

# MANUAL

## Ball valve AL 35-55A

### Brief Introduction

Three-piece ball valve allows easy replacement of gasket, seal, and seats without special tools. Series 55A ball valves use "floating ball" design. Induced by the line pressure, the ball is free to move horizontally inside the valve body. The valve is capable of tight shutoff with flow in either direction or dead-end, regardless of the position of the valve in the line. The downstream seat, opposite the pressurized side of a closed valve, carries the load exerted by the line pressure on the ball, while the upstream seat is subject to little load or wear. For this reason, it is sometimes possible to increase seat life by turning the valve end-for-end in the pipeline.

#### 1. USE:

- 1.1 Life of valve can be maximized if the valve is used within the rated range, in accordance with pressure, temperature, and corrosion data.

#### 2. MANUAL OPERATION:

- 2.1 To open or close the valve, turn the handle  $\frac{1}{4}$  turn (90 degrees).
  - A. Valve in Open Position – the handle is in parallel (in-line) with the valve or pipeline.
  - B. Valve in Closed Position – the handle is perpendicular (crossed) with the valve or pipeline.

#### 3. AUTOMATED OPERATION:

- 3.1 Valves with actuators should be checked for valve stem alignment. Angular or linear misalignment will result in high operational torque and unnecessary wear on the stem seal.

#### 4. DISASSEMBLING & CLEANING THE VALVE:

- 4.1 Ball valves can trap fluids in ball cavity when it is in closed position.
- 4.2 If the valve has been used in hazardous media, it must be decontaminated before disassembly.
  - A. Relieve the line pressure.
  - B. Place valve in half-open position and flush the line to remove any hazardous material from valve.
  - C. All persons involved in the removal and disassembly of the valve should wear the proper protective clothing, such as face shield, glove, apron, etc.

#### 5. REPLACING THE THRUST WASHER, PACKING, AND SEATS

- 5.1 Before replacing the thrust washer and the packing, the pipeline must be de-pressurized.
- 5.2 Maintenance of parts is easy, even if the valve is installed in the line  
*By removing one body bolt and loosening the other three, valve body can be swung out. Seats, gaskets and ball can be replaced without disturbing pipe alignment.*

#### 6. GENERAL INFORMATION FOR ON-SITE INSTALLATION:

- 6.1 The valve may be fitted in any position on the pipeline.
- 6.2 To prevent damage to the seats and ball surface, the pipeline must be flushed, free of dirt, burrs, and welding residues before installing the valve.

#### 7. INSTALLATION OF THREADED VALVES

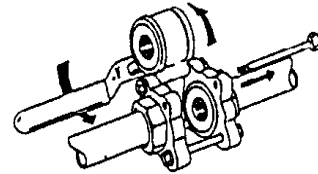
- 7.1 Use conventional sealant, such as hemp core, Teflon, etc. on the threads.
- 7.2 Apply wrench on the hexagon end of the valve only. Tightening by using the valve body or handle can seriously damage the valve.
- 7.3 For applications where screwed end valves are back-welded on site, these valves must be dismantled according to instructions for weld end valves.

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### 8. INSTALLATION OF WELD-END VALVES

- 8.1 Tack-weld the valve on the pipe in four points on both end caps.
- 8.2 With the valve in open position (lever to be parallel to the axis of the pipe), loosen all nuts on the body bolts.  
Remove all the bolts except one.  
Swing the body outside the pipe.
- 8.3 Turn the handle to the half open position to assist in the removal of the seats.
- 8.4 Turn handle in closed position and remove ball.
- 8.5 Place all removed parts in a clean and secure place.
- 8.6 Replace the body and the removed bolt. Tighten all nuts slightly. To prevent any leakage to the body joints after welding, make sure that the body and the end caps remain perfectly parallel.
- 8.7 Finish welding both end caps onto the pipe.
- 8.8 After the pipeline and valve cools, clean end caps then remove the previous replace bolt. Swing out the body. Turn the valve to closed position, then replace the ball. Turn valve in open position and replace seats.
- 8.9 After the seats and the ball are replaced, swing back the body, replace the removed bolt, and tighten the bolt according to the following chart.



