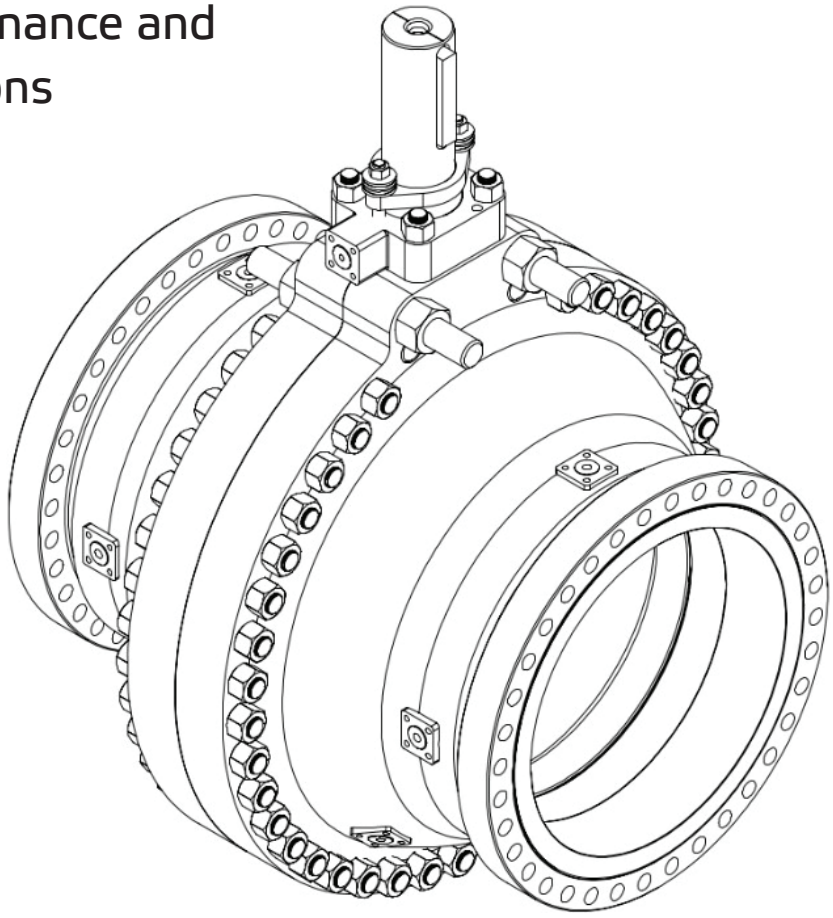
Neles™ Ball Valve

Overhead Vapor Valve for Delayed Coker Service
30 NPS Series D Trunnion Class 300

Installation, maintenance and operating instructions



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READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the valve.

If you require additional assistance, please contact the manufacturer or manufacturer’s representative.

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1. GENERAL

1.1 Scope of the manual

This manual provides the essential information about the use of Overhead Vapor Valves for Delayed Coker Service, 30 NPS, Series D Class 300 Trunnion Ball Valves. For more information on actuators and other equipment, which are covered only briefly, please refer to the separate manuals on their installation, use and maintenance.

NOTE:

Selection and use of the valve in a specific application requires close consideration of detailed aspects.

If you are uncertain about use of the valve or its suitability for your intended purpose, please contact Valmet for more information.

1.2 Valve description

Overhead Vapor Valves for Delayed Coker Service, 30 NPS, Series D Class 300 Trunnion Flanged Ball Valves. The body consists of two body halves which are attached to each other with bolts. The ball and stem are of one piece. The valves have graphite seat backseals and are used for shut-off applications.

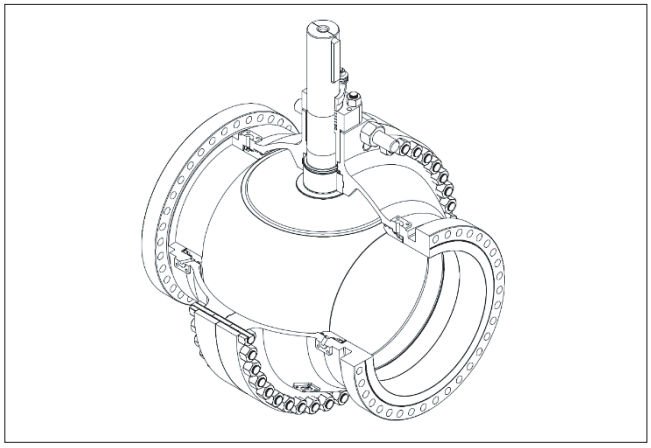

Fig. 1 Construction of the D Series Valve

1.3 Valve markings

The body markings are cast or stamped on the body side. The identification plate (Figure 2) is attached to the valve flange.

