. 7), slipper (Part. n. 8) and put the extension (Part. n. Ex) on stem (Part. n. 5);
f. Install all extension screws (Part. n. 14) and fix extension (Part. n. Ex) on body;
g. Install the packing ring and anti-extrusion ring (Part. n. 3, 3a), gland packing (Part. n. 6), spring washer (Part. n. 4) and lock nut (Part. n. 2b) and tighten (See values given in the table). To avoid rotation of stem, apply temporarily the handle, install stop washer (Part. n. 17), handle (Part. n. 1), handle nut (Part. n. 2a) and tighten (See values given in the table).

11.0 TESTING

After having completed the re-assembly check for the maneuverability of the valve and make sure that ball rotates freely and, if facilities are available, test the ball valve to the appropriate specification with dry and clean gas.

12.0 AUTOMATED BALL VALVES

If the valve is automated, reinstall the actuators and please note that the handle is not used. If necessary, reset the stops. First set the valve in open position and check that ball is fully open. Second set- the valve in closed position and check, adjusting if necessary, for the best closure.

CAUTION! Valves with electrical actuators should be tested starting from valve in HALF OPEN - HALF CLOSED POSITION. This is to ensure that electrical connection is all right and rotation is correct. In case of wrong position switch off electrical actuators immediately and change the direction. Limit and torque switches are ineffective if rotation is wrong.

TABLE 1 - TIGHTNESS VALUES FOR HANDLE NUT 2A-2B, BODY BOLTS 16 AND EXTENTION SCREWS 14

VALVE SIZE	HANDLE NUT 2 A and LOCK NUT 2 B			BODY BOLTS PART No. 16			EXTENTION SCREWS No. 14		
	DIMENSIONS	Nm	INCH LBS	DIMENSIONS	Nm	INCH LBS	DIMENSIONS	Nm	INCH LBS
DN 08-10-15	M12x1.25	15	130	M8x17	35	310	M8x16	35	310
DN 20	M12x1.25	15	130	M10x22	50	440	M8x16	35	310
DN 25	M15x1.5	25	220	M10x22	50	440	M8x16	35	310
DN 32-40-50	M22x1.5	40	355	M12x30	70	620	M10x22	50	440
DN 80-100	M30x2	70	620	M12x35	70	620	M10x22	50	440