INSTALLATION
OPERATION
MAINTENANCE
GUIDE

LD/WD 141 Series
Resilient Seat Ductile Iron Butterfly Valves

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INTRODUCTION

DESIGN FEATURES FOR LD141/WD141 SERIES

- Available in wafer (2″- 12″) body, or lug (2″- 48″) pattern.
- Flange holes comply with ANSI Class 125/150 dimensions.
- Large Diameter (28″-48″) flanges comply with ASME B16.47 Class 150 Series A.
- Cast in top plate with ISO-5211 mounting dimensions provides for direct mounting of Apollo® actuators and manual operators.
- The face-to-face dimensions were designed to comply with MSS SP-67 and API 609.
- Wafer body features four alignment holes for ease of installation.
- Through-shaft design with spline connection between the stem and disc. Disc-to-seat interface provides bubble-tight shut off with reduced torque and extended service life.
- Equipped with a stretch-resistant, non-collapsible, blowout-proof, phenolic-backed cartridge seat. (14″ through 24″ have aluminum backing)
- Meets the intent and has passed AWWA C504-87 Section 5 proof of design tests.
- Factory tested to 110% of full rated pressure in both directions before shipping.
- NSF 372 Approved. Note Viton B seat not included in approval.
- NSF 61 Approved for 2″-24″ SS disc with EPDM/Buna-N Seats.

PRODUCT STORAGE

- The valves should be stored with the disc in the partially open position.
- The valves should be stored indoors in a clean, dry, well-ventilated place away from corrosive materials and protected from excessive dust and dirt.
- The valves should be stored on a rack or pallet off the floor and arranged to prevent damage during handling.
- Keeps valves out of direct sunlight and in a cool location to prolong elastomer life.
- Valves should be protected to prevent damage to the flange faces, disc sealing edge and operator.

PRODUCT MARKING

All APOLLO® Butterfly Valves are equipped with an identification tag attached to the valve neck (Figure 1). This tag provides the model number, part number, size, max pressure rating, and date of manufacture.

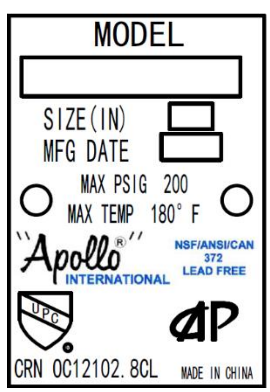


FIGURE 1. APOLLO® BUTTERFLY VALVE IDENTIFICATION TAG EXAMPLE

OPERATING PRESSURES FOR LD141/WD141 SERIES

- 2″-12″ (50mm-300mm) – 200 psig (13.78 bar)
- 14″-48″ (350mm-1200mm) – 150 psig (10.34bar)

FLANGE AND PIPE COMPATIBILITY

APOLLO® Butterfly Valves are designed to fit between the following piping flanges:

- ANSI 125 Cast iron flanges. (all sizes)
- ANSI 150 Steel Flanges, schedule 40. (all sizes)
- ANSI 150 Steel Flanges, schedule 80. (2″-12″ remove 1/16″ raised face.)

NOTE: When installing valve in schedule 80 piping, make sure the valve is properly centered between the pipe flanges to prevent disc edge damage since the clearance between the disc O.D. and the pipe I.D. is reduced. If there is a compatibility question, compare the minimum pipe I.D. with the disc chord dimensions in Table 1.

Valve	Size	Disc Chord
(in)	(mm)	
2	50	1.133
2.5	65	1.706
3	80	2.450
4	100	3.488
5	125	4.296
6	150	5.697
8	200	7.468
10	250	9.484
12	300	11.456
14	350	13.000
16	400	14.970
18	450	16.847
20	500	18.650
24	600	22.558
30	750	28.53
36	900	33.08
42	1050	39.30
48	1200	44.35

TABLE 1. BUTTERFLY VALVE DISC CHORD DIMENSIONS

INSTALLATION INSTRUCTIONS

APOLLO® butterfly valves are designed for use between the faces of ANSI 125 and 150 pound flat, raised face, slip-on or weld-neck flanges at the pressure indicated on the nameplate. **Flange gaskets should not be used**. Consideration should be given to the proper piping alignment prior to the installation of any iron lug bodied valve. All APOLLO® resilient seated butterfly valves are bi-directional with the ability to control flow equally in either direction. All LD141 Series APOLLO® lug style butterfly valves up to 24" may be used for end of line service in either direction (DDES) at 200 psig, above 24" sizes are rated for DDES at 150 psig.

1. Check to make sure that the pipe flange and valve sealing faces are clean and free from any debris (pipe scale, weld slag, etc.).
2. Check the valve nameplate to ensure that the pressure and valve materials are correct for the application. See Table 2 for seat material temperature ratings.

   Warning! – APOLLO® Butterfly valves should never be installed where service conditions could exceed the valve ratings. Failure to heed warning may result in personal injury and/or property damage.

Type	Min	Max
Buna-N	+10 °F (-12 °C)	+180 °F (82 °C)
EPDM	-30 °F (-34 °C)	+225 °F (135 °C)
Viton	-20 °F (-29 °C)	+300 °F (149 °C)

TABLE 2. SEAT MATERIAL TEMPERATURE RATING

3. The seat sealing face on the LD141/WD141 Series butterfly valves is wider than the valve body providing a leak-proof seal when compressed between pipe flanges. Therefore, no flange gaskets are required when installing any APOLLO® butterfly valve.
4. To prevent damage to the disc sealing edge during installation, position the disc in the "partially open" position (Figure 2) so that the disc is still contained within the valve body.

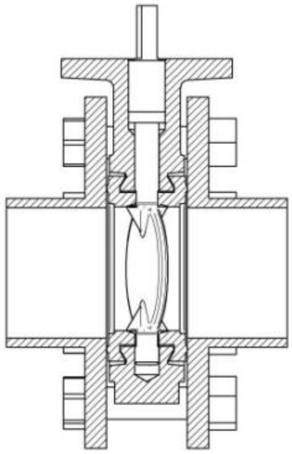


FIGURE 2. VALVE IN THE PARTIALLY OPEN POSITION

5. Spread the pipe flanges apart allowing the valve to be slipped easily in between the flanges.
6. Center the valve between the flanges and loosely install all the flange bolts. On the WD141 wafer valve, the flange bolts that pass through the alignment lugs should be installed first. Consult Table 3 for correct flange bolt size and quantity.