The identification plate has the following markings:

1. Body material
2. Seat material
3. Stem material
4. Ball material
5. Maximum operating temperature
6. Minimum operating temperature
7. Maximum shut-off pressure differential
8. Type code
9. Item code
10. Pressure class

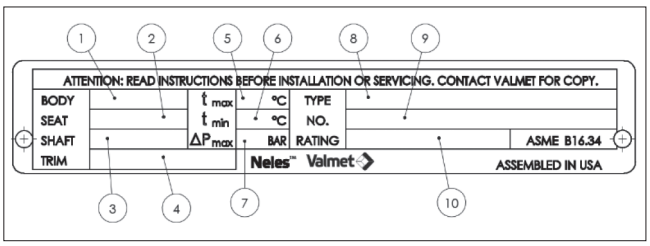

Fig. 2 Identification Plate

1.4 Technical Specifications

Face-to-face length:	ASME B16.10, API 6D
Body ratings:	ASME Class 300
Maximum pressure differential:	See Figure 3
Temperature range:	See Figure 3
Flow direction:	Bidirectional
Leakage rate:	API-598
Dimensions:	See Section 10
Weight:	See Section 10

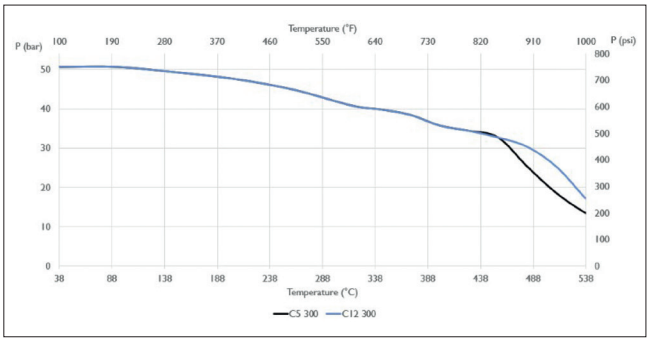

Fig. 3 Pressure/temperature curves of the valve body, material ASTM A217 Gr. C5 & C12

1.5 CE compliance

The valve meets the requirements of the European Directive 2014/68/EU relating to pressure equipment.

1.6 Recycling and disposal

Most valve parts can be recycled if sorted according to material.

Most parts have material marking. A material list is supplied with the valve. In addition, separate recycling and disposal instructions are available from the manufacturer.

1.7 Safety precautions

CAUTION:

Do not exceed the performance limitations!

Exceeding the performance limitations marked on the valve may result in valve damage or even in uncontrolled pressure release. Damage or personal injury may result.

CAUTION:

Do not remove or dismantle a pressurized valve!

Removing or dismantling a pressurized valve will cause an uncontrolled pressure release. Always shut off the pipeline, release the pressure and remove the medium before removing or dismantling the valve. Identify the medium, protect yourself and the environment against any harmful or poisonous substances. Prevent the medium from entering the pipes during maintenance.

Failure to do this may result in damage or personal injury.

CAUTION:

Beware of the cutting movement of the ball!

Keep hands, other parts of your body, tools and other objects out of the open flow port. Also make sure that no foreign objects enter the pipeline. Close and detach the actuator pressure supply for maintenance.

Failure to do this may result in damage or personal injury.

CAUTION:

Protect yourself against noise!

The valve may produce noise in the pipeline. Its level depends on the application and can measured or calculated using the Nelprof computer program. Occupational safety regulations on noise levels should be observed.

CAUTION:

Beware of extreme temperatures!

The valve body may be very hot or very cold. Protect people against frostbites and burns.

CAUTION:

Potential electrostatic charging hazard. Ensure the protection in the process.

CAUTION:

When handling the valve or the valve package, remember its weight!

Do not lift the valve or the valve package from the actuator, positioner, limit switch or their pipes. When lifting the valve, place the lifting ropes around the valve body. See Figure 4.

Damage or personal injury may result from falling parts. Valve weights are listed in Section 10.

1.8 Welding notes (when required)

WARNING:

Welding and/or grinding stainless steel and other alloys containing chromium metal may cause the release of hexavalent chromium. Hexavalent chromium (VI) or Cr(VI), is known to cause cancer. Be sure to use all appropriate personal protective equipment (PPE) when welding metals containing chromium.

CAUTION:

Ensure that any weld splatter does not fall onto the valve closing members eg. ball or seats. This may damage critical seating surfaces and cause leaks.

2. TRANSPORT, RECEPTION AND STORAGE

Check the valve and the associated equipment for any transport damage.

Before mounting the valve, store it indoors in a suitable place.

Do not take the valve to the intended location or remove the flow port protectors until just before the mounting.

The valve is supplied in an open position.

Do not lift the valve or the valve package from the actuator, positioner, limit switch or their pipes.

When lifting the valve, place the lifting ropes around the valve body, see Figure 4.

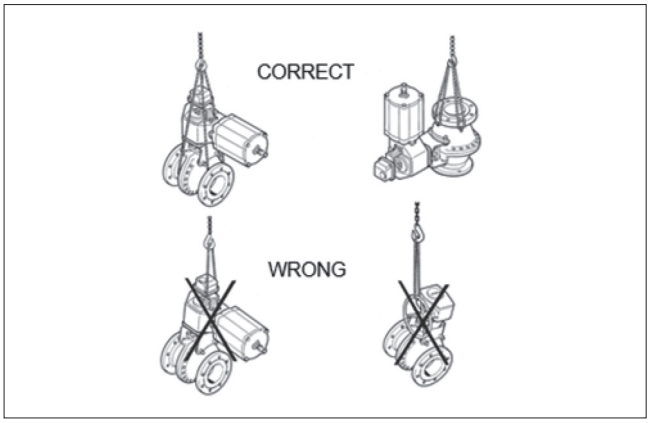

Fig. 4 Lifting the valve package

3. MOUNTING AND COMMISSIONING

3.1 General

Remove the flow port protectors and check the valve for dirt that may have entered it during transportation and storage.

3.2 Mounting the valve in the pipeline

CAUTION:
The valve and valve package are heavy. Remember this when handling them.

