

## SFF & SFR SERIES



SFF / SFR  
EN/ANSI/ASME/API/BS/NF

SFF  
EN/DIN/BS/NF

**CE**

**Ex II 2 G D c**

## REVIEW CONTROL

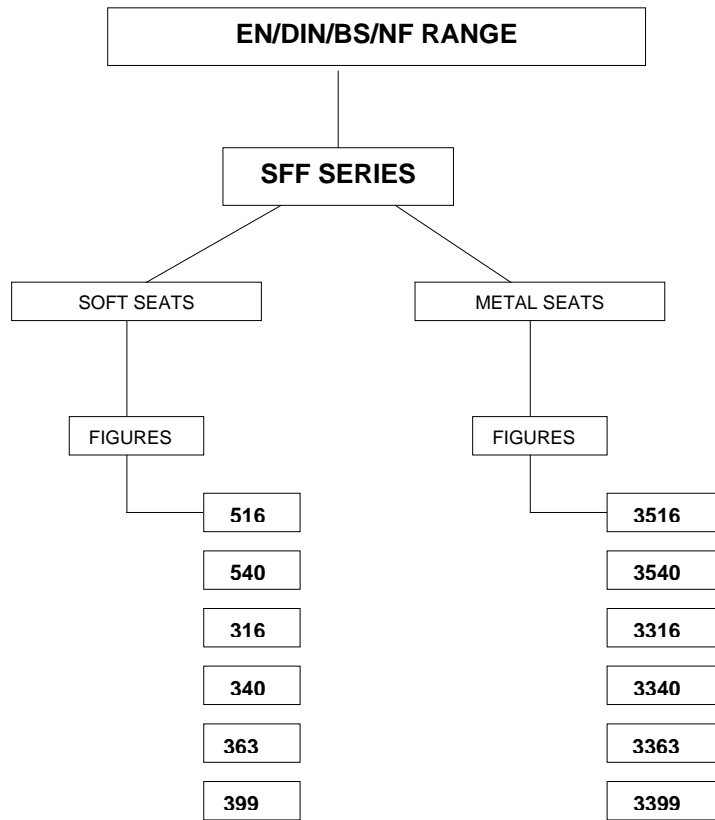
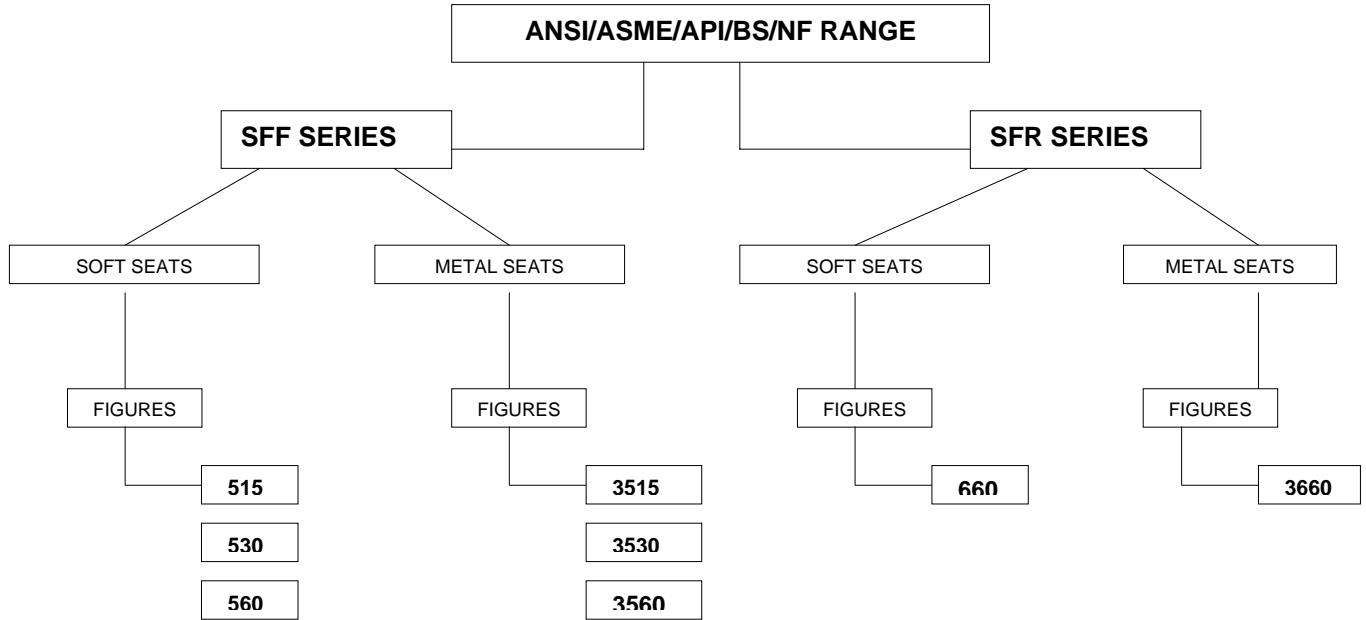
### PROCEDURE REF.: DOC.MMM500E

REV.	DATE	CARRIED OUT BY	APPROVED BY	DESCRIPTION
0	12/03/2001	C. Gallardo	J. Tejedor	General adaptation to EC Directive
1	12/07/2001	JM. Camps	J. Tejedor	Orthographic correction
2	25/10/2001	C. Gallardo	J. Tejedor	Temp. Design. ANSI Class
3	16/05/2002	C. Gallardo	J. Tejedor	Add note page 8 / Add important note page 10 Change of material values chart " Din Thread Assembly ", page 15.
4	08/05/2003	C. Gallardo	J. Tejedor	Add note (*) page 8
5	12/12/2003	C. Gallardo	J. Tejedor	Incorporation of the ATEX Declaration page 5.
6	16/02/2005	J. Rubio	J. Tejedor	Update of improvements (add position 72 &39)
7	14/06/2006	J. Rubio	J. Tejedor	Changes in Design Conditions, page 9
8 & 9	02/04/2008	J. Rubio	J. Tejedor	Updates in EN standards, page 5-7 Add section "Environmental Considerations", page 8
10	05/05/2011	D. Grau	J. Tejedor	Update of Standards, working temperatures and drawings.