7. Slowly move the valve to the full open position (Figure 3) and back to the full closed position ensuring that the disc moves freely without any obstruction. If no obstruction is encountered, return the valve to the full open position and hand tighten all flange bolts using the bolt tightening sequence shown in Figure 4.

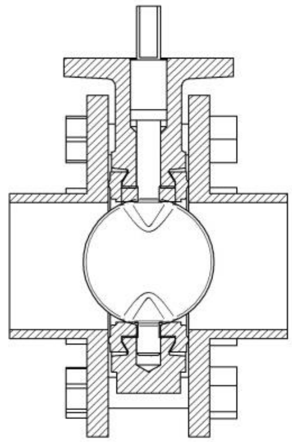


FIGURE 3. VALVE IN THE FULL OPEN POSITION

8. After all flange bolts are fully tightened, cycle the valve from full open to full closed to ensure there is proper disc clearance and there is no seat leakage in the full closed position.

FLANGE SIZE	BOLT SIZE	MIN BOLT TORQUE	MAX BOLT TORQUE
(in)	(in)	(Ft/LBS)	(Ft/LBS)
2″-4″	5/8″	20	70
5″-8″	3/4″	30	120
10″-12″	7/8″	50	200
14″-16″	1″	70	240
18″-20″	1-1/8″	100	380
24″-30″	1-1/4″	140	520
32″ – 48″	1-1/2″	200	800

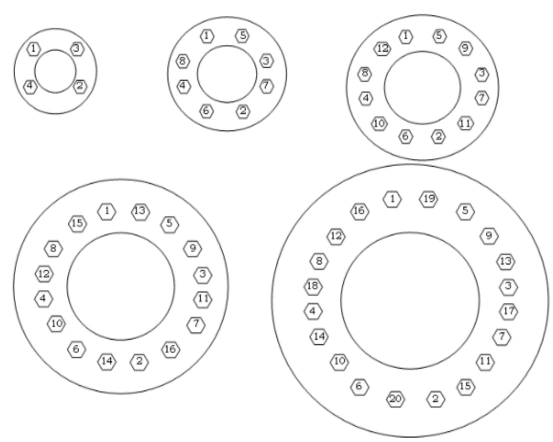


FIGURE 4. FLANGE BOLT TIGHTENING SEQUENCE AND TORQUE VALVES

WAFER BODY HEAVY HEX BOLTS & NUTS					LUG BODY REGULAR HEX HEAD SCREWS		
Valve Size		**Diameter**	**Length**	**Quantity**	**Diameter**	**Length**	**Quantity**
(in)	(mm)	(in)	(in)		(in)	(in)	
2	50	5/8″	4-1/2″	4	5/8″	1-1/2″	8
2.5	65	5/8″	4-1/2″	4	5/8″	1-1/2″	8
3	80	5/8″	5″	4	5/8″	1-3/4″	8
4	100	5/8″	5″	8	5/8″	1-3/4″	16
5	125	3/4″	5-1/2″	8	3/4″	1-3/4″	16
6	150	3/4″	5-1/2″	8	3/4″	2″	16
8	200	3/4″	6″	8	3/4″	2-1/4″	16
10	250	7/8″	6-1/2″	12	7/8″	2-1/4″	24
12	300	7/8″	7″	12	7/8″	2-1/2″	24
14	350	1″	7-1/2″	12	1″	2-3/4″	24
16	400	1″	8-1/2″	16	1″	3″	32
18	450	1-1/8″	9-1/2″	16	1-1/8″	3-1/2″	32
20	500	1-1/8′	11″	20	1-1/8′	4″	40
24	600	1-1/4″	12″	20	1-1/4″	4-1/2″	40

LARGE DIAMETER LUG VALVE HEX HEAD SCREWS					LARGE DIAMETER LUG VALVE BLIND HEX HEAD SCREWS		
Valve	**Size**	**Diameter**	**Length**	**Quantity**	**Diameter**	**Length**	**Quantity**
(in)	(mm)	(in)	(in)		(in)	(in)	
28	700	1-1/4″	6″	48	1-1/4″	3-1/2″	8
30	750	1-1/4″	6″	48	1-1/4″	3-1/2″	8
32	800	1-1/2″	6-1/2″	48	1-1/2″	4-1/2″	8
36	900	1-1/2″	7-1/2″	56	1-1/2″	5″	8
40	1000	1-1/2″	7-1/2″	64	1-1/2″	5″	8
42	1050	1-1/2″	8-1/2″	64	1-1/2″	5″	8
48	1200	1-1/2″	9-1/2″	80	1-1/2″	6″	8

Note: Large diameter valve flanges (28″-48”) are ASME B16.47 Class 150 Series A.

TABLE 3. STUD AND BOLT SPECIFICATIONS FOR LD141/WD141

LEVER HANDLE MOUNTING PROCEDURE

1. Start by loosely assembling the notch plate on the valve top plate. The notch plate should be installed with the notches in the third quadrant of the valve top plate with the stop tabs at the 6 o'clock and 9 o'clock position. The notch plate should be installed with the stop tabs pointing upwards (Figure 5).

2. Next, install the handle so that the lever fully engages in the notches when the lever is released and tighten the notch plate screws

3. Compress the handle lever and position the disc so that the valve is in the full closed position. Align the last notch on the notch plate at the 9 o'clock position with the handle lever and tighten the notch plate screws.

4. Compress the handle lever and position the disc so that the valve is in the full open position and release the lever. The lever should line-up with the last notch on the notch plate at the 6 o'clock position.