Clean the pipes by flushing or blowing before mounting the valve. Keep the valve in fully open position during flushing. Any impurities such as sand or pieces of welding electrode may damage the seats and tightening surfaces of the ball.

NOTE:
Always use the appropriate flange gaskets. Check to see what gaskets are used elsewhere in the pipeline.

NOTE:
Do not try to correct pipeline misalignments with flange bolts.

The functioning of the valve, actuator or the positioner is not affected by the flow direction or the valve position. Do not, however, install the valve with the stem pointing downwards. This may allow impurities at the bottom of the pipeline to enter the space between the stem and the body and damage the gland packing.

Sufficient support for the pipeline reduces stress due to pipeline vibration. Low vibration also ensures reliable positioner operation.

An unsupported valve is easier to maintain. Nevertheless you can support the valve by its body with standard pipe clamps and supports. Do not fasten the supports to the flange bolts or the actuator.

Valve insulation

If necessary, the valve may be insulated. Insulation must not continue above the upper level of the valve body, see Figure 5.

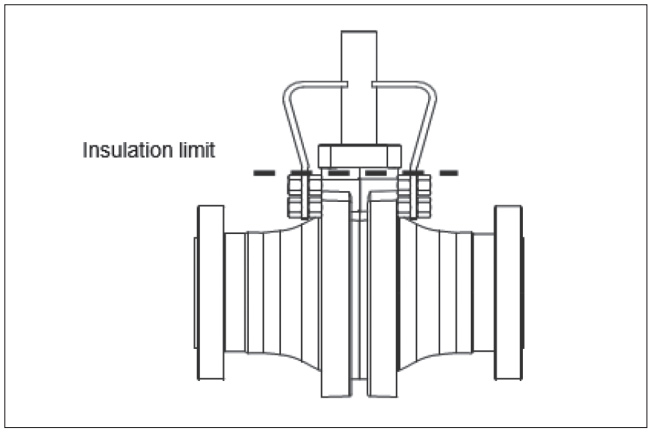

Fig. 5 Insulation of the valve

3.3 Actuator

NOTE:
When mounting the actuator, check that the valve package functions properly. For more information about the mounting of the actuator, see Section 6 or the separate actuator instructions.

The closed position of the ball is indicated as follows:

- By an indicator on the actuator.
- By a groove at the end of the ball stem (parallel to the flow opening).

If you are not sure about the indicator, check the flow direction by the groove.

If possible, mount the valve so that it can remain in place even if the actuator is removed.

The actuator should not touch the pipeline as pipeline vibration may damage it or affect its performance.

3.4 Commissioning

Before commissioning, check the valve and the pipeline for any impurities or foreign objects. Flush the pipeline carefully and keep the valve in fully open position during the flushing.

Check all joints, pipings and cables.

Check the adjustments of the actuator, positioner and the limit switch. For actuator adjustment, see Section 6. For other devices, consult their individual manuals.

If necessary, tighten the gland packing.

4. MAINTENANCE

4.1 Maintenance general

CAUTION:
Observe the safety precautions mentioned in Section 1.7 before maintenance!

CAUTION:
When handling the valve or the valve package as a whole, bear in mind the weight of the valve or the entire package.

Although Valmet valves are designed to work under severe conditions, proper preventative maintenance can significantly help to prevent unplanned downtime and in real terms reduce the total cost of ownership.

Valmet recommends inspecting the valves at least every five (5) years.

The inspection and maintenance interval depends on the actual application and process condition.

The inspection and maintenance intervals can be specified together with your local Valmet experts. During this periodic inspection the parts detailed in the Spare Part Set should be replaced. Time in storage should be included in the inspection interval.

Maintenance can be performed as presented below. For maintenance assistance, please contact your local Valmet office. The part numbers in the text refer to the exploded view and to the parts list in Section 9, unless otherwise stated.

NOTE:
When sending goods to the manufacturer for repair, do not disassemble them. Clean the valve carefully and flush the valve internals.

For safety reasons, inform the manufacturer of the type of medium used in the valve (include material safety datasheets (MSDS)).

NOTE:

In order to ensure safe and effective operation, always use original spare parts to make sure that the valve functions as intended.

NOTE:

For safety reasons, replace pressure retaining bolting if the threads are damaged, have been heated, stretched or corroded.

NOTE:

A valve sent to the manufacturer for servicing should not be dismantled. Clean the valve carefully from inside and outside and, to ensure safety, inform the manufacturer of the type of medium involved.

4.2 Maintenance of a mounted valve

Gland Packing

Replace the gland packing (69), if the tightening of the nuts (18) does not stop leakage.

Ensure that the valve is unpressurized and remove the actuator. Then remove the existing gland packing using a tool that does not damage the tightening surfaces.

Install the new gland packing as instructed in Sections 4.7.

Body and bonnet joint

Should the body joint leak, tighten the nuts (16) as indicated by the torques in Section 4.7.

Turning the ball

If the ball's (3) sealing surface is so badly damaged that the valve leaks in closed position, turn the ball 180 degrees. Note the effect of the measure on the orientation of the actuator. Should the leaking continue, send the ball to the manufacturer for repairs.

4.3 Removing the actuator from the valve

It is usually easiest to remove the actuator and its support equipment before removing the valve from the pipeline. If the package is small or not easily accessible, it is better to remove the entire package at one go.