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1.- **APPLICABLE RANGE**



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2.- **GENERAL INFORMATION**

2.1 **STATEMENT**

**JC SFF** and **SFR** Series Ball Valves have been designed and manufactured for the use, circulation and control of fluids in those industrial processes in which conditions are suitable for the performance levels of the valves, according to the applicable standards.

**Steel & Stainless Steel Valves DN greater than 25**

JC Fábrica de Válvulas, S.A states that JC valves covered by this certificate have been designed and manufactured according to the following European Directive requirements:

- European Pressure Equipment Directive 97/23 EC: Evaluation Procedure of Conformity Mod H Cat III, certified by Bureau Veritas nº CE-PED-H-JCV 001-04-ESP. Marking CE0062 Cat III Mod H.
- Directive 94/9 EC ATEX, classification Group II, Cat 2 for use in explosive atmospheres, areas 1,2 & 21,22. Evaluation of conformity according to Appendix VIII. Marking CE Ex II2GDc.

**Applied harmonized and non-harmonized technical Standards:**

- EN 10213, EN 10204, EN 12266-1, EN 15848-1 & (2)\*, EN ISO 17292, EN 1983, EN 19:2002, others see JC's Catalogue and Assembly & Maintenance Procedures.
- EN 13463-1:2001, EN 1127-1.

The electrical and mechanical extras are not covered by this statement and will have to carry their own in order to be assembled with JC valves.

**Steel & Stainless Steel Valves DN lower than 32**

JC Fábrica de Válvulas, S.A states that JC valves covered by this certificate have been designed and manufactured according to the following European Directive requirements:

- European Pressure Equipment Directive 97/23 EC: classified according article 3, part 3, cat SEP, must not carry the CE label.
- Directive 94/9 EC ATEX, classification Group II, Cat 2 for use in explosive atmospheres, areas 1,2 & 21,22. Evaluation of conformity according to Appendix VIII. Marking CE Ex II2GDc.

**Applied harmonized and non-harmonized technical Standards:**

- EN 10213, EN 10204, EN 12266-1, EN 15848-1 & (2)\*, EN ISO 17292, EN 1983, EN 19:2002, others see JC's Catalogue and Assembly & Maintenance Procedures.
- EN 13463-1:2001, EN 1127-1.

The electrical and mechanical extras are not covered by this statement and will have to carry their own in order to be assembled with JC valves.

The suitability of the materials and the design of the type of valve in terms of their working conditions is the responsibility of the end user of the valve.

\* on request

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**DESCRIPTION OF THE APPLICABLE VALVES**

Category III Module H (ISO EN 9001)

Series	Body	Ball	Bore	Class/ISO PN	JC Fig.	DN	FLANGES
SFF	Two pieces	Floating	Full	150 / ISO PN 20	515 3515	1/2" - 8" 1/2" - 6" (**)	RF Stock Finish
SFF				300 / ISO PN 50	530 3530	1/2" - 6" 1/2" - 1"	
SFF				600 / ISO PN 100	560 3560	2" - 4" 1/2" - 1"	
SFR			Reduced	600 / ISO PN 100	660 3660	2" - 4" 1/2" - 1"	

(\*\*) From DN 80 (3") up to DN 150 (6") pressure limited to 16 bar eff. (limited also depending upon temperature)

**Applicable Technical Standards:**

- EN 19: Marking of general purpose industrial valves.
- EN 558: Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems  
Part 2: Class-designated valves.
- EN 1503-2: Valves - Materials for bodies, bonnets and covers - Part 2: Steels other than those specified in European Standards.

Fire Safe certification:	BS 6755 Part 2 / API 607 6 <sup>TH</sup> Edition / API 6FA / ISO 10497
Valves design:	API 6D / ASME B 16.34 / EN 1983 / EN ISO 17292
Body design:	ASME VIII Div 1
Shell thickness:	ASME B 16.34 / BS ISO 17292
Flanges:	ASME B 16.5
Face-to-face dimensions:	ASME B 16.10 / API 6D
Shell finishing quality:	MSS SP 55
Wetted parts materials & bolting:	NACE MR 01.75
Marking:	EN 19 / API 6D / EN ISO 17292
Pressure testing:	API 598 / ISO 5208 / EN 12266
Actuator mounting flange:	ISO - EN 5211
Fugitive emissions:	EN 15848-1 & (2)*

\* on request

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**SFF SERIES FOR EN/DIN/BS/NF DESIGN**

**DESCRIPTION OF THE APPLICABLE VALVES**

Category III Module H (ISO EN 9001)

Series	Body	Ball	Bore	ISO PN	JC Fig.	DN	FLANGES
SFF	Short (F18) Split body	Floating	Full	16	516 3516	65 - 200 65 - 150	RF Form C
				40	540 3540	15 - 150 15 - 25	
	Long (F1) Split body			16	316 3316	65 - 200 65 - 150	
				40	340 3340	15 - 150 15 - 25	
				63	363 3363	15 - 100 15 - 25	
				100	399 3399	15 - 50 15 - 25	

**Applicable Technical Standards**

- EN 19: Marking of general-purpose industrial valves.
- EN 558: Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems. Part 1: PN-designated valves
- EN 1503-1: Valves - Materials for bodies, bonnets and covers - Part 1: Steels specified in European Standards.

- Fire Safe certification: BS 6755 Part 2 / ISO 10497
- Valves design: EN 1983 / EN ISO 17292
- Body design: DIN 3840
- Shell thickness: BS ISO 17292
- Flanges: EN 1902-1
- Face to face dimensions: EN 558
- Shell finishing quality: MSS SP 55
- Marking: EN 19 / ISO EN 17292
- Pressure testing: ISO 5208 / EN 12266
- Actuator mounting flange: DIN 3337 / ISO - EN 5211
- Fugitive emissions: EN 15848-1 & (2)\*

\* on request

**SCOPE OF INSTALLATION ACCORDING TO THE TYPE OF FLUID (DANGEROUS FOR THE ENVIRONMENT OR HUMAN HEALTH)**

**GROUP 1 CLASSIFICATION**

.- The incorporation of additional safety elements “Double packing” is recommended for the range of products included in Group 1.