5. Note: Notch plate can be rotated 90° degrees to accommodate user preference in regards to handle direction.

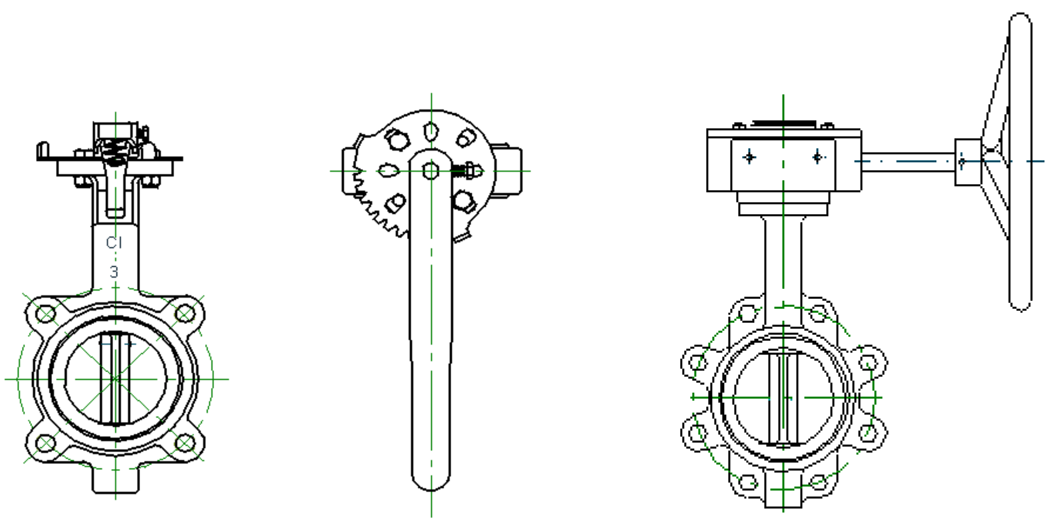
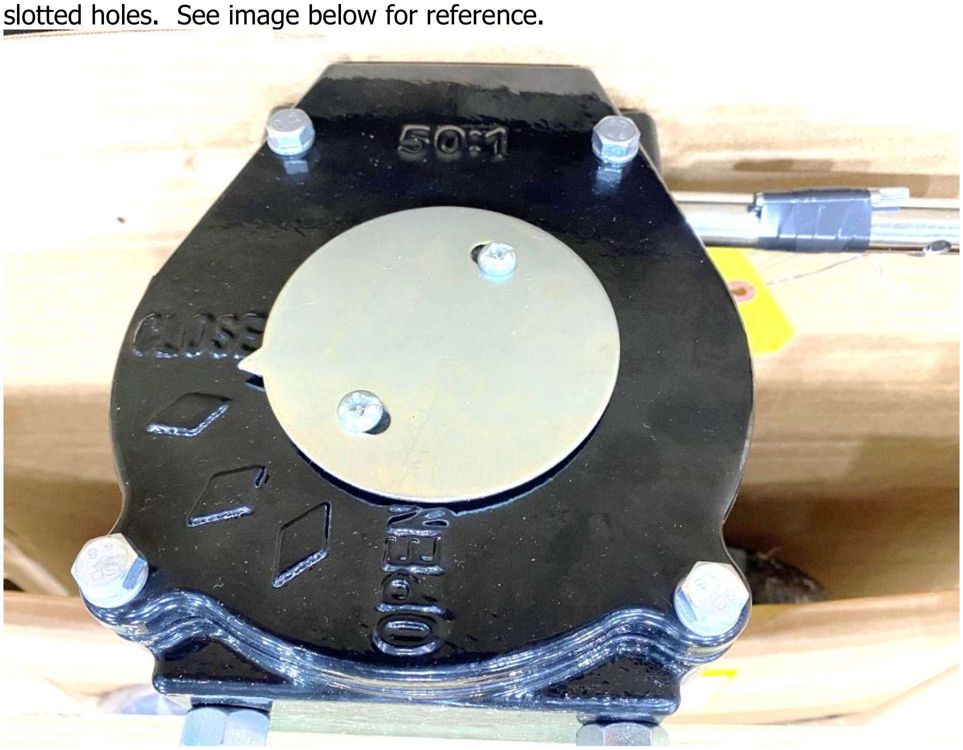


FIGURE 5. NOTCHPLATE AND GEAR OPERATOR INSTALLATION POSITION

GEAR OPERATOR SETTING PROCEDURE

1. The gear operator has two limit stops for FULL OPEN and FULL CLOSED. Adjustment can be made by loosening the lock nut (19mm) and turning the hex head bolt accordingly. See image above.
2. Note the position of the indicator pointer and the word "CLOSE". The pointer should be near the center of "CLOSE" marking. Minor adjustment may be needed after calibration by using the slotted holes. See image below for reference.



MEMORY STOP ASSEMBLY PROCEDURE FOR INFINITE POSTION HANDLES

1. Using the bolt, washers, and wing-nut included in the infinite position handle kit, loosely assemble the parts to the infinite position plate using Figure 6 as a reference.
2. Slide the memory stop along the plate slide hole to the desired position and then tighten the bolt and wing-nut so that the memory stop will not be able to move freely.
3. Place the locking plate on the valve shaft followed by the valve handle and tighten to the shaft. By turning the handle, the locking plate should adjust from the open/closed position to the position of the memory stop.

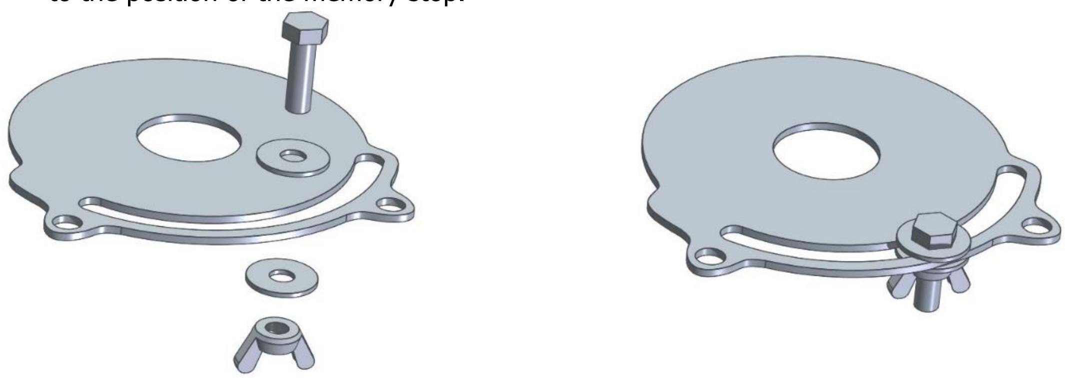


FIGURE 6. MEMORY STOP ASSEMBLY FOR INFINITE POSITION HANDLES

MAINTENANCE AND REPAIR

APOLLO® butterfly valves are designed for extended service with minimal wear and servicing. No regular lubrication is required. Prior to any repair or replacement, the valve must be removed from the line following these precautions:

1. The pipeline on either side of the valve must be depressurized and drained.

2. Ensure that the disc is in the partially open or full closed position before removing the valve from the line

3. **DO NOT** remove an actuator or operator from the valve while the line is still pressurized.