CAUTION:

The valve package is heavy. Remember this when handling it.

NOTE:

To ensure proper reassembly, observe the position of the actuator and the positioner/limit switch with respect to the valve before removing the actuator.

- Close and detach the actuator pressure supply and remove the control cables and pipes from their couplers.
- Loosen the bracket screws.
- Remove the actuator from the valve.
- Removing the bracket and any coupling.

4.4 Removing the valve from the pipeline

CAUTION:

Do not remove or dismantle a pressurized valve!

- Make sure that the pipeline is empty and unpressurized and that there is no medium flowing into the pipeline while the valve is not in its normal position.
- Carefully attach the ropes, loosen the pipe flange screws and lift the valve using the ropes. Make sure that you lift the valve correctly, see Figure 4.

4.5 Dismantling the valve

- Place the valve on its flange on a clean, level surface made of wood, hardboard or plastic. If necessary, support the actuator so that it cannot overturn as the mounting bolts are being removed.
- Remove the actuator if it is still attached to the valve.
- Remove the mounting brackets of the valve.
- Tap loose the key (10) at the end of the ball stem (3).
- Remove any burrs from the keyway edges.
- Loosen the gland packing nuts (18) and the bonnet's (8) fastening nuts (17) and pull the bonnet away from the ball stem (3).
- Remove the body flange bolting (12 & 16) keeping the body halves (1 & 2) together and lift the upper body half on its flange.

4.6 Removing and inspection the valve parts

Ball

To make carrying and inspection easier, the ball has a threaded hole at the end of the stem for an eyebolt.

- Lift the ball (3) from the body (1) and place on a soft surface and clean it.
- Check the sealing and bearing surfaces of the ball stem (3).
- Remove any minor scratches and impurities using an emery cloth.
- File off any burrs from the stem keyway.
- If the ball (3) has deep scratches on its sealing and bearing surfaces or if it is not fully spherical, it should be sent to the manufacturer for repairs.

Bearings

- Check the bearings (4 & 5) for wear. Minor defects may be removed by polishing with fine emery paper (600 grit).

Seats

- Turn the body upside down and detach the seat (7) by tapping at it through the flow opening with a rubber or plastic mallet.

Body and Bonnet

- Always replace the body and bonnet gaskets (65 & 66) during maintenance.
- Remove existing gaskets from all sealing surfaces and clean the surfaces carefully.
- Do not round the sharp edges at the convergence point of the body joint (1 & 2) and bonnet (8) sealing surfaces, as this could cause leaks. See Figure 6.
- Remove the gasket from the bonnet.

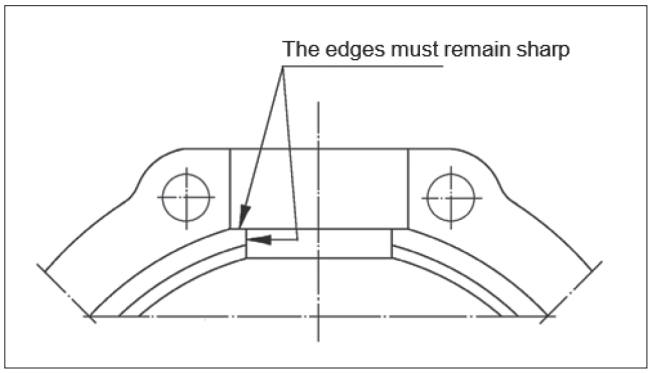

Fig. 6 Sealing surfaces

Other parts

- Clean all parts carefully, including all studs and nuts.
- After cleaning and checking all parts, keep them in a protected place until reassembly. Handle the ball (3), its seats (7) and the body joint surfaces with particular care.
- If necessary, send the valve to the manufacturer for repairs.

4.7 Reassembling the valve

- Clean all valve components carefully. If necessary, use suitable solvents.
- Inspect all components for damage before reassembling the valve. Look for damage to the seating areas, stem (3), body (1 & 2), and bearing (4 & 5) areas. Replace any damaged parts.
- Reassemble the valve by placing the female body half (1) on a level surface in an upright position with the body joint pointing upwards.
- Then put the parts in their place in the following order:
  1. Seats and seals (7, 63, 75, 62, 130, 129)
  2. Ball with its bearings (3, 4, & 5)
  3. Body joint between body halves and bonnet (1, 2, & 8)
  4. Gland packing (69)

Fitting the seats

- Check and clean all components before starting seat (7) assembly.
- The seats (7) of this valve are custom fitted to the ball (3). Replacing one of these components requires each to be refitted. Contact your local Valmet service center when replacing seats or balls.
- With the female body half (1) sitting on a level surface, verify that the seat pocket is free of any contaminant, then lubricate the seat pocket and the back of the seat with “Never Seez”.
- Place the seat (7) on a flat surface with the ball/seat contact surface facing down.
- Install braided graphite seals (63 & 75) in the grooves provided, see Figure 7. It may be necessary to tap the seals into the grooves using a dead-blow hammer or other device.