.- The use of valves without additional safety devices in Group 1 will be the responsibility of the user or the purchaser, as well as the advisability of installing leakage detection systems.

**GROUP 2 CLASSIFICATION**

.- Carbon Steel valves will not be used in corrosive fluids lines

***Warning is given that when the use of fluids that could cause damages to human's health, environment or property is expected, then the necessary safety elements to prevent risks must also be used!***

**ENVIRONMENTAL CONSIDERATIONS:**

According to the premises marked by the ISO 14000 Regulations and the environmental policy of JC Fábrica de Válvulas.

The recyclability of the components that form part of JC valves is the following:

**Recyclable components:**

Metal parts, PTFE (hard), plastic plug (low-density polyethylene).

**Non-recyclable components:**

PTFE mixed with other compounds (Glass-fiber, graphite, etc...), nylon, graphite and graphite mixed with metal.



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**DESIGN CONDITIONS**

SERIES SFF & SFR  
 FOR CLASS-DESIGNATED VALVES  
 API 6D / ANSI B 16.34 / BS EN ISO 17292 /  
 EN 1983

**CLASS 150 - ISO PN 20**

	Unit	A216 WCB	A351 CF8M
Class	psig	150	
Design Temp.	°C	-29 / 230 (see Note 1)	-50 / 230 (see Note 1)
Design Pressure	Psi/N/mm <sup>2</sup>	285/1.965	275/1.896
Test Temp.		Ambient	
Test Pressure	Psi/N/mm <sup>2</sup>	428/2.947	412/2.844
Castings quality factor		0.8	

**CLASS 300 - ISO PN 50**

	Unit	A216 WCB	A351 CF8M
Class	Pounds	300	
Design Temp.	°C	-29 / 230 (see Note 1)	-50 / 230 (see Note 1)
Design Pressure	Psi/N/mm <sup>2</sup>	740/5.102	720/4.964
Test Temp.		Ambient	
Test Pressure	Psi/N/mm <sup>2</sup>	1110/7.653	1080/7.446
Castings quality factor		0.8	

**ANSI 600**

	Unit	A216 WCB	A351 CF8M
Class	Pounds	600	
Design Temp.	°C	-29 / 230 (see Note 1)	-50 / 230 (see Note 1)
Design Pressure	Psi/N/mm <sup>2</sup>	1480/10.204	1440/9.928
Test Temp.		Ambient	
Test Pressure	Psi/N/mm <sup>2</sup>	2220/15.306	2880/14.892
Castings quality factor		0.8	

**Note 1: Seats in PTFE. For other seats material consult JC catalogue or the manufacturer.**

**Note 2: On request in DIN/EN materials or AD-Merkblatt certificates.**

SERIES SFF  
 FOR PN-DESIGNATED VALVES  
 EN 1983 / BS EN ISO 17292

**ISO PN 16**

	Unit	1.0619	1.4408
PN	Bar	16	
Design Temp.	°C (see Note 1)	-20 / 230	-50 / 230
Design Pressure	Bar / N/mm <sup>2</sup>	16 / 1,6	16 / 1,6
Test Temp.		Ambient	
Test Pressure	Bar / N/mm <sup>2</sup>	24 / 2,4	24 / 2,4
Safety factor (Castings)		PN (2), PE (1,5)	

**ISO PN 40**

	Unit	1.0619	1.4408
PN	Bar	40	
Design Temp.	°C (see Note 1)	-20 / 230	-50 / 230
Design Pressure	Bar / N/mm <sup>2</sup>	40 / 4,6	40 / 4,6
Test Temp.		Ambient	
Test Pressure	Bar / N/mm <sup>2</sup>	60 / 6,6	60 / 6,6
Safety factor (Castings)		PN (2), PE (1,5)	

**ISO PN 63**

	Unit	1.0619	1.4408
PN	Bar	63	
Design Temp.	°C (see Note 1)	-20 / 230	-50 / 230
Design Pressure	Bar / N/mm <sup>2</sup>	63 / 6,3	63 / 6,3
Test Temp.		Ambient	
Test Pressure	Bar / N/mm <sup>2</sup>	94,5 / 9,45	94,5 / 9,45
Safety factor (Castings)		PN (2), PE (1,5)	

**ISO PN 100**

(See Note 2)	Unit	A105	Tp. 316
PN	Bar	100	
Design Temp.	°C (see Note 1)	-20 / 230	-50 / 230
Design Pressure	Bar / N/mm <sup>2</sup>	100 / 10	100 / 10
Test Temp.		Ambient	
Test Pressure	Bar / N/mm <sup>2</sup>	150 / 15	150 / 15
Safety factor (Castings)		PN (2), PE (1,5)	

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3.- **INSPECTION ON RECEPTION AND STORAGE**

- 3.1 All of the valves will be examined on reception, to ensure that they have not suffered any damages during transport, and the supplier will immediately be informed of any damages observed.
- 3.2 The valves leave the factory in open position as a measure of protection and to ensure that no foreign body can damage the ball, except fail to close actuated valves (Actuator normally in closed position).
- 3.3 **WARNING!**  
***The valves will be stored under cover and protected from inclement weather conditions and foreign bodies.***
- 3.4 The valves will not be unpacked until they are to be definitively installed, except for purposes of inspection. After inspection they will be packed again.

4.- **INSTALLATION**

- 4.1 The handling and transporting of the valves must be carried out with extreme precaution and using the necessary and adequate means on the basis of their size and weight, in this way avoiding any risks to the persons that handle them.

