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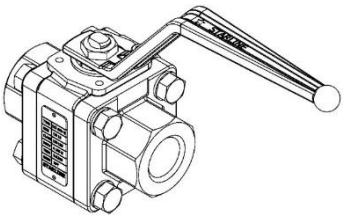
Manual Instruction for Storage, Installation, Operation and Maintenance

Floating Ball Valves



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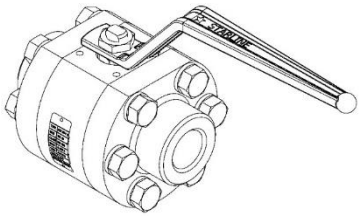
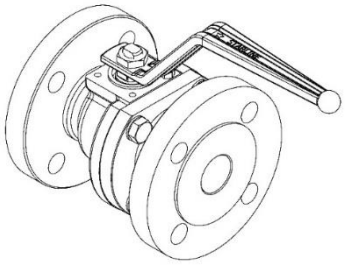


3 pcs Cl. 900-2500



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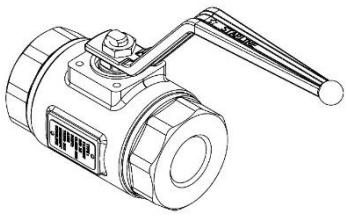

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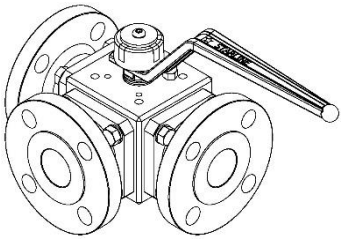
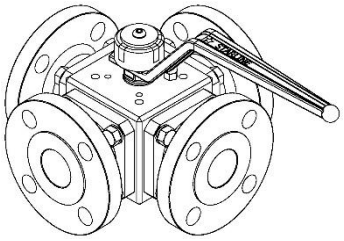
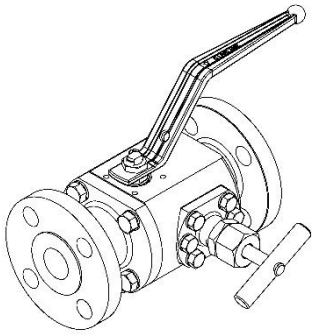


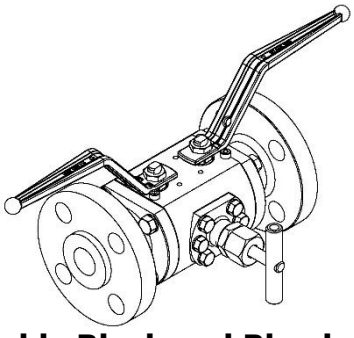
3 way Cl. 150-600



4 way Cl. 150-600



Single Block and Bleed Cl. 150-300



Double Block and Bleed Cl. 150-300

1. INTRODUCTION

This manual is 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 instruction to the present manual will be useful in case of special ball valve, critical services or customer requirements.

Starline has no responsibility in case of problems caused by failure to comply with the given instructions, with the general safety rules and the inappropriate use of valves or by unqualified staff.

2. PRESERVATION AND STORAGE

2.1. VALVE'S RECEIVING

Valves are supplied with end protections, which prevent the ingress of particles inside the valve. Do not damage or remove the end protections from the valve until the installation, in order to keep the integrity of each components.

2.2. STORAGE

2.2.1. GENERAL RECOMMENDATIONS

It is recommended that the valves, after their receiving, are kept, possibly, in their packaging, in a cover, dry, clean and saltiness environment, without dust, sand and mud.

In case the valves are kept in an open environment they have to be covered with waterproof protections and must not be in direct contact with the soil. These protections have to be kept until valve's installation. In case that the protection is removed due to an inspection or storage of the valve, they have to be immediately re-arranged after these operations.

Do not insert any part inside the bore of the body in order to avoid accidents caused by ball handling.

2.2.2. INFORMATION ON SURFACE PROTECTION (EXTERNAL & INTERNAL) OF STARLINE VALVES

a) All carbon steel valves are protected with a superficial treatment against corrosion before leaving Starline facility.
b) All stainless steel, duplex, super-duplex valves are pickled and passivated.
c) All internal surfaces are lubricated with a specific oil (except in case of specific request by the Customer).
d) All valves are adequately packed in order to avoid any damage during the transport and the storage period before their installation.

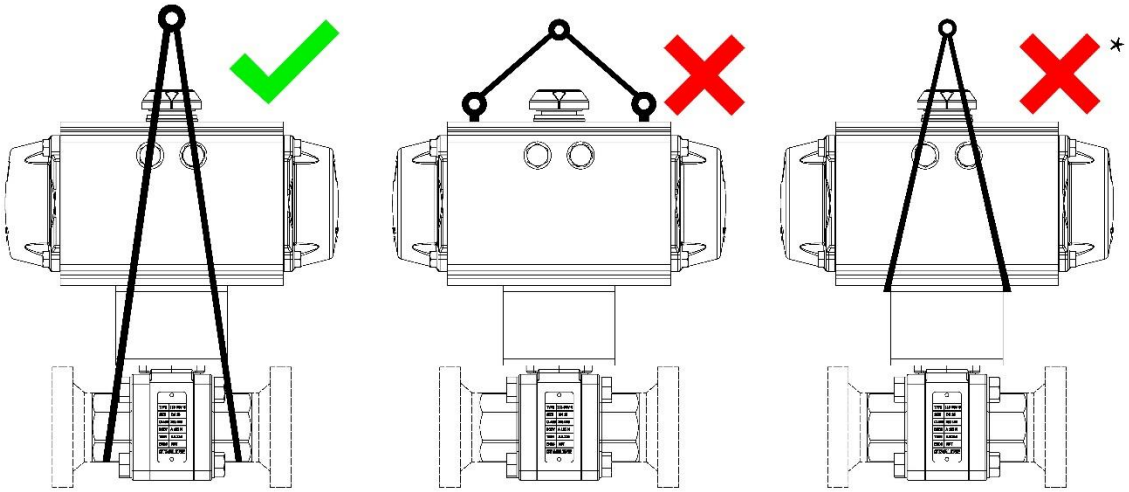
2.2.3. MAINTENANCE DURING STORAGE PERIOD

In case the valve is stored for a long time it shall be checked every 3 months as following:

a) Check that the valve treatment / painting is not damaged; in a contrary case, the interested zone shall be restored with a cleaning, degreasing and re-painted according to the cycle used by Starline.
b) Remove the lateral protections of the valve and, without rotating the ball, verify the absence of dust, debris and rust; also check the integrity of the anti-rust covering.
c) Clean and lubricate the internal part, possibly with sprayed lubricant (except for cleaned and degreased valves).
d) After the cleaning and lubricating arrange two complete cycles of opening and closing (the substances used for lubrication, as oils, have to be suitable for the type of the service and compatible with the materials of the valves' components).
e) The ball must be always kept in open position (except for the valve with automatic or semi-automatic operating systems having a rest close position). Never leave the ball in semi-open position.
f) Reposition the lateral protections of the valve.
g) For the cleaned and degreased valves, the maintenance operations (cleaning, degreasing, ecc.) have to be performed in a specific area (white clean room). After the completion of the maintenance, restore the valve protections and packing.

3. HANDLING AND LIFTING

a) Handling and lifting of the valve must only be carried out by suitably trained personnel respecting the safety conditions laid down in the applicable regulations. Always wear protective gloves.
b) Never insert body's parts in the valve bore to avoid accidents due to ball's rotation.
c) Hook the valve lifting devices to ensure their stability during handling. Lift the valve slowly and pay close attention to the hooking points are firmly locked and the valve is lifted steadily.
d) During the installation on the line, raise the valve already in the correct orientation for mounting.
e) Before removing lifting devices from the valve, make sure that the installation has been properly completed and that the chain-hooks are free of tension.
f) Lifting lugs on the actuator or gear, if present, have only to be used for handling the same (disconnected by the valve or other components such as control panels). Never lift the complete unit using any hooks or gaps present on the actuator / gear. Also, pay attention to the positioning of the lift chains to avoid damaging the actuator / gear / accessories.
g) Valves can be lifted by the gears and lifting lugs, if present, or using the holes or the neck of the flanges. It is recommended to not remove the lateral protection caps of the valve until it is installed on the line.



* Use not permitted for valves above of 1" cl. 150-800 o 3/4" cl. 900-1500.

4. INSTALLATION ON THE LINE AND START OPERATIONS

4.1. GENERAL CAUTIONS

a) The valve installation has to be done just by qualified staff respecting the safety rules.
b) Never insert body's parts in the valve bore to avoid accidents due to ball's rotation.
c) The necessary procedures are contained in this manual.
d) Use the valve only according to the limits (pressure, temperature, etc) indicated on the nameplate on the body. The identification nameplate on the valve shall not be removed from the valve for any reason.

4.2. VALVE PREPARATIONS FOR THE ASSEMBLY ON LINE

a) Remove the valve lateral protections, check its internals, verifying that there are not debris and/or damages, and potentially clean the passage of the valve.
b) Perform a complete cycle of closing and opening (at the end of the cycles the valve must be kept in OPEN position).

4.3. VALVE ASSEMBLY ON THE LINE

4.3.1. GENERAL INDICATIONS

a) Handle the valve following the instructions given in paragraph 3.
b) Remove the lateral protection caps just before the installation.
c) For bidirectional valves, the installation can be done in both ways, always in a position suitable with their use on the line. For unidirectional valves the installation has to be done according to the direction mentioned on nameplate on the body.
d) For the automated valves pay particular attention to the correct positioning of the actuator and the electrical connections (if not differently specified, the actuator has to be assembled in horizontal position.
e) The valve has to be assembled without any line tensions. In any case, the valve can not be used as a support or guide for the pipe.
f) In case of line cleaning (flushing), the ball must be positioned in fully open position. ATTENTION: check the compatibility of washing liquid with the valve materials, particularly his soft parts.

4.3.2. VALVES WITH THREADED ENDS

For the threaded ends use sealant as Hemp Core, PTFE, ecc.

4.3.3. VALVES WITH WELDED

a) With the valve in open position, perform tack weld in four points on both ends.
b) Disassemble the valve.
c) Complete the welding.
d) Re-assembly the valve.
e) Test the valve.

NOTE:

- The flanges must be disassembled. The re-assembly and inspection of the valve are responsibility of the operator.
- The welding must be performed by qualified personnel following the instruction of the manual.
- After the welding of the valve on the line, clean adequately the pipe. (See par. 4.4).

4.3.4. VALVES WITH WELDED NIPPLE ENDS

a) With the valve in open position, perform tack weld in four points on both ends.
b) Complete the welding without overheating the valve body.
c) During the welding operations, do not operate the valve until it has cooled down.

NOTES:

- The welding must be performed by qualified personnel following the instruction of the manual.
- After the welding of the valve on the line, clean adequately the pipe. (See par. 4.4)

4.3.5. VALVES WITH FLANGED ENDS

a) The flanged valves must be positioned between two flanges of the line with the same dimension and class of the flanges on the valve.
b) Bolts, nuts, seals, tightening torque must be according to the reference standards.

4.4. LINE CLEANING

a) Before using the valve, clean the line (flushing) checking that the valve is in fully OPEN position.
b) Clean the line both for valves with a soft insert and with metal seat.

CAUTION: Checking the compatibility of the flushing media with the valve materials, particular the soft parts. Do not use air or gas for cleaning the line.