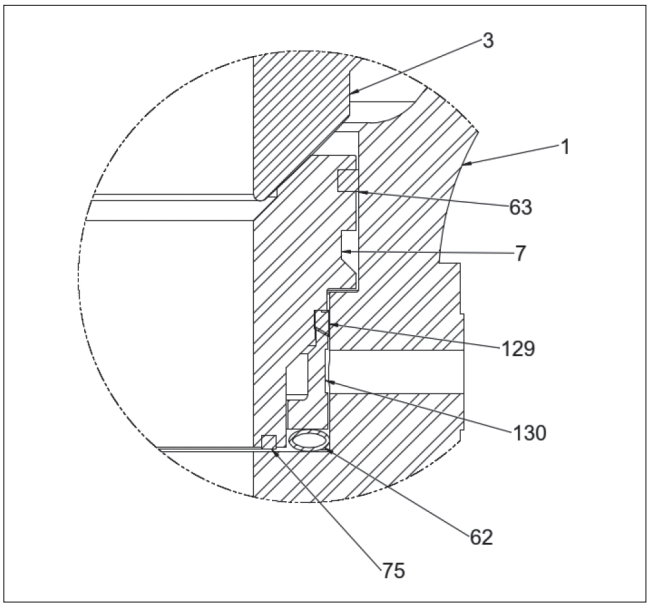

Fig. 7 Seat seals

- Ensure the seat seal (129) has the integrated metal anti-extrusion ring intact and adhered to the graphite portion of the seal.
- Lubricate the major OD of the seat (7) with “Never Seez”, to aid installation.
- Place the seat seal (129) on the step of the seat (7), with the beveled edge up, see Figure 7.
- Place the set ring (130) on top of the seat seal (129) with the beveled edge down to mate with the seat seal, see Figure 7.
- Install internal wire tool no. 202532 into the seat spring (62) to control the shape of the seat spring leaving a 6 inch long pig-tail hanging out of the ID of the spring. This will be used to remove the wire once the seat is installed.
- Place spring (62) in the seat cavity of the body half (1) with the wire hanging into the flow port.
- Place the pre-assembled seat (7) into the seat cavity on top of the spring. Take care not to allow the set ring (130) to fall off during installation.
- Once the seat (7) is properly installed and the spring (62) is not in danger of getting caught under the edge of the seat during assembly, the wire may be pulled out and removed.
- Repeat the above steps for the male body half (2).
- Once the male body half seat has been installed, clean the ID of the seat and body flow port near the lower edge of the seat cavity.
- Once the area is clean and dry, apply duct tape or equivalent, equally spaced around the ID fixing the seat to the ID of the body half to prevent the seat from sliding out when the male body half is rotated over for installation on the female body half.

Bearings and ball

- Lubricate the ball stem (3), trunnions integrated in the ball, and bearings (4 & 5).
- Place the trunnion bearings (4 & 5) on the ball (3).
- Install the sheet ring / thrust bearing (94) over the stem onto the stem side trunnion bearing (4), see Figure 8.
- Install the spacer ring (28) over the stem onto sheet ring (94), see Figure 8.
- Install the retaining ring (26) onto the spacer ring (28), see Figure 8.
- Install the two locking rings (27) into the groove in the trunnion bearing (4), over the retaining ring (26), see Figure 8.
- Lift the ball (3) assembled with the bearings (4 & 5) and place into the female body half (1). The bearings will ensure the ball goes into the correct position inside the body half. **Note:** The wieght of the ball will compress the lower seat (7).

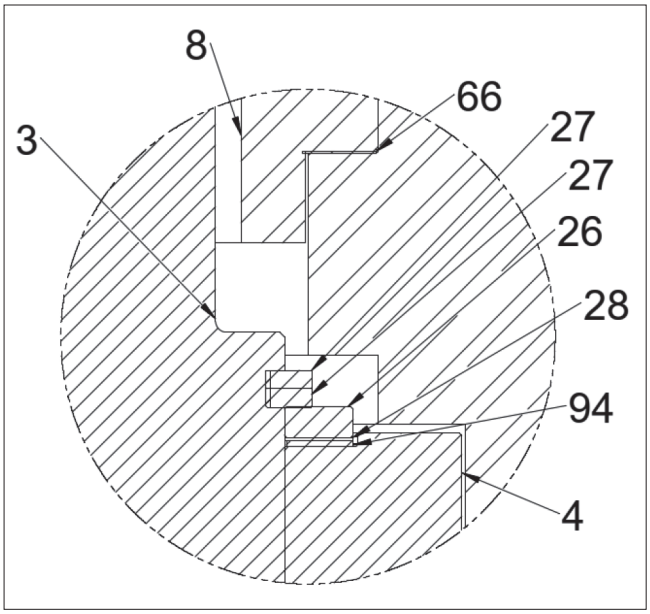

Fig. 8 Upper bearing assembly

Body Joint

- Verify the body seal groove is free of contaminate and then place a new body gasket (65) in the female body (1) groove. Fit and cut the gasket per Figure 9.

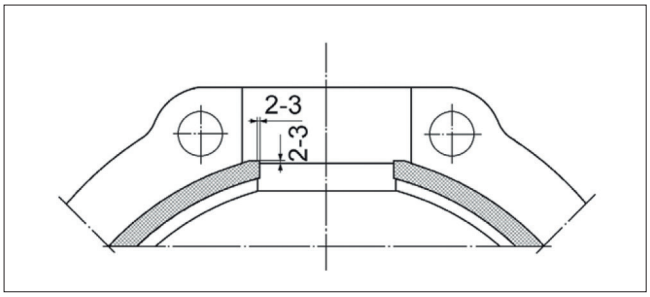

Fig. 9 Fitting and cutting the graphite gasket

Tightening the body joint bolts

- Place the male body half (2) onto the female body half (1) with the stem bore and body stud holes aligned.
- Push the bonnet (3) onto the stem (3) and hand tighten the bonnet nuts (17) on the bonnet studs (13).
- Lubricate the body flange (12 & 16), body neck (11 & 15), and bonnet studs and nuts (13 & 17) and screw them into position.
- Tighten the flange nuts (16) as indicated in Figure 10. Start from opposite the stem and first tighten the nuts to torques that are 1/3 of the values in Table 1. Then tighten them to 2/3 of the values in Table 1. Then tighten to their final torques in the same sequence.
- After tightening the flange nuts (16), loosen the bonnet nuts (17) and remove the bonnet (8).