- 4.2 **WARNING!**  
***Never use the wrench to hold the valve during handling, assembly or transport.***

Check the condition of the valve, firstly to detect any possible damages caused during their transport and/or handling.

Likewise inspect the inside of the valve, as well as the interior of the pipe that connects up to the valve. It is of utmost importance that there are no foreign bodies that could damage the valve seats, insofar as these parts are fundamental to the correct operation of the valve.

**WARNING!**

*When it is known or assumed that the valve is to be installed at a collection point for waste, such as welding slag, rust or scale, **protective filters or screens must be placed, temporarily or definitively (depending on the installation), upstream, before connection with the valve.***

The valve must be installed in such a way that it is accessible for the necessary periodic inspection and maintenance required guaranteeing the performance levels for which it has been designed.

JC Standard SFF Series construction, up to – 20 °C have been designed without fluid direction preference –***“They are Bi-directional”***

When the valves, even forming a part of the SFF Series have been designed to work at temperatures below – 20 °C down to – 46 °C (**LOW TEMPERATURE**), then they will be –***“Unidirectional”*** and will bear an arrow indicating the flow direction.

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The valve can be installed with the stem in any position, although it is recommended that this be done in a vertical position, with the stem upwards.

**WARNING!**

***The valves must not support stress from the piping, the installation must be carried out ensuring correct alignment and parallelism in order to ensure that it is not subject to any unexpected stress.***

Make sure when installing the valve that the flange seal that connects up to the valve is correctly fitted, following the seal manufacturer's instructions, also ensuring that it is compatible with the circulating fluid.

**IMPORTANT!**

After installation run a final check on the valve, opening and closing it to make sure that it is working perfectly.

**WARNING!**

***Make sure that the fluid used in cleaning operations and the way in which the cleaning is done are compatible with the installed valve.***

Having finalised the final cleaning operations prior to bringing the valve on-line, if filters have been installed they can be removed or, on the other hand if the user considers that rust or scale formations may be encountered, they must be left permanently in place.

**IMPORTANT!**

When ball valves are destined to end line, you should reduce the hydrostatic proof pressure of the line to 1,1 Rating pressure.

5.- **PREVENTIVE MAINTENANCE**

- 5.1 Preventive maintenance operations essentially consist of periodic inspections to ensure that the valve is working correctly.
- 5.2 The valves must be opened and closed at least once every 6 months and, should such be required on the basis of the fluid or the application of the valve and its importance, opening and closing check plans will have to be established for shorter periods.
- 5.3 *The user will be responsible for establishing opening and closing plans that are adequate for the work conditions and the fluids used!*
- 5.4 **WARNING!**  
***Never leave the valves open or closed for a long period of time.***
- 5.5 A very high torque increase could be due to the inclusion of foreign bodies in the seats. It is important not to force the valve! Proceed with an inspection of the seats in order to avoid damaging the ball.
- 5.6 We advise replacement of the seals and the seats whenever an in-depth revision of the installation is made.

## 6.- MAINTENANCE OPERATIONS

### PRECAUTIONS BEFORE DISASSEMBLY!

Make sure that the line has been closed and depressurised.  
Open and close the valve several times in order to release the pressure and drain the valve cavity.

#### **WARNING!**

***Wear protective clothing adequate for the circulating fluid. (Comply with the safety guidelines laid down by the company!)***

Remove the valve from the line in the closed position, and clean off any remaining fluid.

***The replacement of parts must be done using original JC spare parts!***

***The manufacturer will not be responsible for the malfunctioning of the valve if original JC parts are not used!***

## 7.- REASONS FOR PARTS REPAIR AND REPLACEMENT

### 7.1.- LEAKAGE THROUGH THE **PACKING**

7.1.1 If a leakage is detected through the packing, open-out the bit on the locking washer (46) and tighten the gland nut (7) by an eighth of a turn.  
Repeat this operation if the leakage persists, then return the bit to its original position. If there is still a leakage replace the packing (11).

### 7.2.- LEAKAGE THROUGH THE **BODY SEAL**

7.2.1 If a leakage is detected in the body seal (13) then the seal must be changed. Follow the instructions in point 7.5.

### 7.3.- LEAKAGE THROUGH THE **PACKING IN VALVES WITH DOUBLE PACKING**

7.3.1 If a leakage is detected in the stem packing lantern ring, as an emergency measure follow the instructions given in point 7.1.1. In continuation replace packing rings and the stem O'rings, following the procedure indicated in point 7.6 "Change of the packing in valves with double packing"

### 7.4.- **CHANGE OF THE PACKING**

We recommend that whenever it is necessary to change the packing, the seats should also be replaced, along with the body seal and stem thrust washers. Nevertheless, should it not be possible to disassembly the valve due to process needs, then the following sequence should be carried out:

#### **DISASSEMBLY**

7.4.1 Make sure that the installation is not under pressure.

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- 7.4.2 Remove the handle or actuator, (6) and open-out the rib of the locking washer (46), in order to remove the gland nut (7), remove the locking washer (46), the disk springs (8) and the spacer (41), should there be one.
- 7.4.3 Remove the stop (9) ,marking its top side for re-assembly, the glass filled PTFE thrust washer (18) and the gland ring(10). Remove the packing (11) without damaging the stem and body surfaces.

**ASSEMBLY**

- 7.4.4 Fit a new packing (11).
- 7.4.5 Replace the gland ring (10), a new glass filled PTFE thrust washer (18) the stop (9) with the marked side facing up, the spacer (41) should there be one, the disk springs (8), the locking washer (46) and tighten the gland nut (7) to the torque specified in point 8.
- 7.4.6 Before refitting the handle, or actuator, check the valve under pressure to ensure the seal of the packing. If a leakage is detected see point 7.1.1. Finish off by bending back the rib of the locking washer (46)
- 7.4.7 Refit the handle or actuator (6).