### BOLT TIGHTENING SPECIFICATIONS:

The body bolts of the valve should be tightened evenly. Tighten one-side snugly, then tighten the one diagonal across. Repeat for the other bolts, bringing them all down tightly in sequence to the torque shown below:

Valve Size	BreakAway Torque(Nm)	BreakAway Torque(IN-LBS)	Cv U.S.GPM
1/4"	7	58	8
3/8"	7	58	8
1/2"	7	58	12
3/4"	9	81	32
1"	16	138	56
1 1/4"	17	150	82
1 1/2"	29	253	120
2"	36	323	240
2 1/2"	59	518	320
3"	85	749	580
4"	130	1152	1020

30% safety factor included.

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### Media and Service Factors:

Media Factors	Multiplier
Clean, particle free, non-lubricating (water, alcohol, etc)	1.00
Clean, particle free, non-lubricating (oils, hydraulic fluid, etc)	0.80
Slurries or heavily corroded and contaminated systems	2.00
Gas or saturated steam, clean and wet	1.00
Gas or superheated steam, clean and dry	1.30
Gas, dirty unfiltered e.g. natural gas, Chlorine	1.50

Service Factors	Multiplier
Simple On and Off Operations	1.00
Throttling	1.20
Positioner Control	1.50
Once per day Operations	1.20
Once every two days or a "Plant Critical" Operation	1.50

### Torque Determination:

Basic Torque \* Media Factor \* Service Factor = Sizing Torque

(Table 2 )

Torque of Body Bolt ( Standard body bolt )

Torque of Body Bolt ( Option-Metric bolt )

SIZE	Threads	lbf-in	kgf-cm	N-m	Threads	lbf-in	kgf-cm	N-m
1/4"	1/4"-20UNC	74 ~ 87	85 ~ 100	8.3 ~ 9.8	M6	74 ~ 87	85 ~ 100	8.3 ~ 9.8
3/8"	1/4"-20UNC	74 ~ 87	85 ~ 100	8.3 ~ 9.8	M6	74 ~ 87	85 ~ 100	8.3 ~ 9.8

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1/2"	5/16"-18UNC	95 ~ 113	110 ~ 130	10.8 ~ 12.7	M8	95 ~ 113	110 ~ 130	10.8 ~ 12.7
3/4"	5/16"-18UNC	104 ~ 122	120 ~ 140	11.8 ~ 13.7	M8	104 ~ 122	120 ~ 140	11.8 ~ 13.7
1"	5/16"-18UNC	113 ~ 139	130 ~ 160	12.7 ~ 15.7	M8	113 ~ 139	130 ~ 160	12.7 ~ 15.7
1.1/4"	3/8"-16UNC	174 ~ 217	200 ~ 250	19.6 ~ 24.5	M10	174 ~ 217	200 ~ 250	19.6 ~ 24.5
1.1/2"	7/16"-14UNC	286 ~ 312	330 ~ 360	32.3 ~ 35.3	M10	286 ~ 312	330 ~ 360	32.3 ~ 35.3
2"	7/16"-14UNC	304 ~ 347	350 ~ 400	34.3 ~ 39.2	M12	304 ~ 347	350 ~ 400	34.3 ~ 39.2
2.1/2"	M14	365 ~ 417	420 ~ 480	41.2 ~ 47.0	M14	365 ~ 417	420 ~ 480	41.2 ~ 47.0
3"	M16	434 ~ 477	500 ~ 550	49.0 ~ 53.9	M16	434 ~ 477	500 ~ 550	49.0 ~ 53.9
4"	M16	451 ~ 495	520 ~ 570	51.0 ~ 55.9	M16	451 ~ 495	520 ~ 570	51.0 ~ 55.9