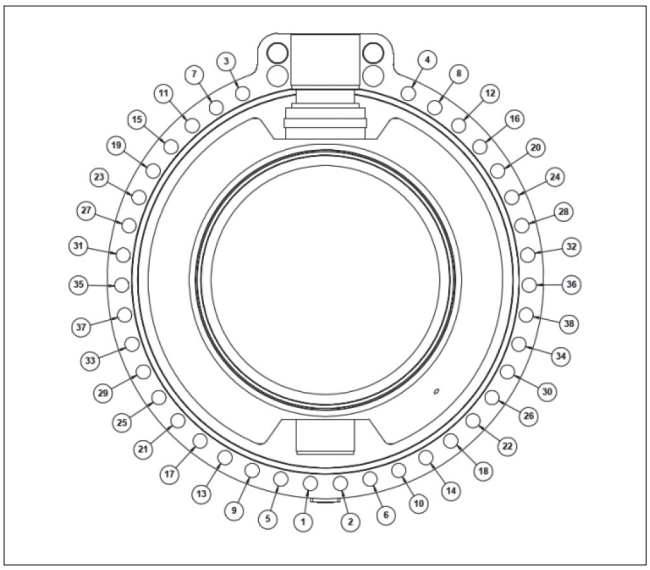

Fig. 10 Tightening the body joint bolts

Tightening the bonnet bolts

- Remove any excessive body gasket (65) from the bonnet (8) surface, without scratching the sealing surfaces.
- Place the ring-shaped bonnet gasket (66) onto the bonnet shoulder. You can attach the gasket to the bonnet for the duration of the installation with small amounts of silicon grease.
- Place the bonnet (8) over the stem (3) and into the body (1 & 2).
- Tighten the bonnet nuts (17) as indicated by the torques in Table 1.

Table 1 Tightening Torques

Thread	Torque, Nm
1-1/2 – 8UN	3200
1-3/4 – 8UN	5200
2-1/2 – 8UN	15900

Gland packing

- Install the lantern ring (13) and packing (69) into the stuffing box.
- Install the gland (9), live loading spring washers (101) (if valve is live loaded), and bonnet stud nuts (18), then tighten the nuts evenly.

5. TESTING THE VALVE

CAUTION:
When you do pressure testing, use equipment conforming to the correct pressure class!

Body tightness should be tested after valve reassembly by applying a sufficiently high water pressure.

With the valve in the half open position, the water filled pressure shell is to be hydrostatically subjected to 150% of the maximum allowable cold working pressure for a period of 5 minutes with no external leakage allowed (see ASME B16.34 for maximum allowable cold working pressure for applicable body materials.)

Both seats are to be tested for tightness by subjecting the closed valve to the pressures and duration required by applicable customer specification, in both directions. Every effort should be made to assure that the valve is filled with water at the start of the test, and that sufficient time is given prior to the measurement of leakage to allow for proper seating of components.

Dry the valve, following the testing to ensure that all water is drained from the valve and all interior passages are blown dry with compressed air.

Preserve the valve by spraying Cortec VCI369 (or equivalent) rust inhibitor in all ports.

6. MOUNTING THE ACTUATOR

- Clean the valve shaft and coupling. File away any burrs in the mating diameters that may hamper fitting.
- Coat the mating bore of the coupling with anti-galling compound and install the coupling onto the valve shaft. Tap the end of the coupling with a hammer, if necessary, to ensure that the valve shaft has bottomed out in the bore of the coupling. Excessive force may damage the sealing of the ball and seat.
- Fasten the actuator bracket loosely to the valve. Do not tighten the bolts. (this step not required at this point if actuator and bracket were removed as a unit and not disassembled).
- Install the key in the keyway of the coupling.
- Coat the bore of the actuator with anti-galling compound, and push the actuator on the coupling carefully. Excessive force may damage the sealing of the ball and seat.
- If actuator and bracket were not removed as a unit, lubricate and install the actuator mounting screws and washers and tighten them together with the bracket bolts. If actuator and bracket were removed as a unit, lubricate, install and tighten the bracket bolts to the valve body.
- Check that the stops of the actuators open and closed positions are correctly adjusted. If adjustment is required, follow the actuator manufacturer's instructions.

7. TROUBLE SHOOTING TABLE

The following Table lists malfunctions that might occuer afer prolonged use.