BUTTERFLY VALVE PART LIST AND DRAWINGS

ITEM #	QTY	DESCRIPTION
1	1	BODY
2	1	SHAFT
3	1	SEAT
4	1	DISC
5	3	BUSHING
6	1	O-RING
7	1	WASHER
8	1	EXTERNAL RETENTION RING
9	1	INTERNAL RETENTION RING
10	2	SET SCREW, FLAT POINT
11	2	SET SCREW, CONE POINT
12	1	NAMEPLATE

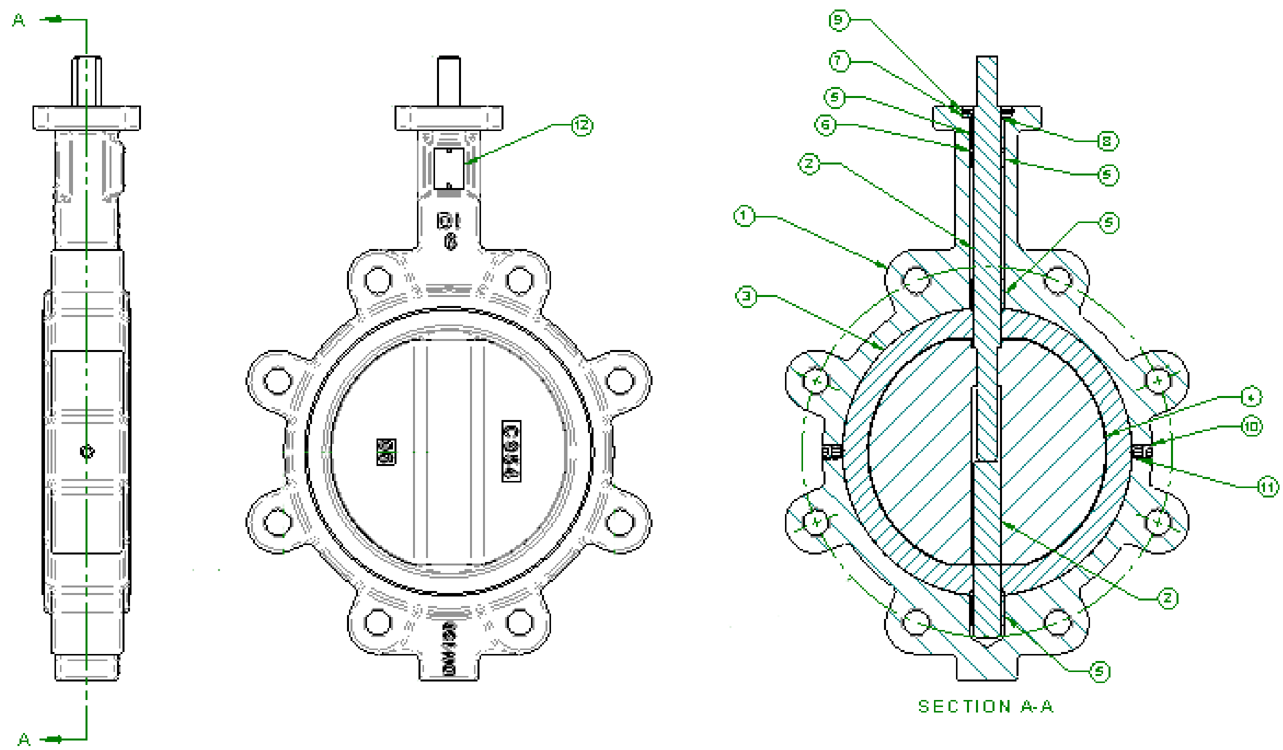


FIGURE 7. LD141/WD141 PARTS LIST & ASSEMBLY DRAWING

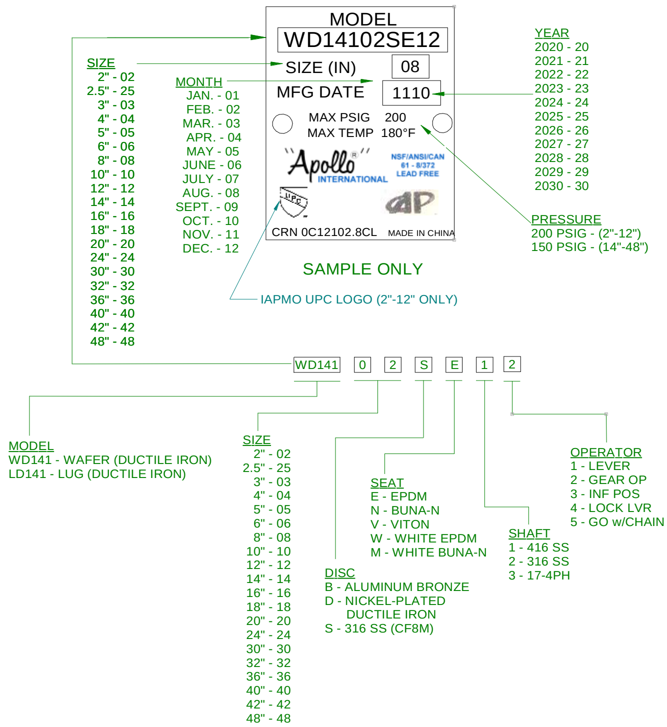


FIGURE 8. EXAMPLE NAME PLATE

VALVE SIZE		WD Model	LD Model
INCHES	DN (MM)	LBS (KG)	LBS (KG)
2	50	6 (3)	8 (4)
2.5	65	6 (3)	10 (4.5)
3	80	7 (3)	11 (5)
4	100	11 (5)	17 (8)
5	125	13 (5)	20 (9)
6	150	16 (7)	23 (10)
8	200	29 (13)	39 (18)
10	250	44 (20)	62 (28)
12	300	70 (32)	97 (44)
14	350		148 (67)
16	400		206 (93)
18	450		277 (125)
20	500		410 (186)
24	600		592 (268)
30	750		1267 (575)
36	900		1951 (885)
42	1050		2480 (1125)
48	1200		3340 (1515)