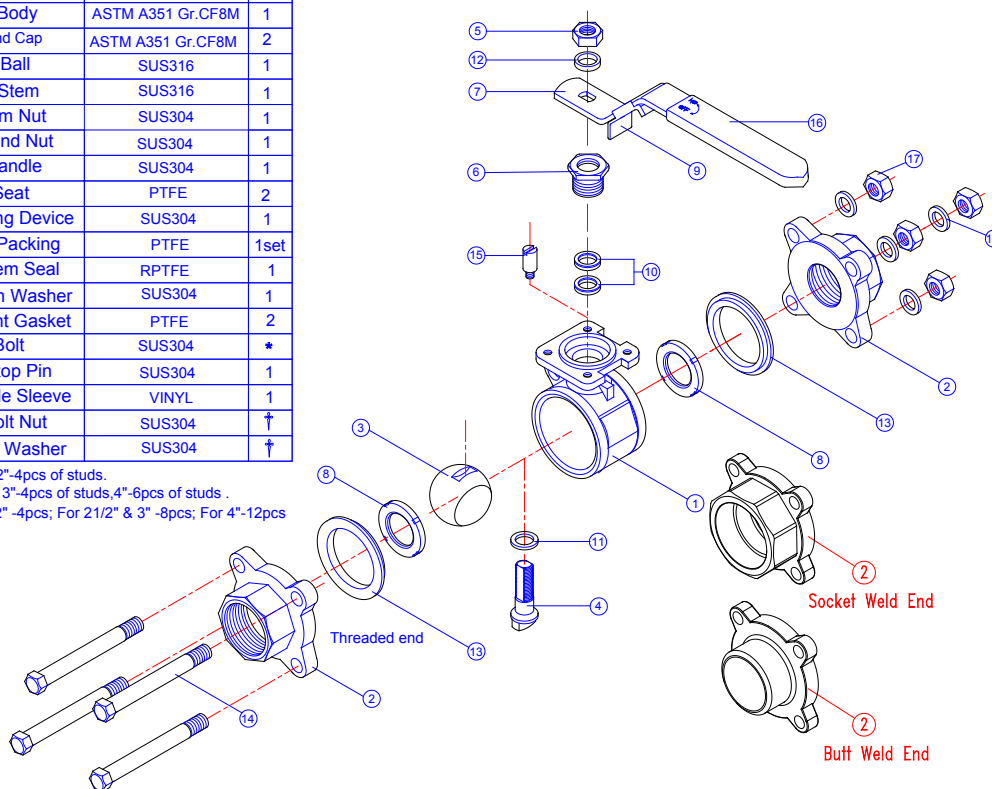
#### MATERIALS LIST

NO.	PART NAME	MATERIAL	Q'TY
1	Body	ASTM A351 Gr.CF8M	1
2	End Cap	ASTM A351 Gr.CF8M	2
3	Ball	SUS316	1
4	Stem	SUS316	1
5	Stem Nut	SUS304	1
6	Gland Nut	SUS304	1
7	Handle	SUS304	1
8	Seat	PTFE	2
9	Locking Device	SUS304	1
10	Stem Packing	PTFE	1set
11	Stem Seal	RPTFE	1
12	Stem Washer	SUS304	1
13	Joint Gasket	PTFE	2
14	Bolt	SUS304	*
15	Stop Pin	SUS304	1
16	Handle Sleeve	VINYL	1
17	Bolt Nut	SUS304	†
18	Bolt Washer	SUS304	†

\* For 1/4" to 2"-4pcs of studs.

For 2 1/2" & 3"-4pcs of studs, 4"-6pcs of studs.

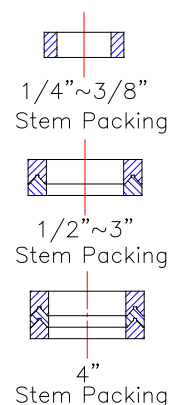
† For 1/4" to 2"-4pcs; For 2 1/2" & 3"-8pcs; For 4"-12pcs



\* Each Repair Kit (Teflon Set) including following parts ;

1. Seat (No. 8) x 2pcs
2. Stem Packing (No. 10) \* Remark (1)
3. Stem Seal (No. 11) x 1pc
4. Joint Gasket (No. 13) x 2pcs