**7.5.- CHANGING THE PACKING AND THE SEALS**

**DISASSEMBLY**

- 7.5.1 Make sure that the installation is not under pressure.
- 7.5.2 Remove the valve from the line. If the circulating fluid is noxious or inflammable precautions must be taken to avoid accidents.
- 7.5.3 Remove the studs (15) or hex-nuts (28) that attach the tailpiece to the body, bearing in mind that there may be fluid trapped in the body cavity. Remove the tailpiece (2) from the body (1).
- 7.5.4 Remove the seat (5) from the tailpiece and the body-tailpiece union seal (13). In the case of metal seat valves also remove the O'ring (33), the graphite seal (54), the ring (29) and the spring-washer (32).
- 7.5.5 Turn the ball (3) to the closed position and remove it from the body. Clean the exterior surfaces, of the bore and the slot, making sure that the pressure release needle at the bottom is not plugged.  
Check the exterior surface of the ball, particularly the area in contact with the seats and the radius of transition between the exterior surface and the bore. If the ball's surface or the slot are damaged replace the ball with a new one.
- 7.5.6 Remove the seat (5) from the body. In the case of valves with metal seats also remove the O'ring (33), the graphite seal (54), the ring (29) and the spring washer (32).
- 7.5.7 Remove the stem (4), for this operation follow points 7.4.2 and 7.4.3, and then extract the stem from inside the body. Remove the glass fibre charged PTFE stem friction washer (12). The stem will incorporate one or two (see figures) O'rings (72) which must also be replaced.

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- 7.5.8 Clean the inside surfaces of the body and the tailpiece, particularly in the area of the seats, the body seal, friction washer and packing.
- 7.5.9 Clean and check the stem. Check that the antistatic device is working by pushing the balls inwards in their housing and making sure they return to their original position. If any of these balls is seized, or the stem surface is damaged, replace it with a new stem.

**ASSEMBLY**

Ensure that all spare parts are JC original, of the same material and with the same dimensions as the parts to be replaced. For valves manufactured before 1983, the spares may be different from those of current models. In case of whatsoever doubt consult your regular supplier.

- 7.5.10 Fit the stem friction washer (12) onto the stem (4). The spare parts set includes two friction washers. For some of the nominal diameters they are the same; should they be different this washer (12) is the one with the thicker gauge. Fit the O'ring (72) (two depending on the figure) into the stem slot.
- 7.5.11 Insert the stem (4) into its housing through the interior of the body.
- 7.5.12 Assemble the packing and the other parts according to points 7.4.4, 7.4.5 and 7.4.6
- 7.5.13 Fit a new seat (5) to the body.
- 7.5.14 Turn the stem to the closed position so that it can be inserted in the slot in the ball. Fit the ball (3) in place in the closed position, making sure that there is no play between the slot and the stem. In valves with metal seats lightly grease the surface of the ball before fitting it into place, if the valve is part of an oxygen circulation line consult the manufacturer.
- 7.5.15 Insert the other seat (5) into the tailpiece and the seal (13) into the body pocket. For valves with metal seats also assemble parts (33), (54), (29) and (32).
- 7.5.16 Attach the tailpiece (2) to the body. In some of the nominal diameters the tailpiece must be fitted in a specific position, due to the fact that the number of body-tailpiece union studs is not equal or a multiple of the number of flange studs. Make sure that the holes of both flanges are in the same position in relation to the valve's axis of symmetry.
- 7.5.17 Tighten the hex-nuts (28) or bolts (15), depending on the type of valve, following the adequate sequence.
- 7.5.18 Fit the handle or actuator (6).
- 7.5.19 Before reassembling the valve in the line make sure that it is in a half-open position in order to check the packing and the body seal, and then close it and test the seal of the seats.

**7.6.- CHANGING THE PACKING IN VALVES WITH DOUBLE PACKING**

We recommend that when a packing change is necessary that all of the seats, body seals and stem friction washers should also be changed. Nevertheless should it be the case that it is not possible to remove the valve from the line, as a result of process needs, follow this sequence:

**DISASSEMBLY**

- 7.6.1 Make sure that the installation is not under pressure.

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- 7.6.2 Remove the handle, or actuator (6), open-out the tab on the safety washer (46) in order to remove the packing nut (7), take off the safety washer (46), the packing springs (8) and the spacer (41), should there be one. Remove the stop (9) marking its topside for reassembly, and the glass fibre charged PTFE friction washer (18).
- 7.6.3 Remove the bolts (933.1) and their washers (127) to separate the neck (68) from the valve body. Remove the seal (40).
- 7.6.4 Withdraw the stem from (4) the neck and then remove the following parts in this order:
- The packing follower (10) and the O'ring (72.1)
  - The graphite ring (11)
  - The packing collar (64)
  - The other graphite ring (11)
- 7.6.5 Continue to remove the following parts from the stem:
- O'ring (72.2)
  - Stem friction washer (12)
  - The two O'rings (72)
- 7.6.6 Remove the guide collar (39) from the body.

**ASSEMBLY**

Before reassembling the new parts clean the following parts and their housings with the utmost care:

- The collar in the body.
  - The O'rings on the stem.
  - The graphite rings, etc. on the neck.
- 7.6.7 Fit the guide collar (39), lightly greased, in place in the body.
- 7.6.8 Fit the O'rings (72) and (72.2), lightly greased, onto the stem (4).
- 7.6.9 Place the stem friction washer (12) onto the stem and insert it into the neck (68).
- 7.6.10 Fit the seal (40) into position in the body.
- 7.6.11 Attach the neck and stem assembly to the body (1), fit the safety washers (127) to the bolts and make them up.
- 7.6.12 Assemble the parts in the following order, in the packing housing in the neck:
- Fully insert a graphite ring (11).
  - Insert the lantern ring (64) and a second graphite ring (11).
  - Fit the collar (10) with its O'ring (72.1).
  - Locate the sliding seal (18), the stop (9), the supplementary ring (41), the packing springs (8), the safety washer (46), the packing nut (7) and tighten to the torque indicated in point 11.
- 7.6.13 Before fitting the handle, or actuator, pressure test the valve to ensure that the packing seals. If a leak is detected follow the steps indicated in point 7.1.1.
- 7.6.14 Attach the handle, or actuator, (6).