FIGURE 9. APPROXIMATE WEIGHTS

(IN)	(MM)	A	B	C	D	E	ØF	ØG	ØG2	KEY	ØH	ØH2	L	ØJ	ØK	N (WD141)	ØM
2	50	3.2	6.375	1.25	1.75	0.394	0.496	0.375	--	--	2.756	--	2.699	4.00	2.09	5/8"-11 (4X)	4.75
2.5	65	3.5	6.880	1.25	1.88	0.394	0.496	0.375	--	--	2.756	--	2.699	4.75	2.54	5/8"-11 (4X)	5.50
3	80	3.7	7.130	1.25	1.88	0.394	0.496	0.375	--	--	2.756	--	2.699	5.13	3.09	5/8"-11 (4X)	6.00
4	100	4.5	7.880	1.25	2.13	0.472	0.621	0.375	--	--	2.756	--	2.699	6.75	4.09	5/8"-11 (8X)	7.50
5	125	5.0	8.380	1.25	2.25	0.551	0.745	0.375	--	--	2.756	--	2.699	7.75	4.85	3/4"-10 (8X)	8.50
6	150	5.5	8.880	1.25	2.25	0.551	0.745	0.375	--	--	2.756	--	2.699	8.63	6.13	3/4"-10 (8X)	9.50
8	200	6.9	10.250	1.75	2.50	0.669	0.870	0.563	0.438	--	4.921	4.015	4.606	10.56	7.89	3/4"-10 (8X)	11.75
10	150	8.3	11.500	1.88	2.75	0.866	1.120	0.563	0.438	--	4.921	4.015	4.606	13.06	9.89	7/8"-9 (12X)	14.25
12	300	9.8	13.250	1.88	3.13	0.945	1.244	0.563	--	--	4.921	--	4.606	16.00	11.89	7/8"-9 (12X)	17.00
14	350	11.0	14.500	1.88	3.13	0.945	1.244	0.563	--	--	4.921	--	Ø5.91*	17.13	13.38	1"-8 (12X)	18.75

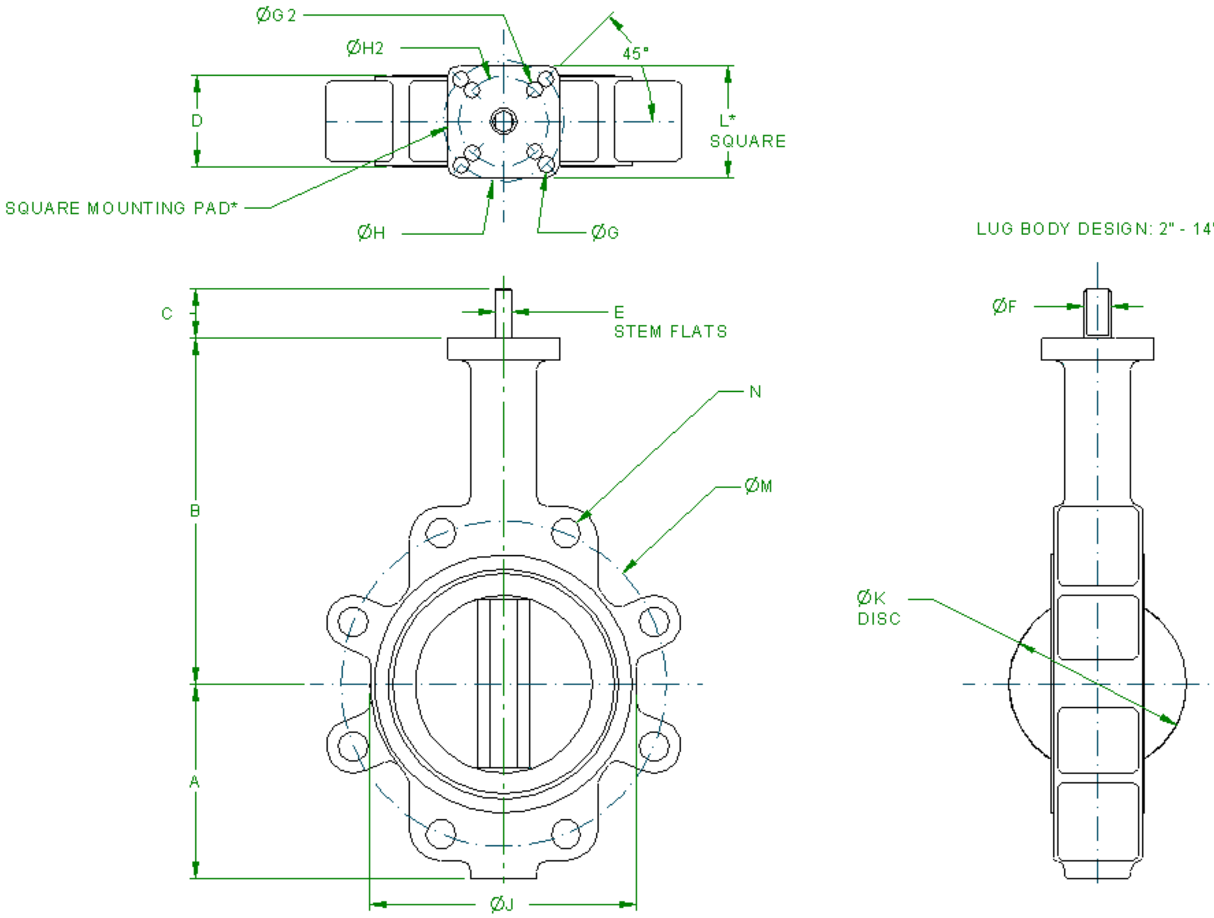


FIGURE 10. 2"- 14" LD141 DRAWING

(IN)	(MM)	A	B	C	D	ØF	ØG	KEY (SQUARE)	ØH	L	J	K	N (LD141)	M
16	400	12.0	15.750	2.00	3.50	1.313	0.563	0.313	4.921	Ø5.91	20.00	15.38	1"-8 (16 X)	21.25
18	450	13.2	16.630	2.00	4.25	1.500	0.813	0.375	6.496	Ø8.27	21.38	17.38	1 1/8"-7 (16 X)	22.75
20	500	14.7	18.880	2.50	5.25	1.625	0.813	0.375	6.496	Ø8.27	23.31	19.38	1 1/8"-7 (20 X)	25.00
24	600	18.1	22.130	2.75	6.13	2.000	0.813	0.500	6.496	Ø8.27	27.88	23.38	1 1/4"-7 (20 X)	29.50