5. OPERATIVE INSTRUCTIONS

5.1. VALVE OPERATION INSTRUCTION

a) The ball valves are designed to be used just in two positions: fully open or fully closed. Do not use the ball valves in intermediate positions as a flow regulator.
b) The end user is responsible of the fluid/gas, which has to be in line with and compatible with the materials of each component of the valve.
c) The valve has no safety system against possible line overpressure. The user has the responsibility to check that the pressure and the service temperature of the line falls within the limits of the valve design.
d) Avoid surge pressure in the line, which can compromise the valve integrity.
e) The manual valves can be easily operated with a lever or gear operator with hand wheel.
f) In order to close a valve with a lever, rotate it of 90° clockwise, to open rotate it of 90° anti-clockwise. The close position is identified when the lever is perpendicular to the line flow.
g) To close the valves with reducers, turn the hand-wheel clockwise until the position indicator on the outside indicates CLOSE. To open the valve, turn the hand-wheel anti-clockwise until the position indicator shows OPEN.
h) Valves can be operated with pneumatic, hydraulic and electric actuators. On these valves, there is a position indicator that shows if the valve is in open or closed position.
i) Valves can be also supplied without any operator (bare stem). In this case, the position of opening or closing of the valve is identified by the mill machining on the head of the stem: in case that this machining is parallel to the axis of the flow, the valve is in open position (PIC. 10.21); if the milling are perpendicular to the flow axis, the valve is in closed position. (PIC. 10.22)
j) In case that the valve is not been handled for a long time, it is recommended to partially operate the valve of about 15° every 3 months. This procedure will avoid the oxidation of the ball/seats contact surface, ensuring good conditions for a long time.
   CAUTION: For safety reasons, do not perform this operation on pressurized valves in closed position.

5.2. CAUTIONS

a) The end user is responsible for the valve installation and for its use. Follow carefully the instructions given in this manual and check that the valve always works according to the limits established by the data sheet.
b) Check periodically the presence of eventual leakage through connections and the correct tightening of nuts and bolts.
c) Before performing any kind of maintenance on the valve, remember to fully depressurize the line and discharge the pressure from the body cavity. Perform these operations at ambient temperature and without pressure, using the equipment and the adequate safety devices.
d) Never insert parts of the body in the bore of the valve to avoid accidents caused by ball handling.

6. MAINTENANCE

6.1. PLANNED MAINTENANCE

Plan the replacement of each soft part of the valve every 2 years as recommended.

6.2. CAUTIONS

The maintenance operations have to be performed by qualified staff only and respecting the instructions contained in this manual and the general safety rules.

Never introduce parts of the body in the valve bore to avoid accidents caused by ball handling.

Use only original spare parts given by Starline. For general information related to spare parts, see pinned drawings. For more information, contact Starline.

6.3. REMOVAL OF THE VALVE FROM THE LINE

a) If possible, clean the line before removing the valve.
b) Be sure that all pressure on the pipe is relieved.
c) Set the ball in semi-open position to discharge the residual pressure in the body cavity.
d) If present, use the drain and the vent devices to remove internal residual pressure to empty the valve from the internal residual flows.
e) Set the valve in complete open position.
f) Use appropriate handling devices for the weight and size of the valve (see paragraph.3).
g) In case of flanged valve, after having anchored for the lifting (see paragraph 3), remove the bolts, nuts and seals from the flanges and proceed with removal of the valve from the line.
h) After the removal of the valve from the line, clean it accurately.

6.4. GUIDE FOR PROBLEMS RESOLVING

Here below the table with possible problems that could arise during use of the valve and the respective corrective actions. Before run any type of action, it is always advisable to contact Starline.

The stem and the device of opening / closing of the valve not rotate or they are very hard	The packing ring (3) of the stem (5) is very compressed by the gland packing nut(2b)	Release slightly the nut (2b). In case of the stem (5) rotate normally, replace the packing ring (3) with original spare parts of Starline.
	Stem surface (5) rough or accumulation of dirt.	Remove the operator (1) and the below components (2a, 17, 2b, 4, 6, 3). Clean the metal parts and check the integrity, replace the packing ring (3) and the damaged parts only with original spare parts of Starline.
	Stem (5) bent or damaged	Remove the stem (5) and perform the complete maintenance*. Advice Starline to ensure the causes.
	Ball (9)/seats (10) damaged	Remove the ball (9) and seats (10) and perform the complete maintenance*. Advice Starline to ensure the causes.
	Presence of a foreign body inside of the valve	Disassemble the valve from the line, check and remove any foreign bodies from his inside.
	Gear (1)/actuator (1) frozen	Try to move the valve manually. Heat the gear/actuator with special blankets or thermal guns, bringing it up to the operating temperature mentioned on their manual (make sure that the procedure of heating of the components is suitable with external environment/service valve).
	Gear (1)/ Actuator (1)	Remove the gear (1)/actuator (1) and check their correct operation (contact the supplier of the gear/actuator in case of need)
Body seals leakage	Tightening torque of bolts (16) and nuts (16a) not correct	Tighten the bolts (16) and nuts (16a) using the tightening torque mentioned on table no. 12
	Tightening of the flange (13) on body (12) not correct (for treaded valves)	Check the complete tightening of the flange (13) on body (12).
	Metal seats of the seals damaged of the corrosion	The valve must be disassemble and the damaged component repaired/replaced
	Seals/Gaskets damaged	Replace the seals in the leakage points and perform the complete maintenance of the valve.*
Stem leakage	Stem packing area not compressed properly	Compress the seals (3) evenly through the nut (2b) using the tightening torque mentioned on table no.12

	Seals/gaskets damaged (3)	Replace the seals of the stem (3)
	Stem (5) deformed or damaged from scratches or nicks.	The stem (5) must be replaced and perform the complete maintenance of the valve.*
Leakage in line for problems of seals ball-seats	The ball (9) not closed properly	Bring the gear (1)/handle (1) in CLOSE position checking the position of the stem (5)
	Soft seat (10) or metal seat are damaged	Perform the complete maintenance of the valve* and in case of damage of metal seats please contact Starline to repair
	Damage of metal-to-metal selas (10)	Disassemble the valve and contact Starline to repair.
	Presence of debris on sealing surface	Valve disassembly and complete maintenance of the valve.*

NOTE:

- Use always equipment suitable with the environment and with the service of the valve.

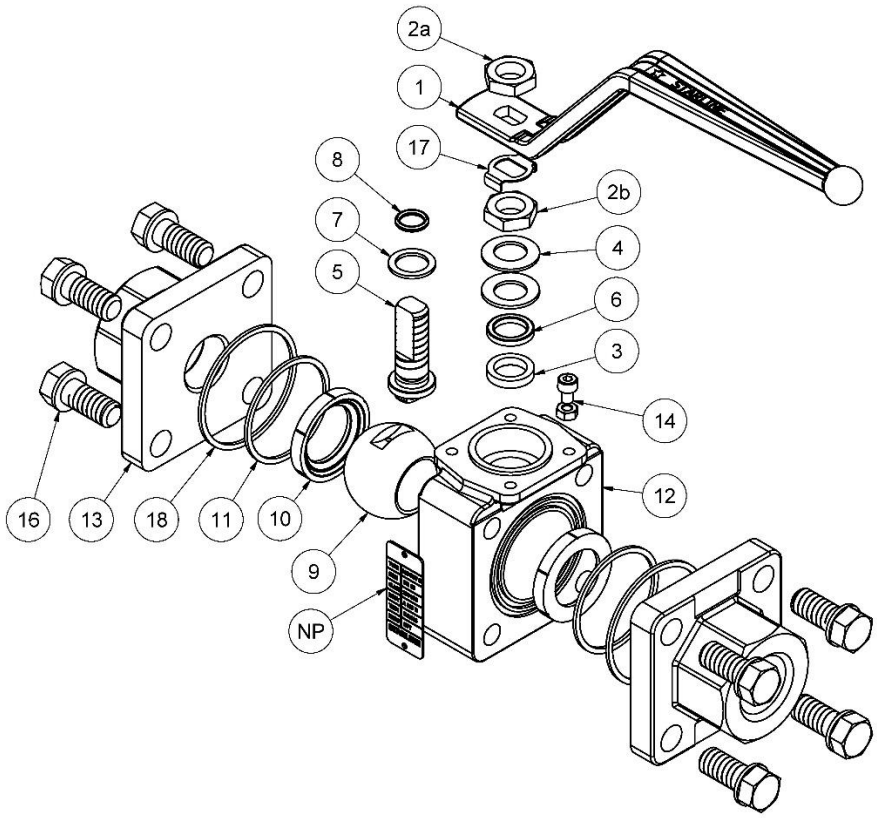
*Maintenance complete: procedure that include the disassembly, cleaning and check of the integrity of the components and the replacement of all soft parts.

6.5. HANDLING OF THE VALVE'S COMPONENTS

a) Handle carefully the graphite seals and lip seals to avoid twisting or folding.
b) Internal components of the valve as ball, seats and stem have to be handled carefully to avoid to damage their surfaces.
c) The tools used for the maintenance of the internal parts of the valve must be protected with soft material to avoid any damage.

7. EXPLODED VIEWS – DISASSEMBLY – MAINTENANCE – RE-ASSEMBLY

7.1 3 PIECES VALVE cl. 150-800

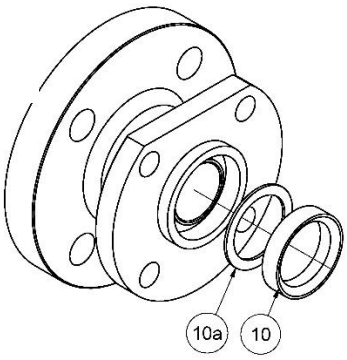


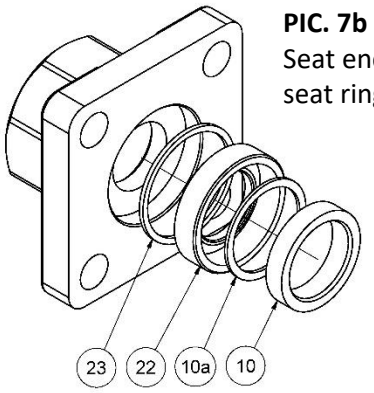
N. ITEM	QTA'	DESCRIZIONE
1	1	Handle
2 a	1	Handle nut
2 b	1	Gland packing nut
3	1	Packing ring
4	2	Spring washer
5	1	Stem
6	1	Gland packing
7	1	Thrust washer
8	1	O-ring stem
9	1	Ball
10	2	Seats
10a*	2	Seat gasket
11	2	First body seal
12	1	Body
13	2	Flange
14	1	Stop-pin
16	***	Bolts
17	1	Stop washer
18	2	Second body seal
Np	1	Nameplate
22**	2	Seat ring
23**	2	Seat seal

* Use only for flanges without seat ring incorporated (PIC. 7a).
** Only for seats encapsulated (PIC. 7b).
*** See table 12.1

ENCAPSULATED SEATS OPTION

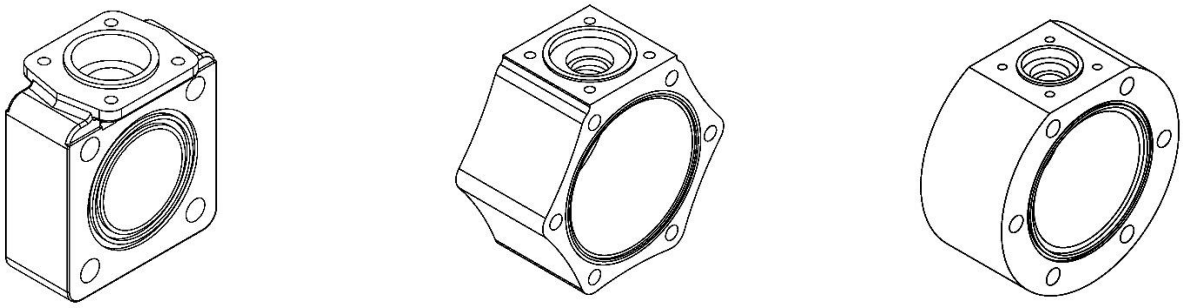
PIC. 7a
Encapsulated seat





PIC. 7b
Seat encapsulated with seat ring

SHAPE OF THE BODY



7.1.1 VALVE DISASSEMBLY

a) Set the valve in opening position.
b) Remove in sequence: handle nut (2a), handle (1) / gear (1) / actuator (1), stop washer (17), gland packing nut (2b), spring washer (4), gland packing (6), packing ring (3) and stop-pin (14).
c) Remove the bolts body-flange (16) with the respective flanges (13) and the body seals (11-18).
d) Set the valve in CLOSE position and remove the ball (9) taking care not damage it. In case of valves with seats (10) guided in the body (12) with the ball (9), push on the outside one of seats also (10), later remove the second one remained in the body.
e) Push the stem (5) inside the body (12) and remove it through the lateral bore of the body (12) (if necessary rotate it to facilitate the insertion).
f) Remove the O-Ring (8) and the thrust washer (7) from the stem (5).
g) In case of encapsulated seats (10), remove the seat (10) from the bottom of the flange (13) and relative seat gasket (10a) as indicated in PIC.7.5.
   For the seats encapsulated (10) with seat ring (22), remove the seat ring (22) and the relative seal (23) from the flange, remove the seat (10) and, if exist, the seat gasket (10a) as indicated in PIC.7.6.