#### \* Remark (1)



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It's necessary to take apart ball valve for maintenance under following leaking situation ;

- 1. Stem Leaking :** Tighten Stem Nut according to Tighten Torque (Table 1). If stem is still leaking continuously, thus, it's necessary to take apart ball valve and change Stem Packing (No. 10).
- 2. Joint Gasket Leaking :** Tighten bolt, bolt nut according to Tighten Torque (Table 2). If gasket is still leaking continuously, thus, it's necessary to take apart ball valve and change Joint Gasket (No. 13).
- 3. Seat Leaking :** Check ball valve if in "Normally Closed" position first. If seat is still leaking continuously, thus, it's necessary to take apart ball valve and change Seat (No. 8).

Stem Nut Tightening Torque ( Table 1 )

Size	Stem Thread	Series 55A								
		In-lbs			Nm			kg-cm		
1/4"	3/8"-24UNF	95	~	104	10.8	~	11.8	110	~	120
3/8"	3/8"-24UNF	95	~	104	10.8	~	11.8	110	~	120
1/2"	3/8"-24UNF	122	~	130	13.7	~	14.7	140	~	150
3/4"	3/8"-24UNF	122	~	130	13.7	~	14.7	140	~	150
1"	7/16"-20UNF	434	~	477	49.0	~	53.9	500	~	550
1 1/4"	7/16"-20UNF	434	~	477	49.0	~	53.9	500	~	550
1 1/2"	9/16"-18UNF	694	~	781	78.4	~	88.2	800	~	900
2"	9/16"-18UNF	694	~	781	78.4	~	88.2	800	~	900
2 1/2"	3/4"-16UNF	1215	~	1389	137.2	~	156.8	1400	~	1600

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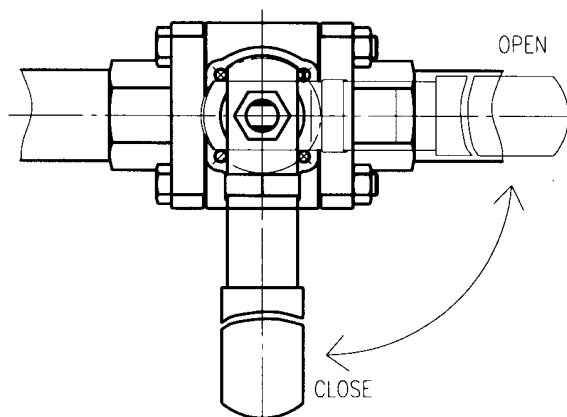
3"	3/4"-16UNF	1215	~	1389	137.2	~	156.8	1400	~	1600
4"	M24*P3.0	1736	~	1910	196.0	~	215.6	2000	~	2200