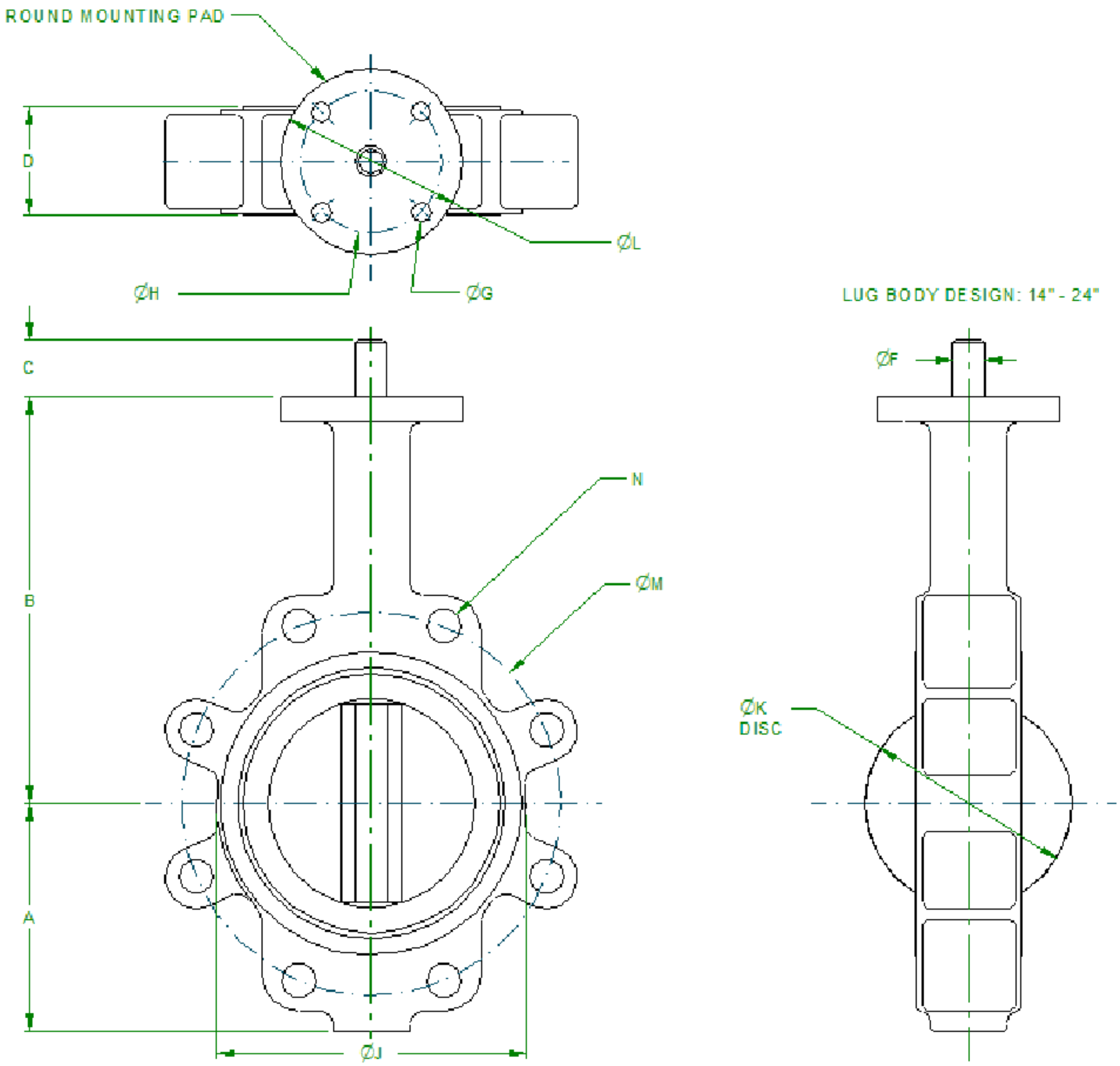


FIGURE 11. 16"- 24" LD141 DRAWING

Size (in)	Size (mm)	A	B	C	D	ØD1	ØD2	ØD3	ØD4	ØD5	ØD6	N-UNC	Ød1
28	700	45.83	24.57	6.02	6.50	27.36	33.99	7.87	10.00	11.81	2.49	24 - 1-1/4x7	5/16 (8x)
30	750	45.51	25.47	6.02	6.61	29.28	36.00	7.87	10.00	11.81	2.49	24 - 1-1/4x7	5/16 (8x)
32	800	50.51	26.46	6.02	7.48	31.27	38.50	7.87	10.00	11.81	2.49	24 - 1-1/2x6	5/16 (8x)
36	900	51.89	26.89	6.77	7.99	34.03	42.75	7.87	10.00	11.81	2.95	28 - 1-1/2x6	5/16 (8x)
40	1000	60.63	31.50	6.77	8.50	37.99	47.24	7.87	10.00	11.81	3.35	32 - 1-1/2x6	5/16 (8x)
42	1050	65.16	33.78	6.77	9.88	40.53	49.50	7.87	10.00	11.81	3.74	32 - 1-1/2x6	5/16 (8x)
48	1200	71.85	37.72	7.44	10.87	45.67	56.00	9.06	11.73	13.78	4.13	40 - 1-1/2x6	7/8 (8x)