7.1.2 CHECK AND REPLACEMENT OF THE COMPONENTS OF THE VALVE

With the valve completely disassembled, clean and check the following components:

BALL(9)

a) Clean the ball (9) and check carefully that the strip of contact line with the insert is free of scratches or other surface damage.
b) Any small nicks out of the seal area can be restored with the use of diamond paste.
c) Lubricate all the spherical area with a thin layer of grease.

SEAT (10): for an optimal sealing, it is recommended the complete replacement of the seats.

STEM (5): clean the stem (5) and check that the sealing areas of the seals are without scratches, abrasions or rust.

STEM SEALS (3; 7; 8) – BODY (11; 18) – SEAT GASKET (10a) – SEAT SEAL (23): it is necessary the replacement with new components.

SPRINGS (4): clean the springs (4) with kerosene solvent or similar and after that grease/oil them carefully.

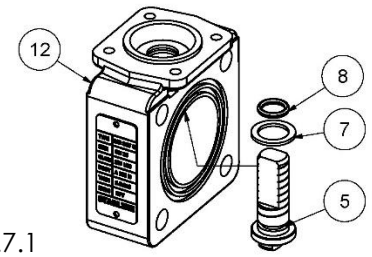
BOLTS (16) – NUTS (2a;2b) and THREADS: all the bolts and nuts (2a; 2b; 16) must be cleaned with kerosene, dried and lubricated with protective oil. Visually check the integrity of the threads.

NOTE: For components that require of lubrication, it is recommended the use of the grease suitable for the material and service of the valve.

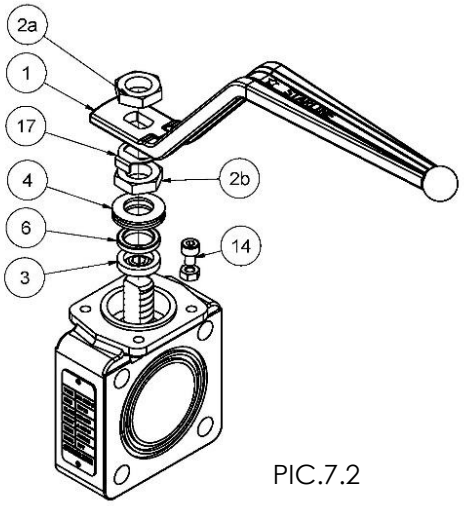
7.1.3 VALVE RE-ASSEMBLY

a) Insert the thrust washer (7) and the O-ring (8) on stem (5). (PIC.7.1)
b) Insert the stem (5) from inside of the body (12) (if necessary rotate it to facilitate the insertion).
c) With the stem (5) already inserted, assembly the packing ring (3) and the thrust washer (6). (PIC.7.2)
d) Set the spring washer (4) checking the right direction.
e) Pre-pull the stem screwing manually the gland packing nut (2b) on stem (5).
f) Set the stem (5) in CLOSE position and insert the ball (9), in CLOSE position, through the lateral bore of the body (12).
g) Set the ball (9) in OPEN position.
h) Set the seat (10) on the ball (9) insert it on body (12).
   In case of seat encapsulated (10) assembly the components (10) and (10a) if exist, as indicated in PIC.7.5. For the seats encapsulated (10) with seat ring (22) assembly the components (10), (10a) if exist, (22) and (23) as indicated in PIC.7.6.
i) Insert the body seals (11-18) on the first side using the holes on the body (12). (PIC.7.3), for class 1500-2500 assembly them on the flange (13).

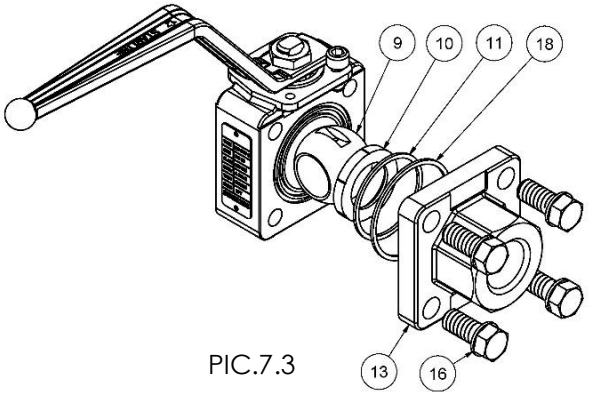
j) Assembly the first flange (13) orient it following the holes exist on the body (12).
k) Block the flange (13) screwing the bolts (16) using the tightening torque mentioned on the table 12.6.
l) Repeat the steps i – j – k – l to assembly the second flange (13).
m) Complete the tightening of the gland packing nut (2b) using the tightening torque mentioned on table 12.1.
n) Assembly in the sequence: stop washer (17), handle (1) and handle nut (2a).
o) Screw the stop-pin (14) to limit the rotation of the stem (5).



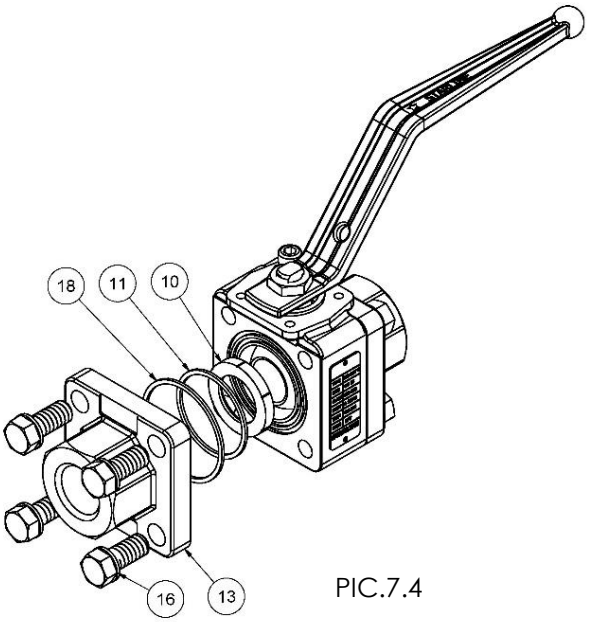
PIC.7.1



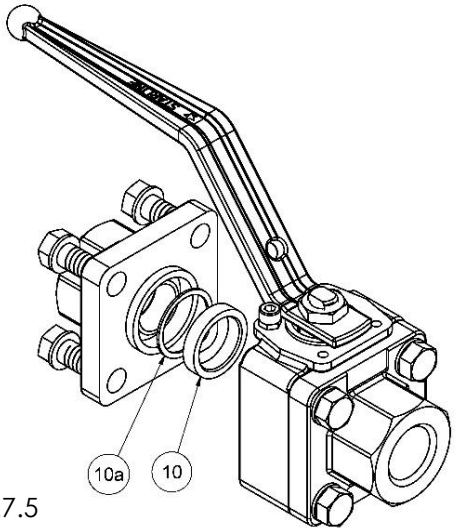
PIC.7.2



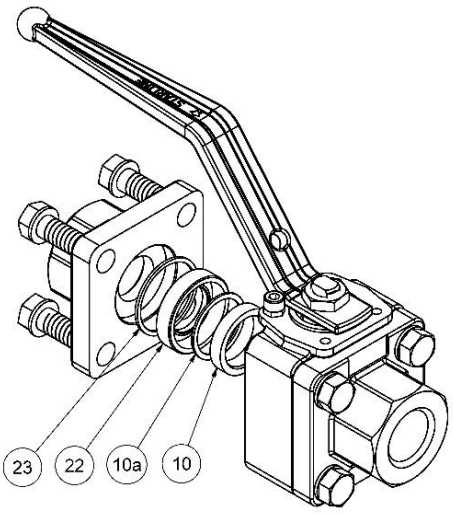
PIC.7.3



PIC.7.4



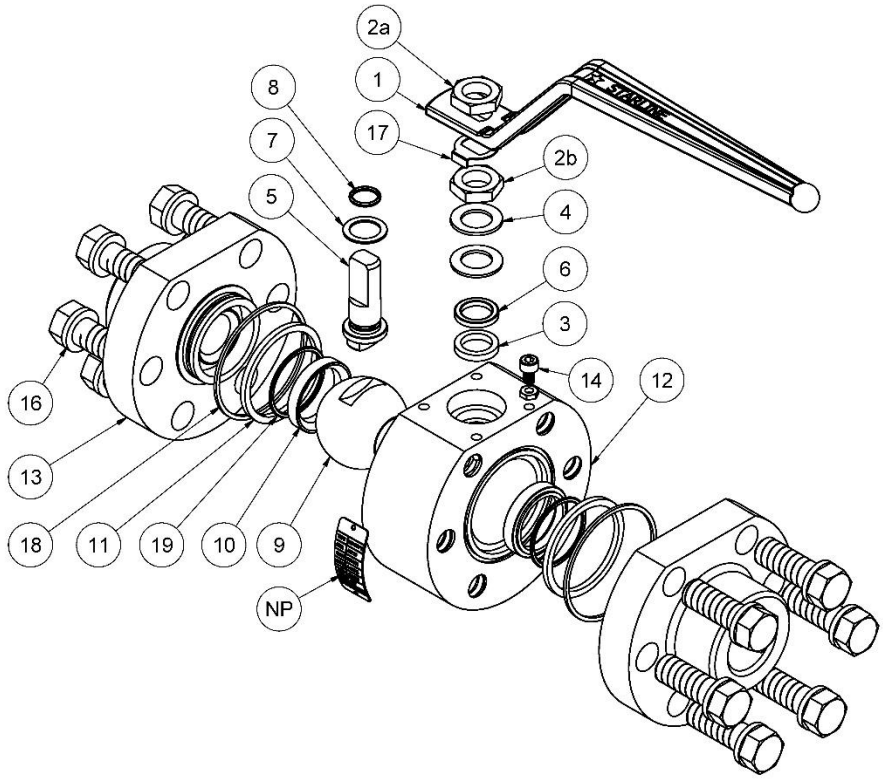
PIC.7.5



PIC.7.6

7.2 3 PIECES VALVE cl. 900-2500

*Only seats encapsulated



N. ITEM	QTA'	DESCRIZIONE
1	1	Handle
2 a	1	Handle nut
2 b	1	Gland packing nut
3	1	Packing ring
4	2	Spring Washer
5	1	Stem
6	1	Gland packing
7	1	Thrust washer
8	1	O-ring stem
9	1	Ball
10	2	Seats
11	2	First body seal
12	1	Body
13	2	Flange
14	1	Stop-pin
16	***	Bolts
17	1	Stop washer
18	2	Second body seal
19	2	Seat seal
Np	1	Nameplate
*** See table 12.2		

7.2.1 VALVE DISASSEMBLY

a) Set the valve in opening position.
b) Remove in sequence: handle nut (2a), handle (1) / gear (1) / actuator (1), stop washer (17), gland packing nut (2b), spring washer (4), gland packing (6), packing ring (3) and stop-pin (14).
c) Remove the bolts body-flange (16) with the respective flanges (13) and the body seals (11-18).
d) Set the valve in CLOSE position and remove the ball (9) taking care not damage it. In case of valves with seats (10) guided in the body (12) with the ball (9), push on the outside one of seats also (10), later remove the second one remained in the body.
e) Push the stem (5) inside the body (12) and remove it through the lateral bore of the body (12) (if necessary rotate it to facilitate the insertion).
f) Remove the O-Ring (8) and the thrust washer (7) from the stem (5).
g) In case of encapsulated seats (10), remove the seat (10) from the bottom of the flange (13) and relative seat gasket (10a) as indicated in PIC.7.11.
   For the seats encapsulated (10) with seat ring (22), remove the seat ring (22) and the relative seal (23) from the flange, remove the seat (10) and, if exist, the seat gasket (10a) as indicated in PIC.7.12.