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**8.- MAXIMUM GLAND NUT TIGHTNESS TORQUE IN mKp.**

<u>NOMINAL DIAMETER (1)</u>	<u>PTFE PACKING</u>	<u>GRAPHITE PACKING</u>
15	2	2.2
20	2	2.2
25	2	2.2
32	2.5	2.5
40	4	4
50	4	4
65	6.5	7
80	7.5	8
100	8	8
125	8.5	9
150	9	9
200	21	23

(1) Understood as the bore diameter for reduced bore valves.

**9.- TIGHTNESS TORQUE CHARTS FOR BODY/TAILPIECE UNION STUDS AND HEX-NUTS. VALUES IN MKG.**

**DIN THREAD ASSEMBLY (\*)**

**ANSI ASSEMBLY UNC THREAD (\*\*)**

Elastic limit 0.2% (Kg/mm <sup>2</sup> )			Elastic limit 0.2% (Kg/mm <sup>2</sup> )				
	30	64	21	55	72.4	55	
Material	5.6	A4.70	Material	B8/B8M	L7M	B7	B7M
Stud Ø			Stud Ø				
M.6	0.61	0.9	3/8"	1.57	4	5.44	4
M.8	1.48	2.2	7/16"	2	5.5	7.4	5.5
M.10	2.94	4.4	1/2"	2.6	7	9.5	7
M.12	4.27	6.4	9/16"	4.2	11	15	11
M.14	8.2	12.3	5/8"	6.3	16.5	22.5	16.5
M.16	12	18	3/4"	10	27	37	27
M.18	17	15.5	7/8"	16.8	44	59	43
M.20	34	51	1"	25	65	87	72
			1.1/8"	35	93	125	93
			1.1/4"	48	128	171	128
			1.3/8"	70	167	223	167
			1.1/2"	95	247	330	247

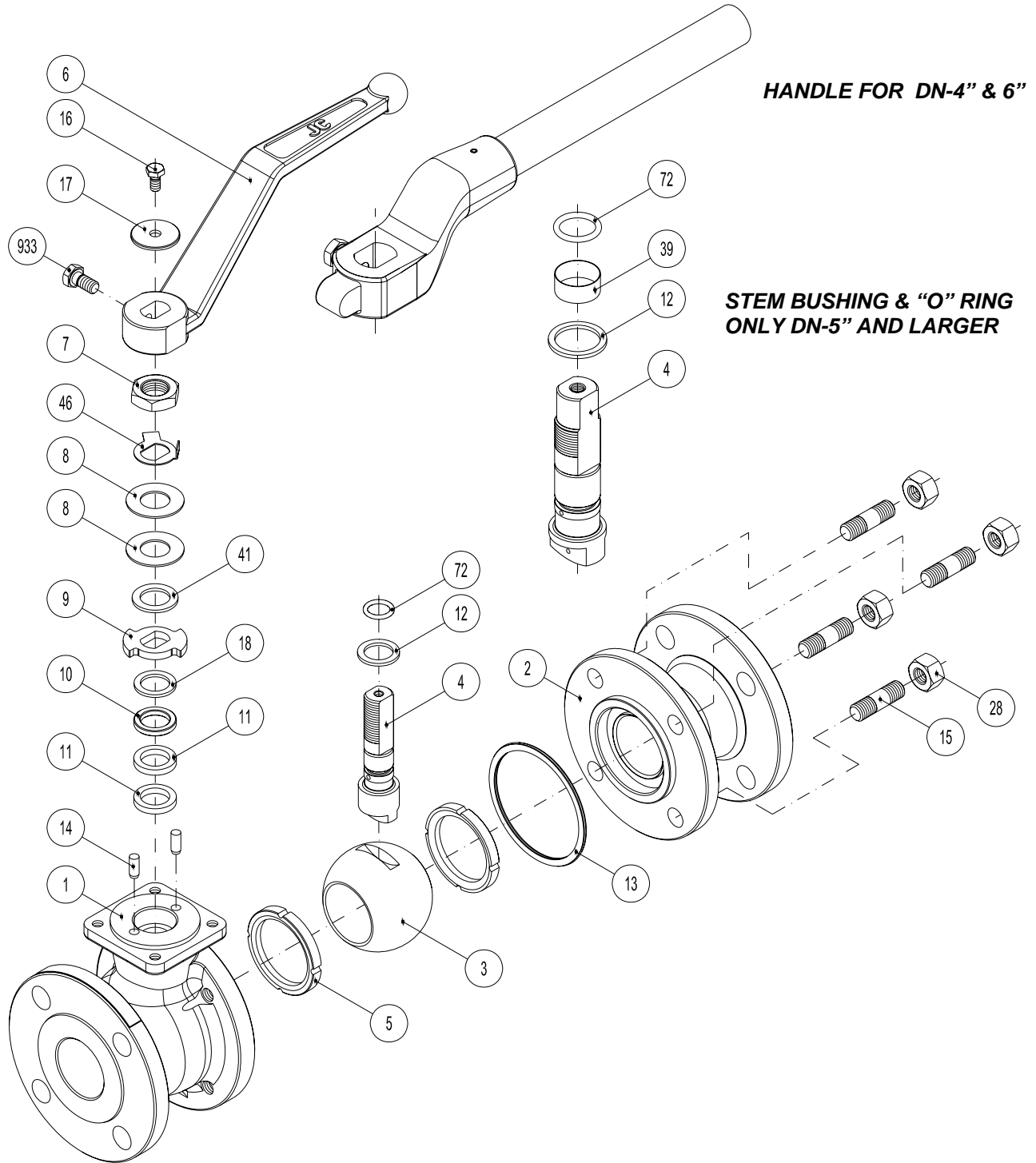
(\*) LUBRICATION WITH SAE 10 AND A LOAD NO HIGHER THAN 80% OF THE ELASTIC LIMIT IS ASSUMED.