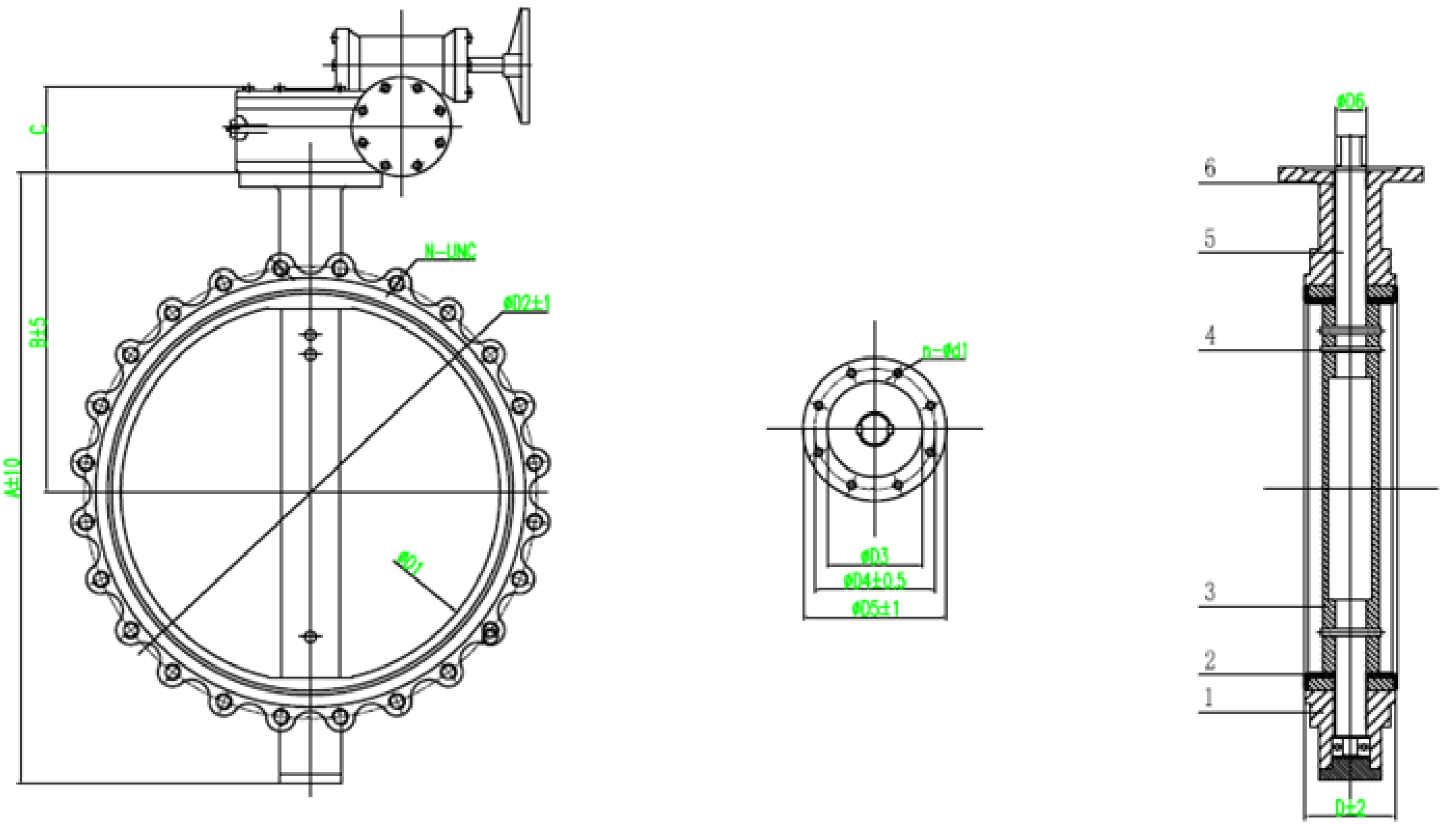


FIGURE 12. 28″- 48″ LD141 DRAWING

(IN)	(MM)	A	B	C	D	E	ØF	ØG	ØG2	KEY	ØH	ØH2	L	ØJ	ØK	ØM	LUGS
2	50	3.2	6.375	1.25	1.75	0.394	0.496	0.375	--	--	2.756	--	2.699	4.00	2.09	--	--
2.5	65	3.5	6.880	1.25	1.88	0.394	0.496	0.375	--	--	2.756	--	2.699	4.75	2.54	--	--
3	80	3.7	7.130	1.25	1.88	0.394	0.496	0.375	--	--	2.756	--	2.699	5.13	3.09	--	--
4	100	4.5	7.880	1.25	2.13	0.472	0.621	0.375	--	--	2.756	--	2.699	6.75	4.09	--	--
5	125	5.0	8.380	1.25	2.25	0.551	0.745	0.375	--	--	2.756	--	2.699	7.75	4.85	--	--
6	150	5.5	8.880	1.25	2.25	0.551	0.745	0.375	--	--	2.756	--	2.699	8.63	6.13	--	--
8	200	6.9	10.250	1.75	2.50	0.669	0.870	0.563	0.438	--	4.921	4.015	4.606	10.56	7.89	11.75	2
10	150	8.3	11.500	1.88	2.75	0.866	1.120	0.563	0.438	--	4.921	4.015	4.606	13.06	9.89	14.25	2
12	300	9.8	13.250	1.88	3.13	0.945	1.244	0.563	--	--	4.921	--	4.606	16.00	11.89	17.00	2
14	350	11.0	14.500	1.88	3.13	0.945	1.244	0.563	--	--	4.921	--	Ø5.91*	17.13	13.38	18.75	4