Table 2 Trouble Shooting Table

Symptom	Possible fault	Recommended Action
Leakage through a closed valve	Wrong stop adjustment of the actuator	Adjust actuator stops for closed position
	Faulty zero setting of the positioner	Adjust the positioner
	Damaged seat	Replace seat
	Damaged closing member	Replace the closing member
Leakage through body joint	Damaged gasket	Replace the gasket
	Loose body joint	Tighten the body stud nuts
Irregular valve movements	Actuator or positional malfunction	Check the operation of the acutator and positioner
	Process medium accumulated on the sealing surface	Clean the sealing surface
	Closing member or seat damaged	Replace the closer member or seat
Gland packing leaking	Gland packing worn or damaged	Replace the gland packing
	Loose packing	Tighted the packing nuts

8. ORDERING SPARE PARTS

When ordering spare parts, always include the following information:

- Type code, sales order number, serial number (stampled on the valve body)
- Number of the parts list, part number, name of the part and quantity required

This information can be found from the identification plate or documents.

9. EXPLODED VIEWS AND LISTS OF PARTS

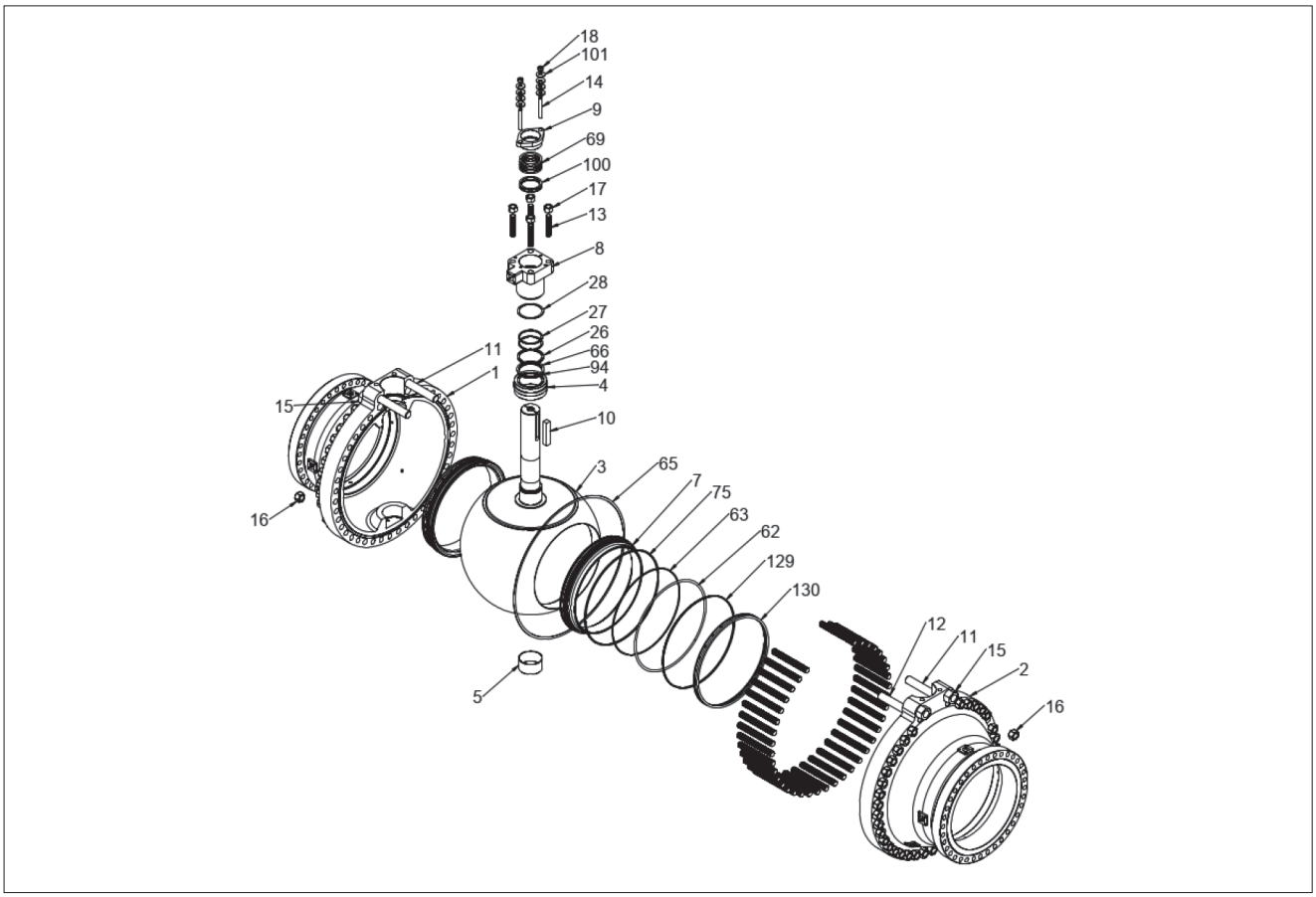

Fig. 11 Exploded View

Part	Qty	Description	Spare part category
1	1	Body half, female	
2	1	Body half, male	
3	1	Ball	3
4	1	Trunnion bearing	3
5	1	Trunnion bearing	3
7	2	Seat	2
8	1	Bonnet	
9	1	Gland	
10	1	Key	3
11	4	Neck stud	
12	38	Body flange stud	
13	4	Bonnet stud	
14	2	Packing gland stud	
15	4	Neck stud nut	
16	76	Body flange stud nut	
17	4	Bonnet stud nut	
18	2	Packing gland stud nut	
19	1	Identification plate	
26	2	Retainer ring	
27	2	Locking ring	
28	1	Spacer ring	
62	2	Spring	1
63	2	Outer seat seal	1
65	1	Seal strip	1
66	1	Sheet ring	1
69	5	Packing ring	1
75	2	Inner seat seal	1
94	1	Sheet ring / Thrust bearing	
100	1	Lantern ring	
101	8	Disc spring	
129	2	Seat seal	1
130	2	Set ring	