7.2.2 CHECK AND REPLACEMENT OF THE COMPONENTS OF THE VALVE

With the valve completely disassembled, clean and check the following components:

<u>BALL(9)</u>

a) Clean the ball (9) and check carefully that the strip of contact line with the insert is free of scratches or other surface damage.
b) Any small nicks out of the seal area can be restored with the use of diamond paste.
c) Lubricate all the spherical area with a thin layer of grease.

<u>SEAT (10)</u>: for an optimal sealing, it is recommended the complete replacement of the seats.

<u>STEM (5)</u>: clean the stem (5) and check that the sealing areas of the seals are without scratches, abrasions or rust.

<u>STEM SEALS (3; 7; 8) – BODY (11; 18) – SEAT (10a)</u>: it is necessary the replacement with new components.

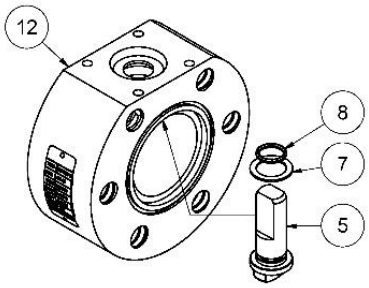
SPRINGS (4): clean the springs (4) with kerosene solvent or similar and after that grease/oil them carefully.

BOLTS (16) – NUTS (2a;2b) and THREADS: all the bolts and nuts (2a; 2b; 16) must be cleaned with kerosene, dried and lubricated with protective oil. Visually check the integrity of the threads.

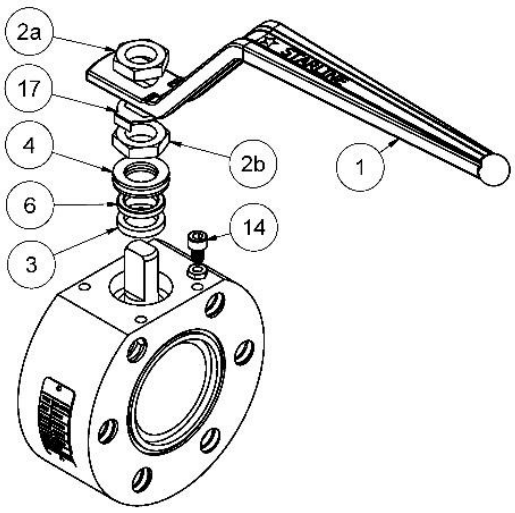
NOTE: For components that require of lubrication, it is recommended the use of the grease suitable for the material and service of the valve.

7.2.3 VALVE RE-ASSEMBLY

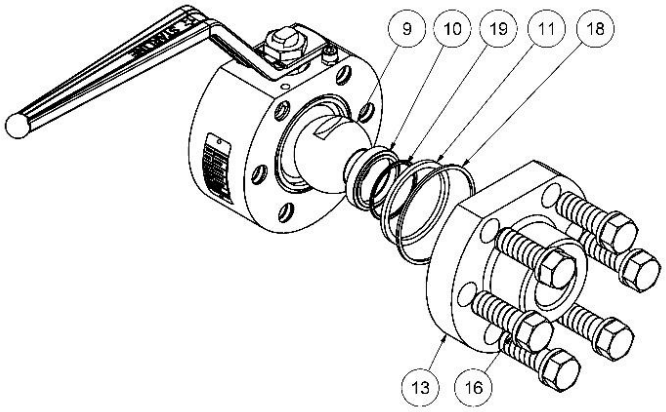
a) Insert the thrust washer (7) and the O-ring (8) on stem (5). (PIC.7.7)
b) Insert the stem (5) from inside of the body (12) (if necessary rotate it to facilitate the insertion).
c) With the stem (5) already inserted, assembly the packing ring (3) and the thrust washer (6). (PIC.7.8)
d) Set the spring washer (4) checking the right direction.
e) Pre-pull the stem screwing manually the gland packing nut (2b) on stem (5).
f) Set the stem (5) in CLOSE position and insert the ball (9), in CLOSE position, through the lateral bore of the body (12).
g) Set the ball (9) in OPEN position.
h) Set the seat (10) on the ball (9) insert it on body (12).
   In case of seat encapsulated (10) assembly the components (10) and (10a) if exist, as indicated in PIC.7.11. For the seats encapsulated (10) with seat ring (22) assembly the components (10), (10a) if exist, (22) and (23) as indicated in PIC.7.6.
i) Insert the body seals (11-18) on the first side using the holes on the body (12). (PIC.7.9), for class 1500-2500 assembly them on the flange (13).
j) Assembly the first flange (13) orient it following the holes exist on the body (12).
k) Block the flange (13) screwing the bolts (16) using the tightening torque mentioned on the table 12.6.
l) Repeat the steps i – j – k – l to assembly the second flange (13).
m) Complete the tightening of the gland packing nut (2b) using the tightening torque mentioned on table 12.2.
n) Assembly in the sequence: stop washer (17), handle (1) and handle nut (2a).
o) Screw the stop-pin (14) to limit the rotation of the stem (5).



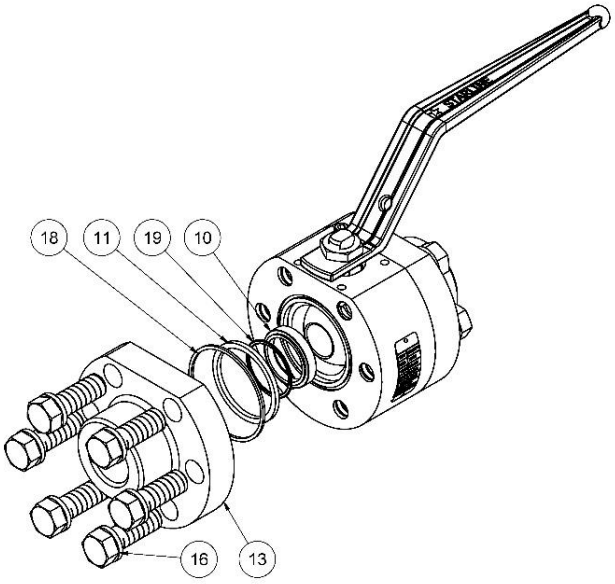
PIC.7.7



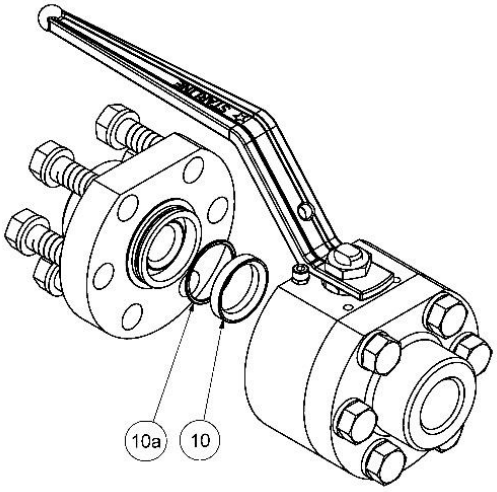
PIC.7.8



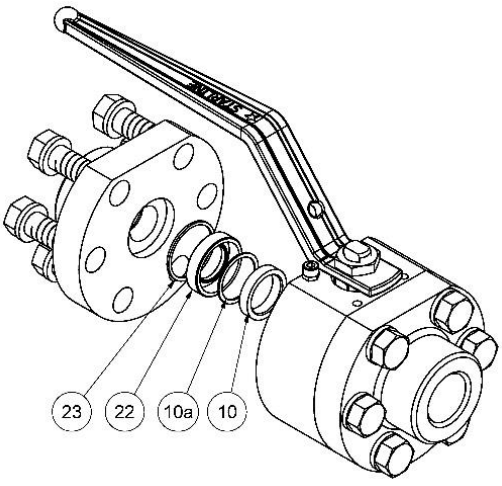
PIC.7.9



PIC.7.10



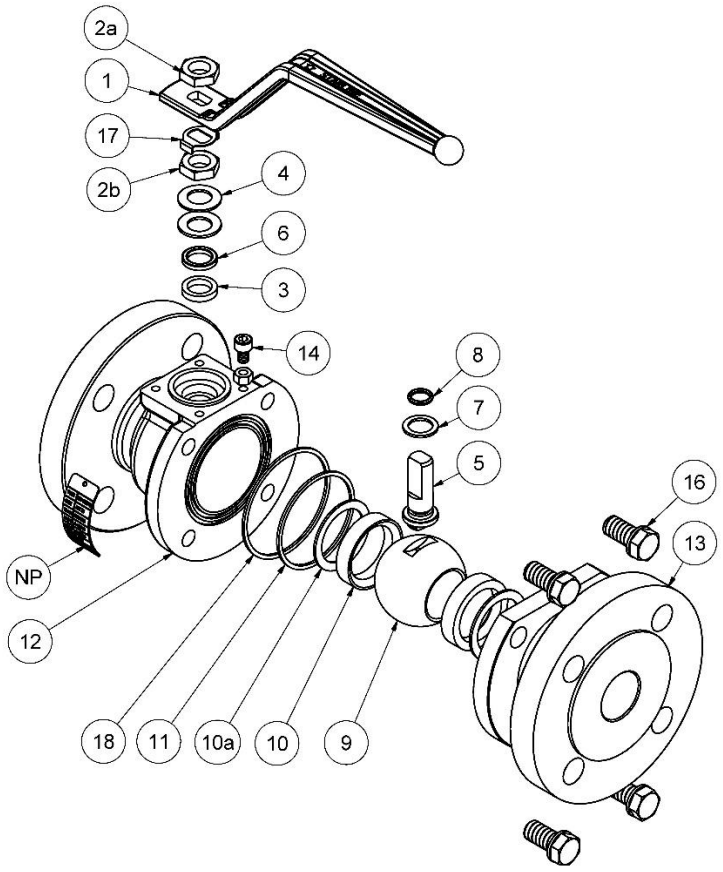
PIC.7.11



PIC.7.12

7.3 2 PIECES VALVE cl. 150-300

* Only seats encapsulated



N. ITEM	QTA'	DESCRIZIONE
1	1	Handle
2 a	1	Handle nut
2 b	1	Gland packing nut
3	1	Packing ring
4	2	Spring Washer
5	1	Stem
6	1	Gland packing
7	1	Thrust Washer
8	1	O-ring stem
9	1	Ball
10	2	Seats
10a*	2	Seat gasket
11	1	First body seal
12	1	Body
13	1	Flange
14	1	Stop-pin
16	***	Bolts
17	1	Stop washer
18	1	Second body seal
Np	1	Nameplate

* Use only for flanges without seat ring integrated (FIG. 7a).
*** See table 12.3

7.3.1 VALVE DISASSEMBLY

a) Set the valve in opening position.
b) Remove in sequence: handle nut (2a), handle (1) / gear (1) / actuator (1), stop washer (17), gland packing nut (2b), spring washer (4), gland packing (6), packing ring (3) and stop-pin (14).
c) Remove the bolts body-flange (16) with the respective flanges (13) and the body seals (11-18).
d) Set the valve in CLOSE position and remove the ball (9) taking care not damage it.
e) Push the stem (5) inside the body (12) and remove it through the lateral bore of the body (12) (if necessary rotate it to facilitate the insertion).
f) Remove the O-Ring (8) and the thrust washer (7) from the stem (5).
g) In case of encapsulated seats (10), remove the first seat (10) from the bottom of the flange (13) and relative seat gasket (10a); after that remove the other seat as indicated in PIC.7.17.
h) For the seats encapsulated (10) with seat ring (22), remove the seat ring (22) and the relative seal (23) from the flange, remove the seat (10) and, if exist, the seat gasket (10a) as indicated in PIC.7.18. Remove, at the same, the other seat from the bottom on the body (12).