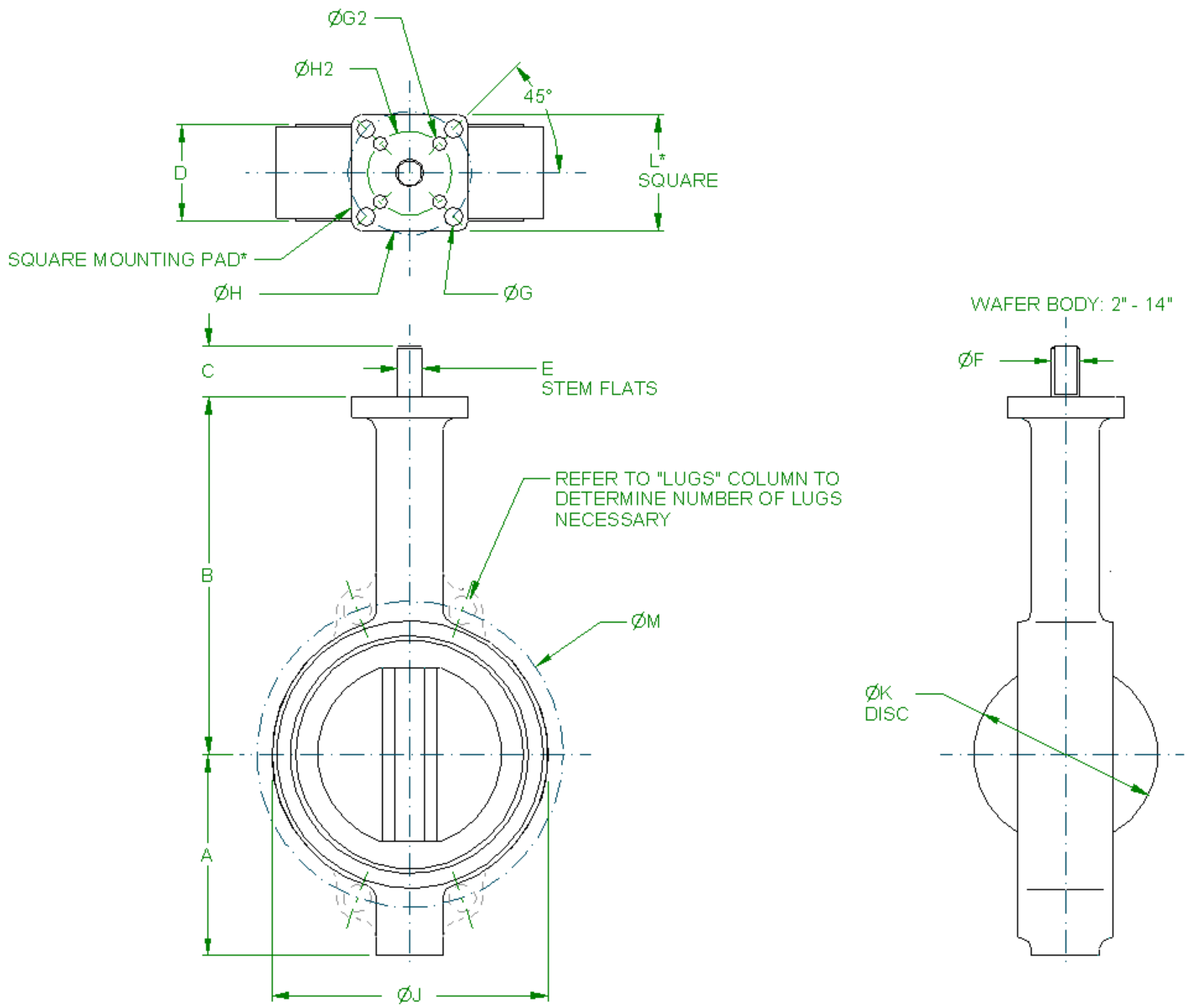


FIGURE 13. 2"- 14" WD141 DRAWING

(IN)	(MM)	A	B	C	D	ØF	ØG	KEY (SQUARE)	ØH	ØL	ØJ	ØK	ØM	LUGS
16	400	12.5	15.750	2.00	3.50	1.313	0.563	0.313	4.921	Ø5.91	20.00	15.38	21.25	4
18	450	13.2	16.630	2.00	4.25	1.500	0.813	0.375	6.496	Ø8.27	21.38	17.38	22.75	4
20	500	14.7	18.880	2.50	5.25	1.625	0.813	0.375	6.496	Ø8.27	23.31	19.38	25.00	4
24	600	18.1	22.130	2.75	6.13	2.000	0.813	0.500	6.496	Ø8.27	27.88	23.38	29.50	4

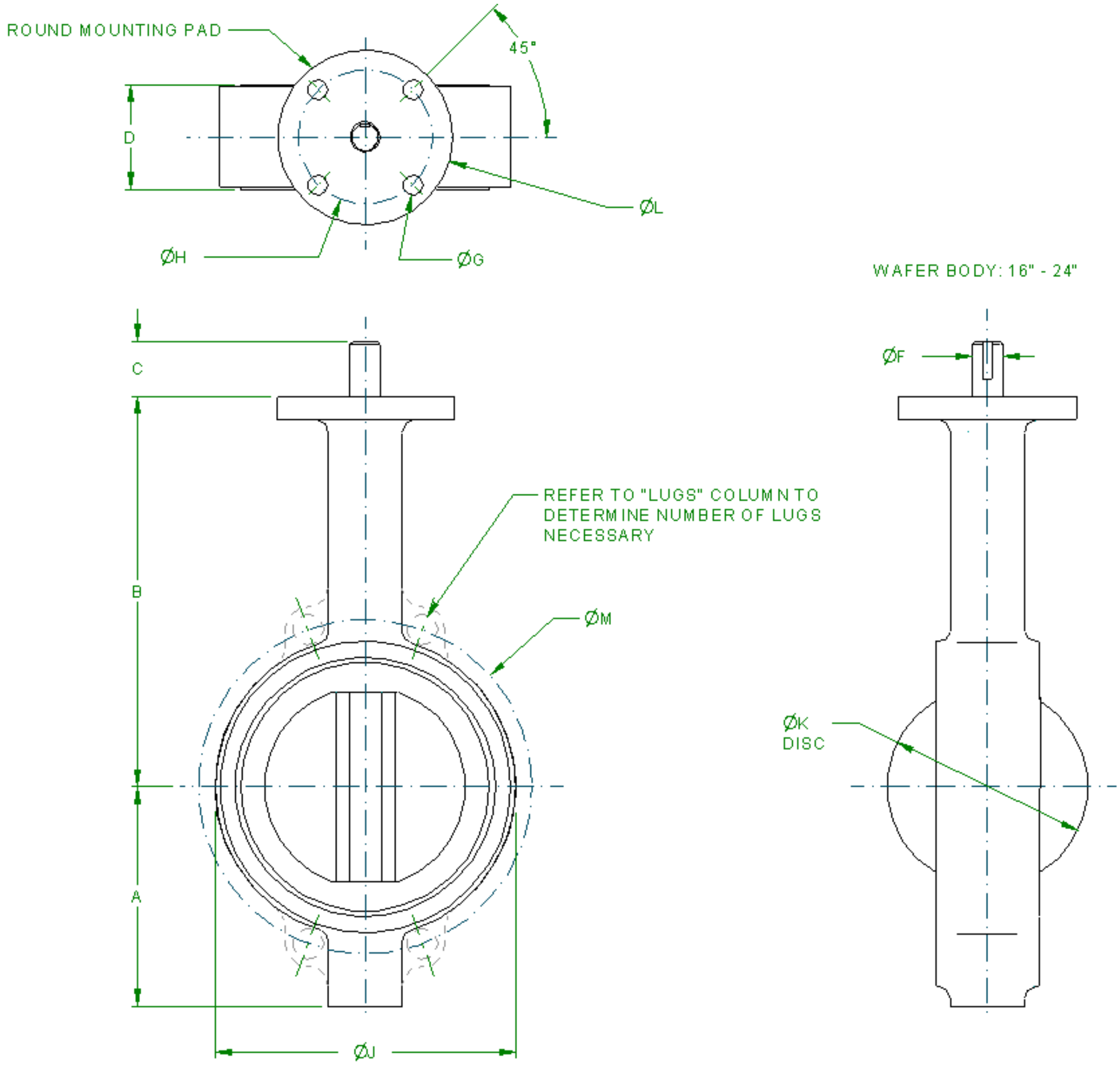


FIGURE 14. 16"- 24" WD141 DRAWING

AMENDMENT REGISTER

Date	ECN	Rev.	Page	Description	By:
9/22/2014	M14630	A	ALL	New Release	SAV
10/31/24	M18490	B	ALL	Replaced Conbraco with Aalberts; thread pitch from 8 to 7 on 18” and 20”. Added torque for 30”-48”.	GDG