10. DIMENSIONS AND WEIGHTS

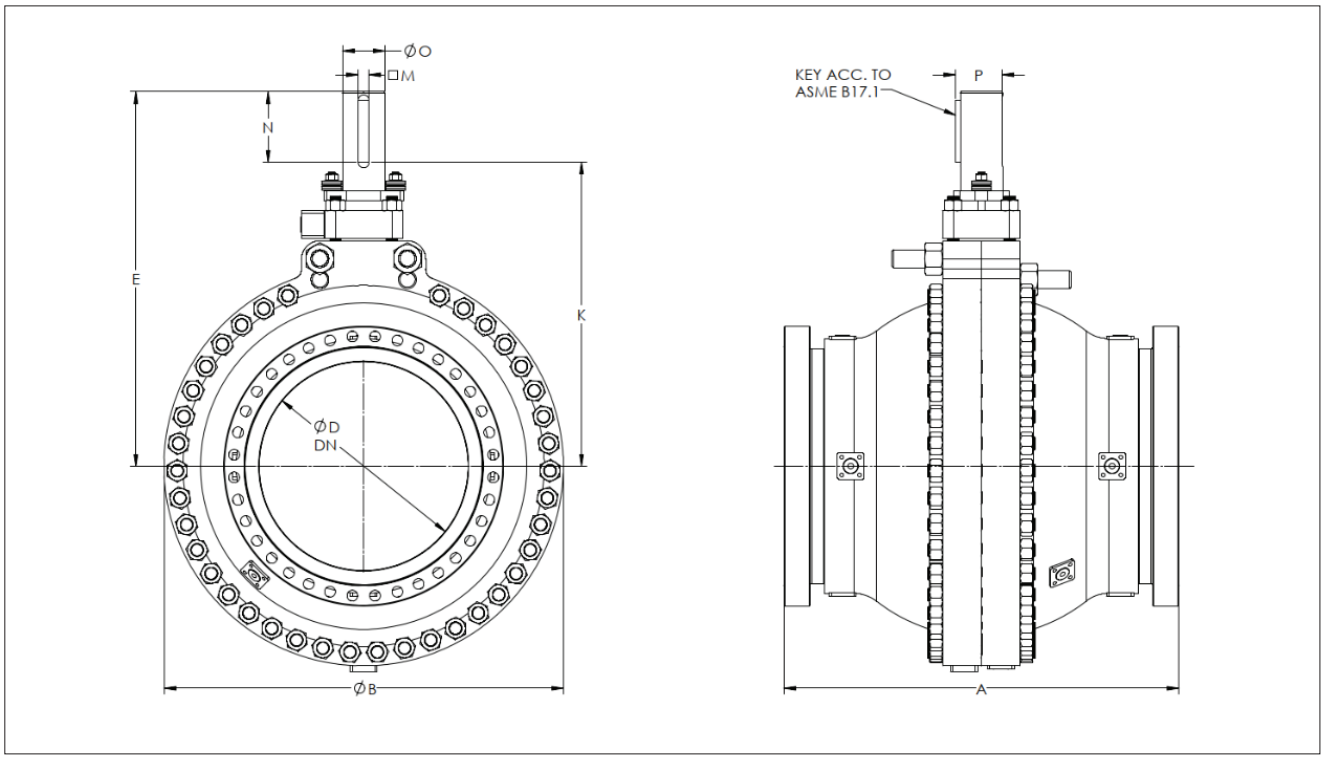

Fig. 12 Dimensional Layout

D2D, ASME CLASS 300

Type	Dimensions, mm										Mounting Face	Plug NPTF	kg
	DN	A	ØB	ØD	E	K	M	N	ØO	P			
D2D 30	750	1397	1414	740	1485	1235	38.10	250	150	166.6	F35, F40, F48	1	5500

Type	Dimensions, in										Mounting Face	Plug NPTF	lbs
	Size	A	ØB	ØD	E	K	M	N	ØO	P			
D2D 30	30	55.00	55.67	29.13	58.46	48.62	1.50	9.84	5.91	6.56	F35, F40, F48	1	12100

11. TYPE CODE

Neles™ ball valve, series D											
1.	2.	3.	4.	5.	6.	7.	8.	9.	/	10.	11.
D2	D	Y	30	Y	Y	Y	03	G		-	-

1.	SERIES
D2	Full bore, flanged

2.	PRESSURE RATING
D	ASME class 300

3.	CONSTRUCTION
Y	Special delayed coker service construction

4.	SIZE (IN)
30	30*

*) Flanges acc. To ASME B16.47 series B

5.	BODY	BOLTING
J	C5	L7M / 2HM
Y	C5	B16 / 2HM

6.	BALL
Y	CA6NM / 410 + CrC

7.	SEAT TYPE
Y	K style seat

8.	STANDARD MATERIALS				
	Seat seal	Body gasket	Gland packing	Wound spring or bellows spring	
03	Graphite	Graphite	Graphite	W	X-750

9.	PACKING CONTRUCTION CODE
G	Standard packing, live loaded graphite packing

10.	FLANGE FACING
-	ASME B16.5 raised face Ra 3.2-6.3
05	Ring Joint

11.	FLANGE DRILLING
-	Acc. To valve pressure rating

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