7.3.2 CHECK AND REPLACEMENT OF THE COMPONENTS OF THE VALVE

With the valve completely disassembled, clean and check the following components:

BALL(9)

a) Clean the ball (9) and check carefully that the strip of contact line with the insert is free of scratches or other surface damage.
b) Any small nicks out of the seal area can be restored with the use of diamond paste.
c) Lubricate all the spherical area with a thin layer of grease.

SEAT (10): for an optimal sealing, it is recommended the complete replacement of the seats.

STEM (5): clean the stem (5) and check that the sealing areas of the seals are without scratches, abrasions or rust.

STEM SEALS (3; 7; 8) – BODY (11; 18) – SEAT (10a): it is necessary the replacement with new components.

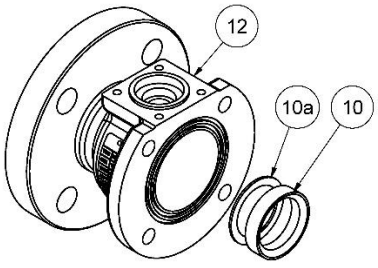
SPRINGS (4): clean the springs (4) with kerosene solvent or similar and after that grease/oil them carefully.

BOLTS (16) – NUTS (2a;2b) and THREADS: all the bolts and nuts (2a; 2b; 16) must be cleaned with kerosene, dried and lubricated with protective oil. Visually check the integrity of the threads.

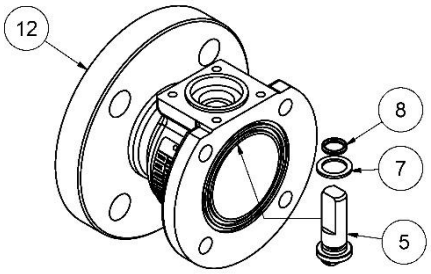
NOTE: For components that require of lubrication, it is recommended the use of the grease suitable for the material and service of the valve.

7.3.3 VALVE RE-ASSEMBLY

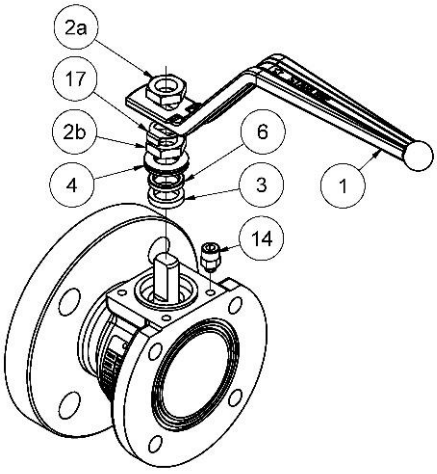
a) Insert the seat (10) on the bottom of the body (12). (PIC.7.13)
b) In case of seat encapsulated (10) assembly the components (10) and (10a) if exist, as indicated in PIC.7.17. For the seats encapsulated (10) with seat ring (22) assembly the components (10), (10a) if exist, (22) and (23) as indicated in PIC.7.18.
c) Insert the thrust washer (7) and the O-ring (8) on stem (5). (PIC.7.14)
d) Insert the stem (5) from inside of the body (12) (if necessary rotate it to facilitate the insertion).
e) With the stem (5) already inserted, assembly the packing ring (3) and the thrust washer (6). (PIC.7.15)
f) Set the spring washer (4) checking the right direction.
g) Pre-pull the stem screwing manually the gland packing nut (2b) on stem (5).
h) Insert the seat on the bottom of the flange (13) as indicated in the point 'a'.
i) Set the stem (5) in CLOSE position and insert the ball (9), in CLOSE position, through the lateral bore of the body (12). (PIC. 7.16)
j) Set the ball (9) in OPEN position.
k) Insert the body seals (11-18) using the holes on the body (12). (PIC.7.16), for class 1500-2500 assembly them on the flange (13).
l) Assembly the flange (13) orient it following the holes exist on the body (12).
m) Block the flange (13) screwing the bolts (16) using the tightening torque mentioned on the table 12.6.
n) Complete the tightening of the gland packing nut (2b) using the tightening torque mentioned on table 12.3.
o) Assembly in the sequence: stop washer (17), handle (1) and handle nut (2a).
p) Screw the stop-pin (14) to limit the rotation of the stem (5).



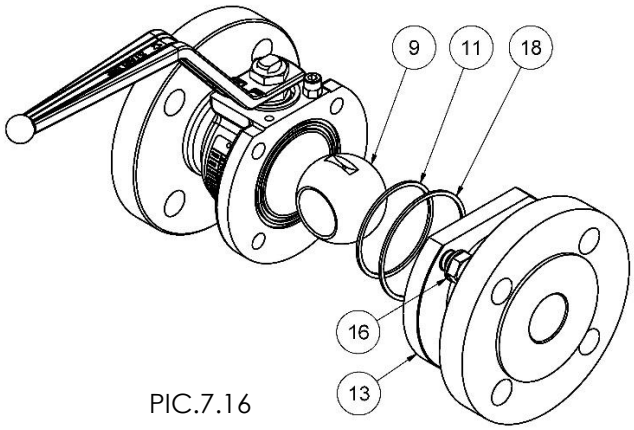
PIC.7.13



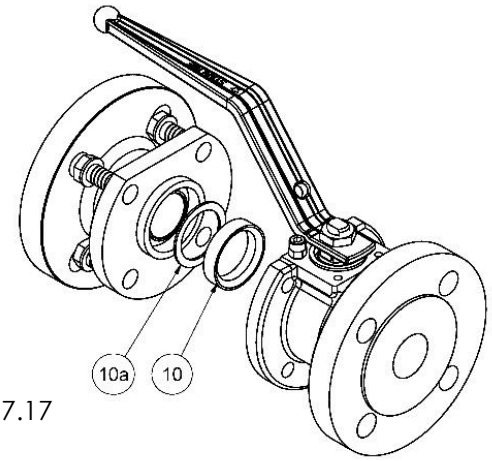
PIC.7.14



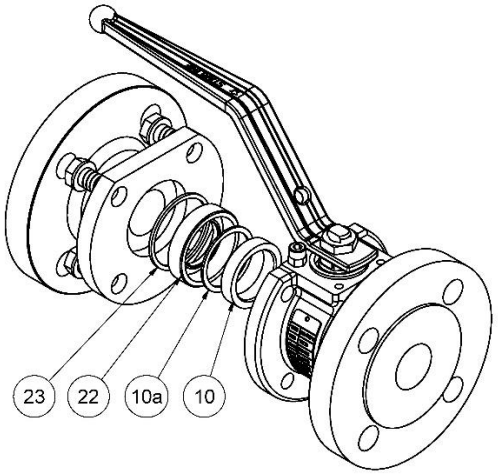
PIC.7.15



PIC.7.16

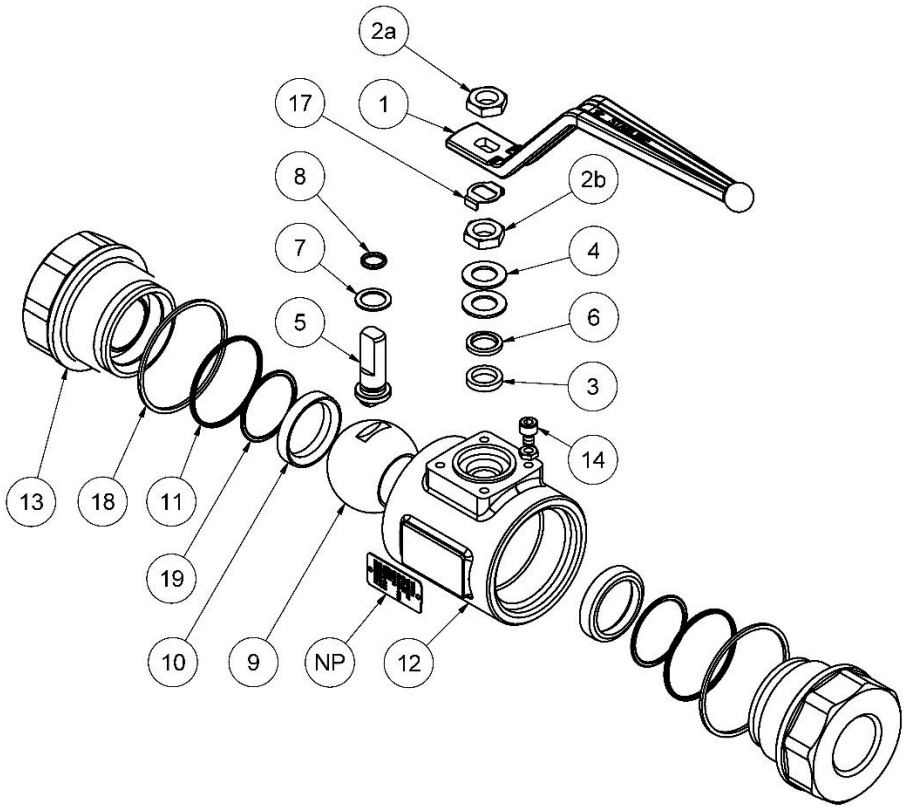


PIC.7.17



PIC.7.18

7.4 THREADED VALVE cl. 150-1500



N. ITEM	QTA'	DESCRIZIONE
1	1	Handle
2 a	1	Handle nut
2 b	1	Gland packing nut
3	1	Packing ring
4	2	Spring Washer
5	1	Stem
6	1	Gland packing
7	1	Thrust Washer
8	1	O-ring stem
9	1	Ball
10	2	Seats
11	2	First body seal
12	1	Body
13	2	Flange
14	1	Stop-pin
17	1	Stop washer
18	2	Second body seal
19	2	Seat seal
Np	1	Nameplate

7.4.1 VALVE DISASSEMBLY

a) Set the valve in opening position.
b) Remove in sequence: handle nut (2a), handle (1) / gear (1) / actuator (1), stop washer (17), gland packing nut (2b), spring washer (4), gland packing (6), packing ring (3) and stop-pin (14).
c) Unscrew the flanges (13) from the body (12) and the body seals (11-18).
d) Set the valve in CLOSE position and remove the ball (9) taking care not damage it.
e) Push the stem (5) inside the body (12) and remove it through the lateral bore of the body (12) (if necessary rotate it to facilitate the insertion).
f) Remove the O-Ring (8) and the thrust washer (7) from the stem (5).
g) Remove the seat (10) from the bottom of the flange (13) and relative seat gasket (10a).