### The Steps for Maintenance Instruction ;

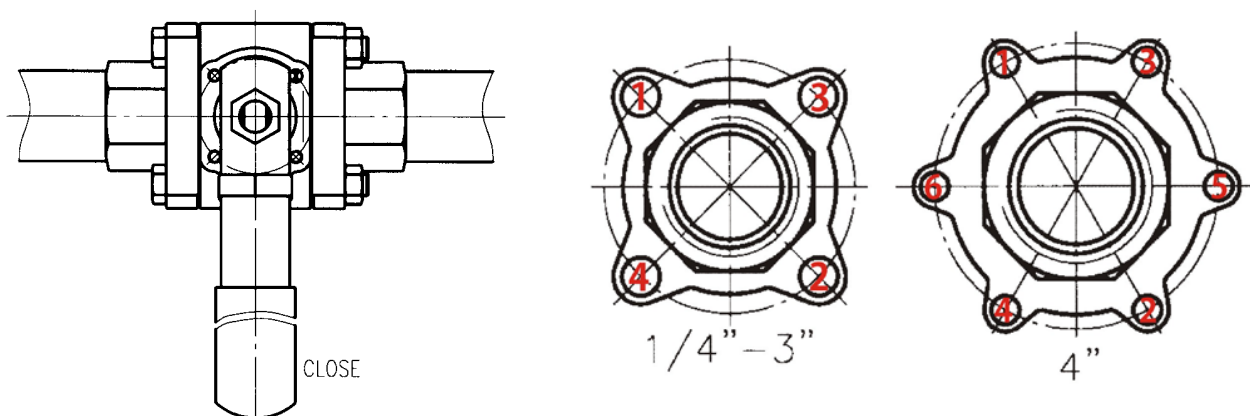
1. While ball valve still in pipe line, it's necessary to relieve the line pressure first. Then make ball valve in "normally open" & "normally closed" once again, and let the remaining pressure inside body be out of pipe lines, in order to avoid any accidents to occur.
2. Loosen all Bolts (No. 14), Bolt Washer (No. 18), Bolt Nut (No. 17) on End Cap (No. 2).
3. While taking off body away from end caps, pay attention to seats & other parts which are "**Not Falling Down**".
4. Take out Seat (No. 8) and Joint Gasket (No. 13) from body.
5. Turn the handle in "closed" position, take out Ball (No. 3) from body and pay attention to "**Not Falling Down**" while taking the ball out. Put ball in clean and safe place in order to install back.
6. Loosen Handle Nut (No. 5), take off Stem Washer (No. 12) and Handle (No. 16), loosen Gland Nut (No. 6) and take off Stem Packing (No. 10).
7. All taken-out parts need to put in clean and safe place.
8. Push Stem (No. 4) downward and take off it.
9. Take off Stem Seal (No. 11).
10. To clean and check up the stem if any damage.
11. Put new stem seal on stem, then put into body.
12. Put new packing into body, then put gland nut back .
13. Refer to Stem Nut Tightening Torque (Table 1), tighten stem nut accordingly.
14. Put back handle and stem washer.
15. Then screw the handle nut.
16. Pay attention to the handle which must be in "closed" position, then put ball into body.
17. Change to use new joint gasket and seat, put seat into gasket and then install them together on body (on both sides).
18. Put body back between two end caps.
19. Put on bolt, bolt washer and screw bolt nut on bolt tightly by hands. Then make BV in "open" & "closed" position within 3~5 times (see below drawing), and finally put BV in "closed" position.

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20. After make sure BV in "closed" position (see below left drawing). Refer to 1,2,3,4... orderly (see below right drawings), screw bolt nut on bolt tightly according to Body Bolt Tightening Torque (Table 2).

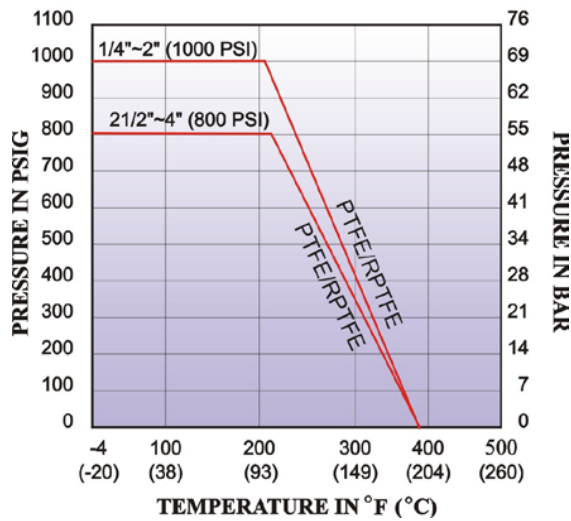


21. After finish assembling, check the ball valve if could open & close smoothly and then do a piping test.

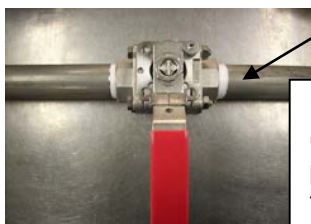
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Pressure Vs. Temperature Chart



**Re: 3pc Ball Valve – dismantling procedure and illustration**



1.) Put valve in close position first (handle and pipe are in vertical position), fix the valve on the pipe temporarily with spot welding on four points of end caps



6.) Adjust body and ends by hand, and make sure they're in alignment. Use a tool to screw bolts and nuts together, and avoid the displacement to occur between body and ends.