(\*\*) A FRICTION COEFFICIENT OF 0.12 AND 75% OF THE ELASTIC LIMIT IS ASSUMED

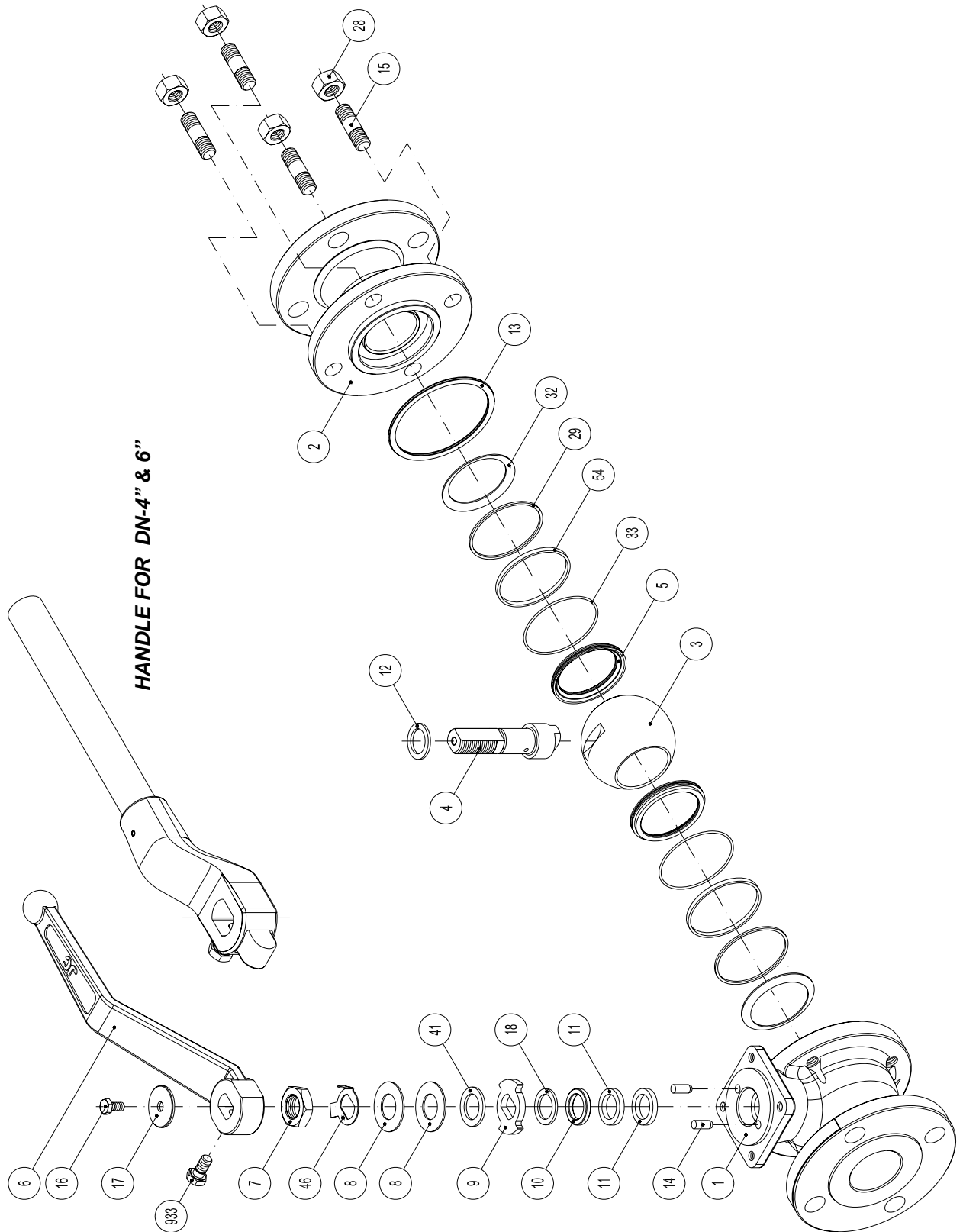


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**10.- SOFT SEAT VALVE**

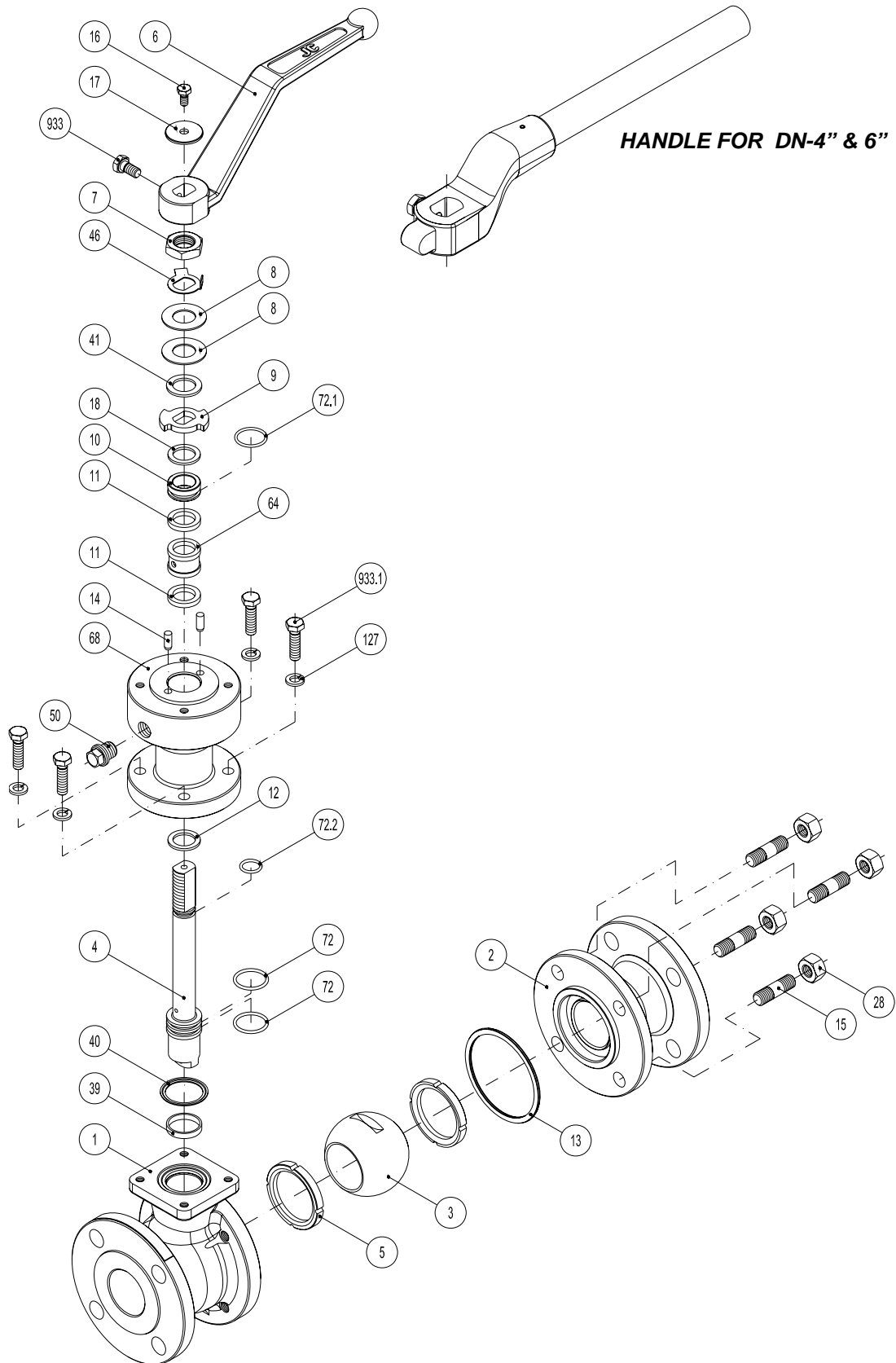