7.4.2 CHECK AND REPLACEMENT OF THE COMPONENTS OF THE VALVE

With the valve completely disassembled, clean and check the following components:

BALL(9)

a) Clean the ball (9) and check carefully that the strip of contact line with the insert is free of scratches or other surface damage.
b) Any small nicks out of the seal area can be restored with the use of diamond paste.
c) Lubricate all the spherical area with a thin layer of grease.

SEAT (10): for an optimal sealing, it is recommended the complete replacement of the seats.

STEM (5): clean the stem (5) and check that the sealing areas of the seals are without scratches, abrasions or rust.

STEM SEALS (3; 7; 8) – BODY (11; 18) – SEAT (10a): it is necessary the replacement with new components.

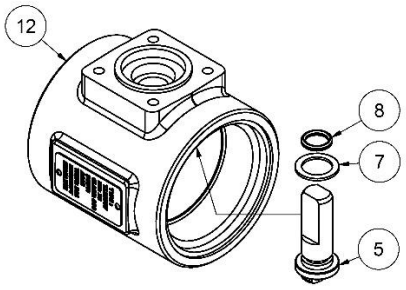
SPRINGS (4): clean the springs (4) with kerosene solvent or similar and after that grease/oil them carefully.

NUTS (2a;2b) and THREADS: nuts (2a; 2b) and threads must be cleaned with kerosene, dried and lubricated with protective oil. Visually check the integrity of the threads.

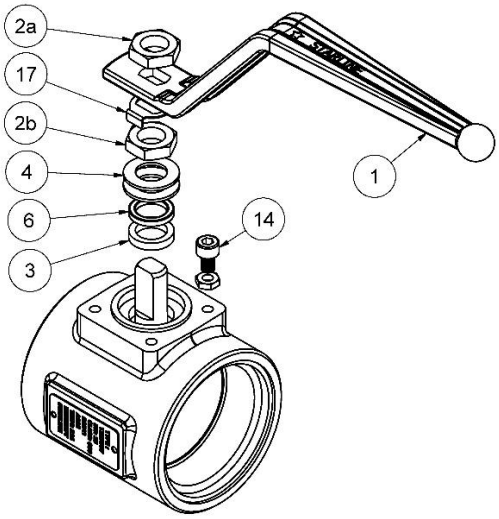
NOTE: For components that require of lubrication, it is recommended the use of the grease suitable for the material and service of the valve.

7.4.3 VALVE RE-ASSEMBLY

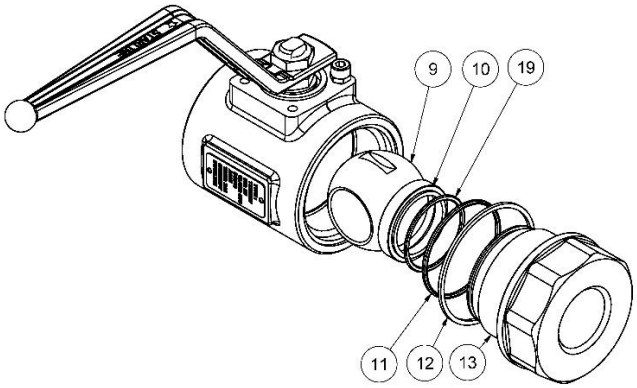
a) Insert the thrust washer (7) and the O-ring (8) on stem (5). (PIC.7.19)
b) Insert the stem (5) from inside of the body (12) (if necessary rotate it to facilitate the insertion).
c) With the stem (5) already inserted, assembly the packing ring (3) and the thrust washer (6). (PIC.7.20)
d) Set the spring washer (4) checking the right direction.
e) Pre-pull the stem screwing manually the gland packing nut (2b) on stem (5).
f) Set the stem (5) in CLOSE position and insert the ball (9), in CLOSE position, through the lateral bore of the body (12).
g) Set the ball (9) in OPEN position.
h) Insert the seat (10) with the seat seal (19) inside of the flange (13), as indicated in PIC. 7.23.
i) Insert the body seals (11-18) on the first side using the holes on the body (12). (PIC.7.21), for class 1500 assembly them on the flange (13).
j) Screw completely the first flange (13) on the body (12).
k) Repeat the steps h- i – j to assembly the second flange (13).
l) Complete the tightening of the gland packing nut (2b) using the tightening torque mentioned on table 12.5.
m) Assembly in the sequence: stop washer (17), handle (1) and handle nut (2a).
n) Screw the stop-pin (14) to limit the rotation of the stem (5).



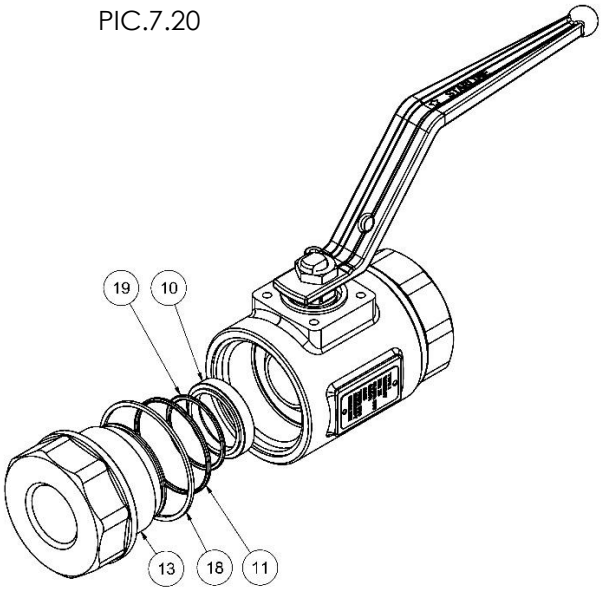
PIC.7.19



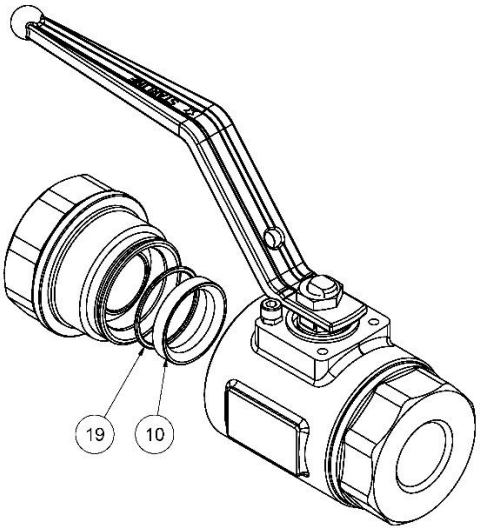
PIC.7.20



PIC.7.21

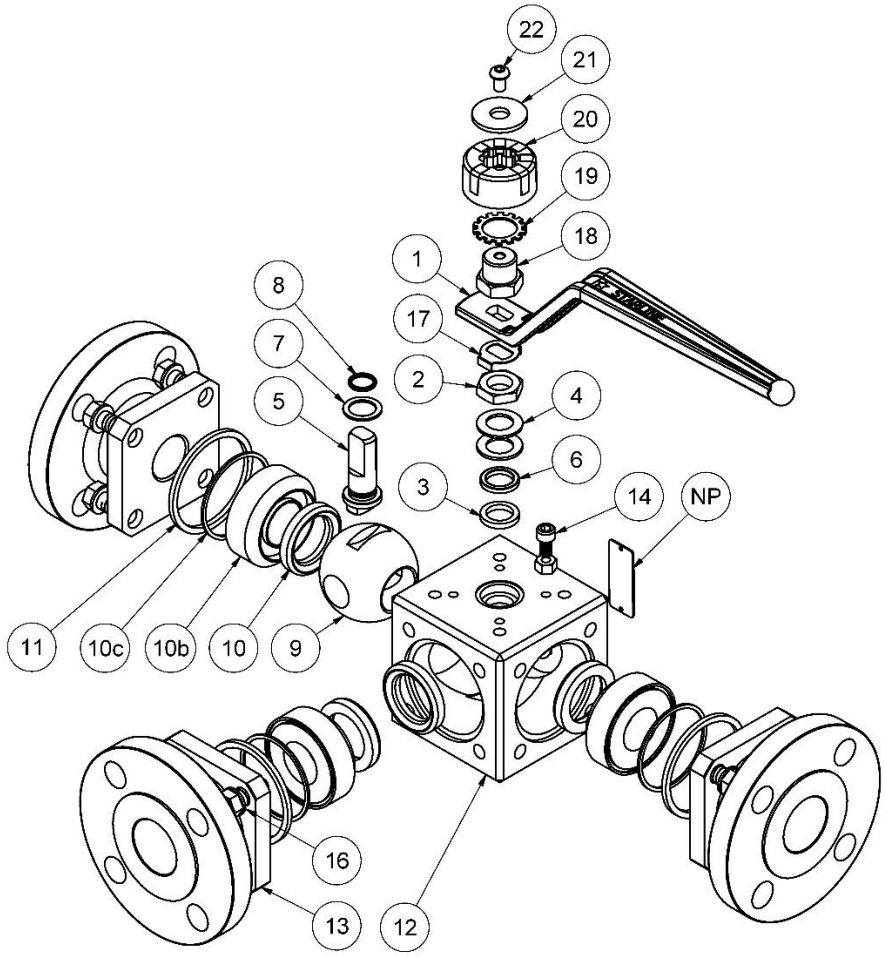


PIC.7.22



PIC.7.23

7.5 3WAY VALVE cl. 150-600



N. ITEM	QT	DESCRIZIONE
1	1	Handle
2	1	Gland packing nut
3	1	Packing ring
4	2	Spring Washer
5	1	Stem
6	1	Gland packing
7	1	Thrust washer
8	1	O-ring stem
9	1	Ball
10	4	Seats
10b	3	Seat ring
10c	3	Seat seal
11	3	First body seal
12	1	Body
13	3	Flange
14	1	Stop-pin
16	*	Bolts
17	1	Stop washer
18	1	Handle nut
19	1	Lock washer
20	1	Position indicator
21	1	Washer
22	1	Screw
Np	1	Nameplate
*See table 12.5		

7.5.1 VALVE DISASSEMBLY

a) Remove from the body (12) all the bolts body-flange (16) and the respective flange (13).
b) Set the handle in line with one of the lateral ways.
c) Remove the seats rings (10b) (with the seats 10) and the seals (11-18).
d) Remove the ball (9) from the central bore taking care not damage it.
e) Remove the fourth seat (10) from the internal bottom of the body (12).
f) Remove in the sequence: screw (22), washer (21), position indicator (20), lock washer (19), handle nut (18), handle (1) / gear (1) / actuator (1), stop washer (17), gland packing nut (2), spring washer (4), gland packing (6), packing ring (3) and stop-pin (14).
g) Push the stem (5) to the internal of the body (12) and remove it through the lateral bore of the body (if necessary rotate it to facilitate the insertion).
h) Remove the O-ring (8) and the thrust washer (7) from the stem (5).
i) Remove the seat (10) from the seat ring (10b) taking care not damage the components.

7.5.2 CHECK AND REPLACEMENT OF THE COMPONENTS OF THE VALVE

With the valve completely disassembled, clean and check the following components:

<u>BALL(9)</u>

a) Clean the ball (9) and check carefully that the strip of contact line with the insert is free of scratches or other surface damage.
b) Any small nicks out of the seal area can be restored with the use of diamond paste.
c) Lubricate all the spherical area with a thin layer of grease.

SEAT (10): for an optimal sealing, it is recommended the complete replacement of the seats.

STEM (5): clean the stem (5) and check that the sealing areas of the seals are without scratches, abrasions or rust.

STEM SEALS (3; 7; 8) – BODY (11) – SEAT (10c): it is necessary the replacement with new components.

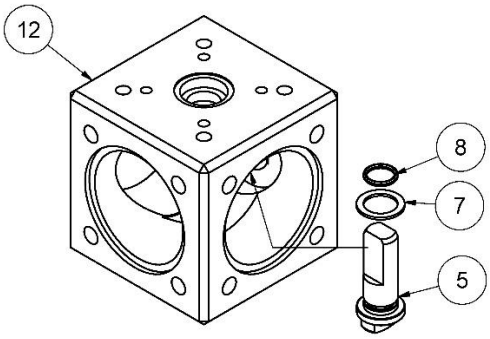
SPRINGS (4): clean the springs (4) with kerosene solvent or similar and after that grease/oil them carefully.

BOLTS (16) - NUTS (2;18) and THREADS: all the bolts (16) and nuts (2; 18) must be cleaned with kerosene, dried and lubricated with protective oil. Visually check the integrity of the threads.

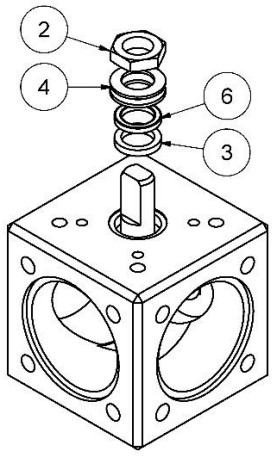
NOTE: For components that require of lubrication, it is recommended the use of the grease suitable for the material and service of the valve.

7.5.3 VALVE RE-ASSEMBLY

a) Insert the thrust washer (7) and the O-ring (8) on stem (5). (PIC.7.24)
b) Insert the stem (5) from inside of the body (12) (if necessary rotate it to facilitate the insertion).
c) With the stem (5) already inserted, assembly the packing ring (3) and the thrust washer (6). (PIC.7.25)
d) Set the spring washer (4) checking the right direction.
e) Pre-pull the stem screwing manually the gland packing nut (2) on stem (5).
f) Insert the seat (10) in the blind part of the body (12). (FIG. 7.26).
g) Set the stem (5) in the appropriate position to allow the insertion of the ball (9), from the central bore of the body (12). (See the catalogue no. 8 for the port configurations).
h) Insert the three seats ring (10b) already assembled with the seats (10).
i) Insert the first body seals (11) and the seat seals (10c).
j) Screw the first flange (13) in the front bore of the body (12) screwing the bolts (16) using the tightening torque mentioned on table 12.6. (PIC.7.27).
k) Assembly the other two lateral flanges (13) on the body (12) screwing the bolts (16), alternate the left side with right side to get a constant pressure on the seats rings (10b).
l) Complete the tightening of the gland packing nut (2) using the tightening torque mentioned on table 12.5. (PIC.7.28).
m) Assembly in the sequence: stop washer (17), handle (1), handle nut (18), lock washer (19), position indicator (20) (keeping the correct orientation of the ball), washer (21) and screw (22).
n) Screw the stop-pin (14) to limit the rotation of the stem (5).



PIC.7.24



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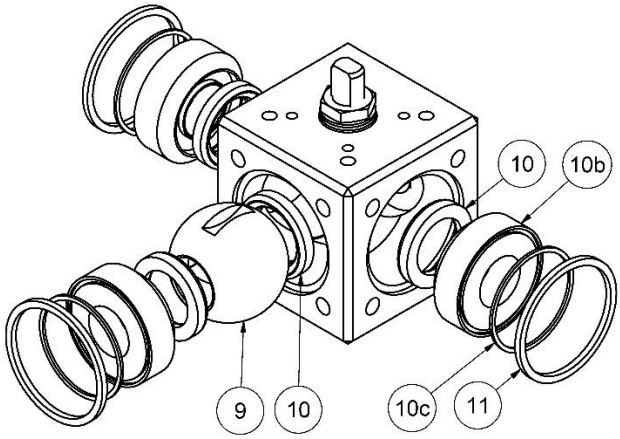

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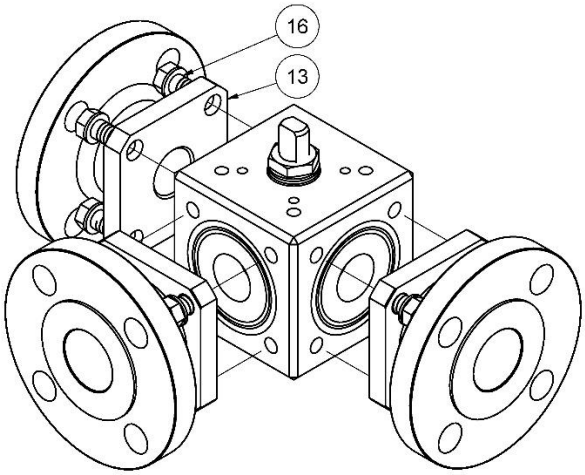

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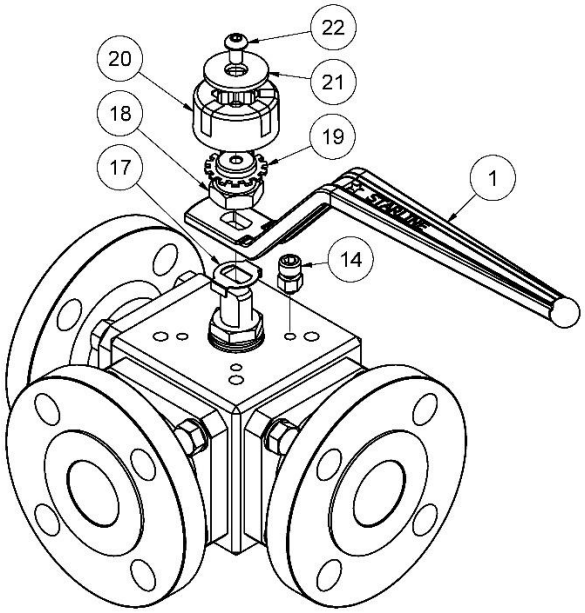
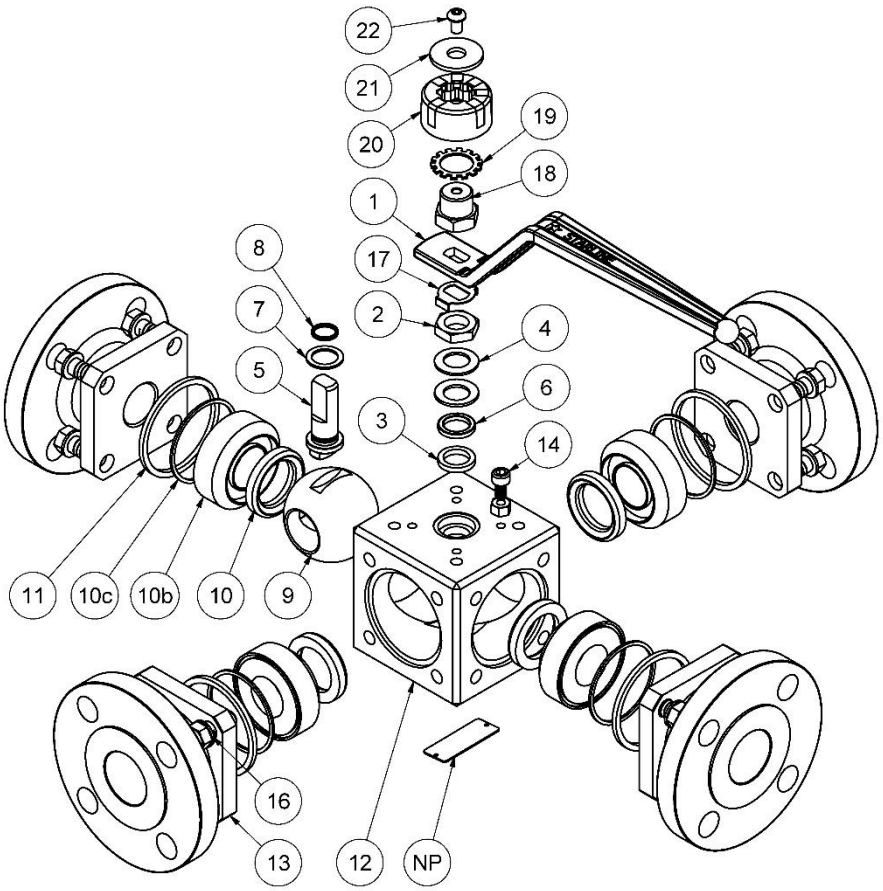


PIC.7.28

7.6 4WAY VALVE cl. 150-600



N. ITEM	QT	DESCRIZIONE
1	1	Handle
2	1	Gland packing nut
3	1	Packing ring
4	2	Spring washer
5	1	Stem
6	1	Gland packing
7	1	Thrust Washer
8	1	O-ring stem
9	1	Ball
10	4	Seats
10b	4	Seat ring
10c	4	Seat seal
11	4	First body seal
12	1	Body
13	4	Flange
14	1	Stop-pin
16	*	Bolts
17	1	Stop washer
18	1	Handle nut
19	1	Lock washer
20	1	Position indicator
21	1	Washer
22	1	Screw
Np	1	Nameplate
* See table 12.5		

7.6.1 VALVE DISASSEMBLY

a) Remove from the body (12) all the bolts body-flange (16) and the respective flange (13).
b) Set the handle in line with one of the lateral ways.
c) Remove the seats rings (10b) (with the seats 10) and the seals (11-18).
d) Remove the ball (9) from the central bore taking care not damage it.
e) Remove in the sequence: screw (22), washer (21), position indicator (20), lock washer (19), handle nut (18), handle (1) / gear (1) / actuator (1), stop washer (17), gland packing nut (2), spring washer (4), gland packing (6), packing ring (3) and stop-pin (14).
f) Push the stem (5) to the internal of the body (12) and remove it through the lateral bore of the body (if necessary rotate it to facilitate the insertion).
g) Remove the O-ring (8) and the thrust washer (7) from the stem (5).
h) Remove the seat (10) from the seat ring (10b) taking care not damage the components.

7.6.2 CHECK AND REPLACEMENT OF THE COMPONENTS OF THE VALVE

With the valve completely disassembled, clean and check the following components:

BALL(9)

a) Clean the ball (9) and check carefully that the strip of contact line with the insert is free of scratches or other surface damage.
b) Any small nicks out of the seal area can be restored with the use of diamond paste.
c) Lubricate all the spherical area with a thin layer of grease.

SEAT (10): for an optimal sealing, it is recommended the complete replacement of the seats.

STEM (5): clean the stem (5) and check that the sealing areas of the seals are without scratches, abrasions or rust.

STEM SEALS (3; 7; 8) – BODY (11) – SEAT (10c): it is necessary the replacement with new components.

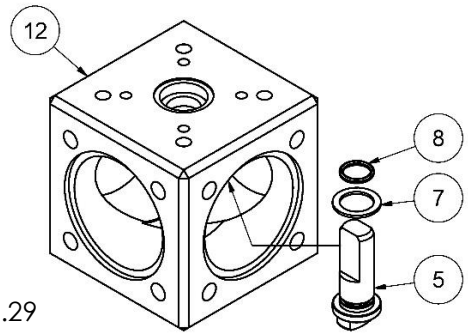
SPRINGS (4): clean the springs (4) with kerosene solvent or similar and after that grease/oil them carefully.