11.- METAL SEAT VALVE

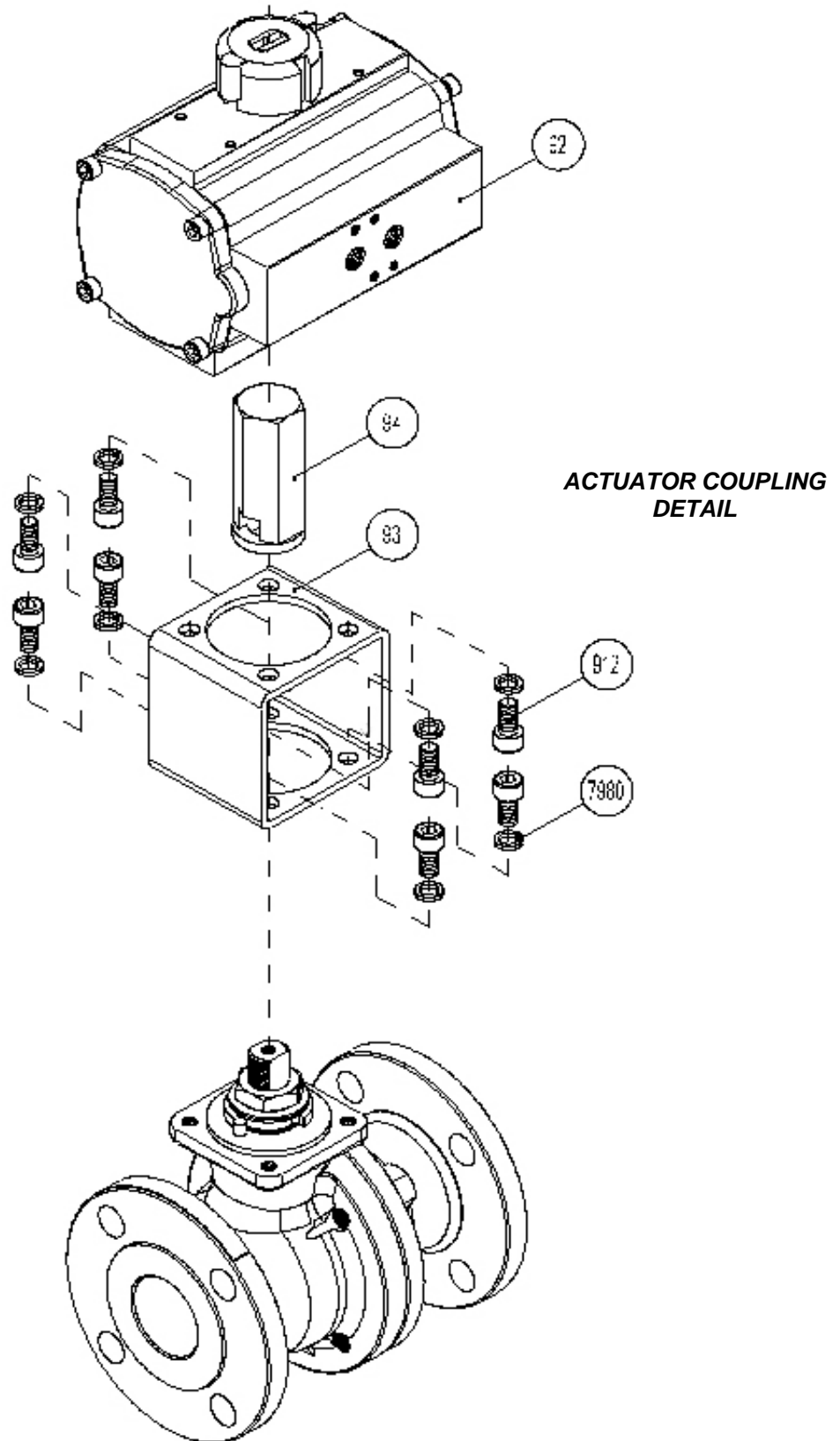


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**12.- VALVE WITH DOUBLE PACKING**



13.- AUTOMATED VALVE





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