BOLTS (16) - NUTS (2;18) and THREADS: all the bolts (16) and nuts (2; 18) must be cleaned with kerosene, dried and lubricated with protective oil. Visually check the integrity of the threads.

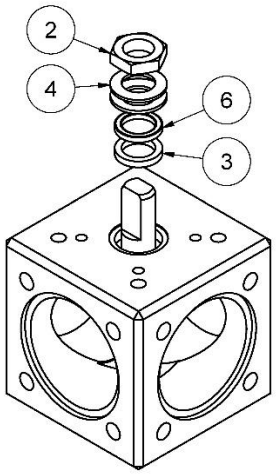
NOTE: For components that require of lubrication, it is recommended the use of the grease suitable for the material and service of the valve.

7.6.3 VALVE RE-ASSEMBLY

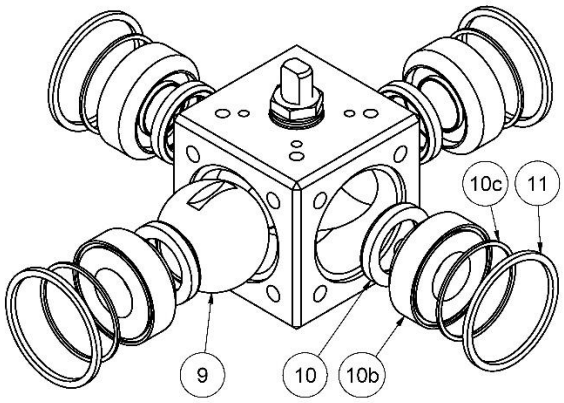
a) Insert the thrust washer (7) and the O-ring (8) on stem (5). (PIC.7.29)
b) Insert the stem (5) from inside of the body (12) (if necessary rotate it to facilitate the insertion).
c) With the stem (5) already inserted, assembly the packing ring (3) and the thrust washer (6). (PIC.7.30)
d) Set the spring washer (4) checking the right direction.
e) Pre-pull the stem screwing manually the gland packing nut (2) on stem (5).
f) Set the stem (5) in the appropriate position to allow the insertion of the ball (9), from the central bore of the body (12). (See the catalogue no. 9 for the port configurations). (FIG.7.31)
g) Insert the four seats ring (10b) already assembled with the seats (10).
h) Insert the first body seals (11) and the seat seals (10c).
i) Assembly the first and the second flanges (13) on opposite sides of the body (12) alternate the left side with right side to get a constant pressure on the seats rings (10b). Use the tightening torque mentioned on table 12.6. (PIC.7.32).
j) Assembly the other flanges (13) in the same way of the point 'i'. (FIG.7.33).
k) Complete the tightening of the gland packing nut (2) using the tightening torque mentioned on table 12.5. (PIC.7.34).
l) Assembly in the sequence: stop washer (17), handle (1), handle nut (18), lock washer (19), position indicator (20) (keeping the correct orientation of the ball), washer (21) and screw (22).
m) Screw the stop-pin (14) to limit the rotation of the stem (5).



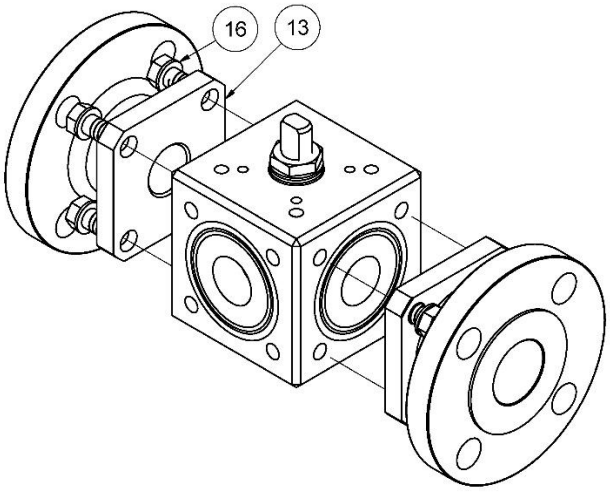
PIC.7.29



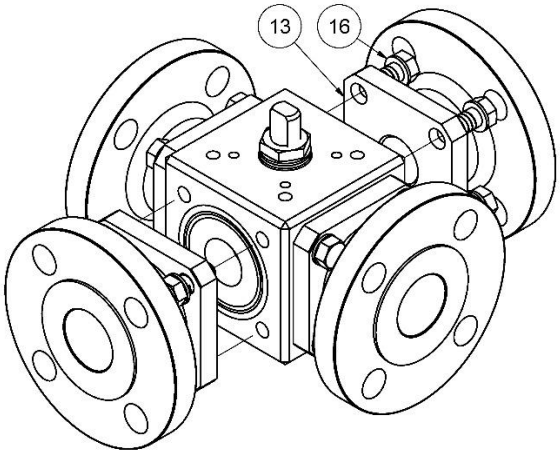
PIC.7.30



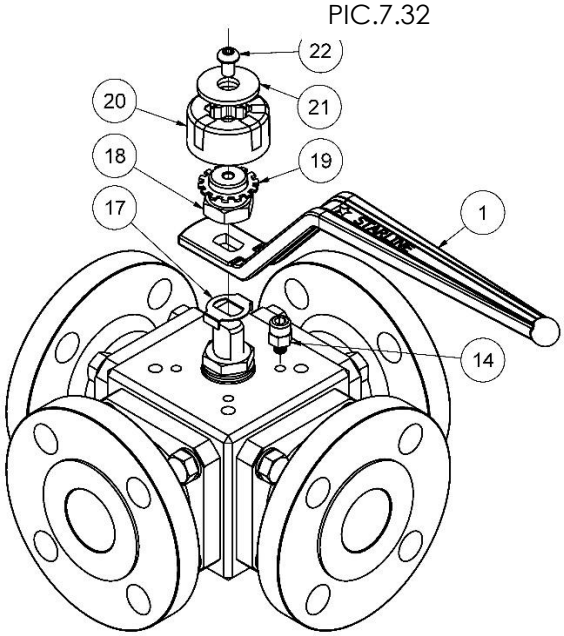
PIC.7.31



PIC.7.32



PIC.7.33



PIC.7.34

8 TEST

After re-assembling, the valve manoeuvrability shall, be checked by performing dive open-close movement and by checking the alignment between ball and flange. If possible, perform an additional test according to the Starline procedure.

9 TABLES WITH TIGHTNESS TORQUE VALUES SUGGESTED

TABLE 12.1 – 3PIECES VALVE cl. 150-800

TIGHTENING TORQUE FOR NUTS 2A-2B, QUANTITY BODY BOLTS 16

VALVE DIMENSION		HANDLE NUT 2A GLAND PACKING NUT 2B			FLANGE BOLTS No. 16	
FULL BORE	REDUCED BORE	DIMENSION	Nm	INCH LBS	DIMENSION	QUANTITY
1/4	-	M 10x1	8	70	M 8x17	8
3/8	1/2	M 10x1	8	70	M 8x17	8
1/2	3/4	M 10x1	8	70	M 8x17	8
3/4	1	M 12x1,25	15	130	M 10x22	8
1	1 1/4	M 12x1,25	15	130	M 10x22	8
1 1/4	1 1/2	M 15x1,5	25	220	M 12x30	8
1 1/2	2	M 15x1,5	25	220	M 12x30	8

TABLE 12.2 – 3PIECES MEGASTAR VALVE cl. 900-2500

TIGHTENING TORQUE FOR NUTS 2A-2B, QUANTITY BODY BOLTS 16

VALVE DIMENSION		HANDLE NUT 2A GLAND PACKING NUT 2B			FLANGE BOLTS No. 16	
FULL BORE	REDUCED BORE	DIMENSION	Nm	INCH LBS	DIMENSION	QUANTITY
1/4	-	M 12x1,25	15	130	M 10x22	4
3/8	1/2	M 12x1,25	15	130	M 10x22	4
1/2	3/4	M 12x1,25	15	130	M 10x22	6
3/4	1	M 12x1,25	15	130	M 12x35	6
1	1 1/4	M 15x1,5	25	220	M 14x40	6
1 1/4	1 1/2	M 22x1,5	40	335	M 14x50	8
1 1/2	2	M 22x1,5	40	335	M 14x50	8
2	2 1/2	M 22x1,5	40	335	M 14x50	10

TABLE 12.3 – 2PIECES SPLIT STAR VALVE cl. 150-300

TIGHTENING TORQUE FOR NUTS 2A-2B, QUANTITY BODY BOLTS 16

VALVE DIMENSION		HANDLE NUT 2A GLAND PACKING NUT 2B			FLANGE BOLTS No. 16	
FULL BORE	REDUCED BORE	DIMENSION	Nm	INCH LBS	DIMENSION	QUANTITY
1/4	-	M 10x1	8	70	M 8x17	4
3/8	1/2	M 10x1	8	70	M 8x17	4
1/2	3/4	M 10x1	8	70	M 8x17	4
3/4	1	M 12x1,25	15	130	M 10x22	4
1	1 1/4	M 12x1,25	15	130	M 10x22	4
1 1/4	1 1/2	M 15x1,5	25	220	M 12x30	4
1 1/2	2	M 15x1,5	25	220	M 12x30	4
2	2 1/2	M 15x1,5	25	220	M 12x30	6
2 1/2	3	M 22x1,5	40	355	M 12x35	6
3	4	M 24x2	50	440	M 12x35	8
4	6	M 24x2	50	440	M 12x35	8
6	8	M 36x2	80	700	M 14x40	8

TABLE 12.4 – THREADED VALVE cl. 150-1500

TIGHTENING TORQUE FOR NUTS 2A-2B

VALVE DIMENSION		HANDLE NUT 2A GLAND PACKING NUT 2B		
FULL BORE	**REDUCED BORE**	**DIMENSION**	**Nm**	**INCH LBS**
DN 08-10-15	DN 15-20	M 10x1	8	70
DN 20-25	DN 25-32	M 12x1,25	15	130
DN 32-40-50	DN 40-50-65	M 15x1,5	25	220
DN 65	DN 80	M 12x1,5	40	335
DN 80	DN 100	M 24x2	50	440

TABLE 12.5 – THREE-FOUR WAY VALVES cl. 150-600

TIGHTENING TORQUE FOR NUTS 2A-2B, QUANTITY BODY BOLTS 16

VALVE DIMENSION	HANDLE NUT 2A GLAND PACKING NUT 2B			FLANGE BOLTS No. 16	
	DIMENSION	**Nm**	**INCH LBS**	**DIMENSION**	**QUANTITY**
DN 08-10	M 10x1	8	70	M 8x17	4
DN 15	M 12x1,25	15	130	M 8x17	4
DN 20	M 12x1,25	15	130	M 10x22	4
DN 25	M 15x1,25	25	220	M 10x22	4
DN 32-40	M 15x1,5	25	220	M 12x30	4
DN 50	M 22x1,5	40	335	M 12x35	6
DN 65	M 24x2	50	440	M 12x35	8

TABLE 12.6 TORQUE VALUES FOR BODY'S BOLTS 16

BOLTS	NUTS	TIGHTENING TORQUE – (Nm)					
mm	**CH - mm**	**B7/L7**	**B7M/L7M**	**B8/B8M**	**B8 / B8M-CL2**	**GR660-D**	**A4.70**
M3	5,5	1,5	1,1	0,5	0,7	1,5	0,9
M4	7	3,4	2,6	1	1,6	3,4	2,1
M5	8	6,7	5,1	1,9	3,2	6,7	4,2
M6	10	12	8,7	3,3	5,5	12	7,1
M7	11	20	15	5,4	9,1	20	12
M8	13	28	21	7,9	14	28	18
M10	17	55	42	16	27	55	34
M12	19	96	73	27	46	96	60
M14	22	160	120	44	73	160	95