

M&J VALVE

AN SPX BRAND

M-303

Performance Leader in Thru-Conduit Gate Valves



SPX[®]

M-303: The Performance Leader in Thru-Conduit Gate Valves

The M & J Valve Model M-303 is an advanced fabricated body design slab gate valve manufactured and tested to API-6D. The fabricated body allows for a wide selection of material choices. The floating slab gate uses the natural force of line pressure to obtain a dynamically tight downstream seal in high-pressure differential applications. Low-pressure sealing is accomplished with coil springs that energize the seat pushing it against the gate.

Ease of maintenance and versatility make the M-303 the leading gate valve in the industry. The two-piece stem/common yoke simplifies operator mounting and conversions. The two-piece stem design (14" and larger) allows different materials to be used in wetted areas while standard material is used for stem threads. Combined with the bolted packing retainer, the two piece stem allows quick operator and extension changes in the field with the valve under pressure.

Choice of Operators

Manual, electric, hydraulic or cylinder

Patented M&J Cupola Design-14" and Larger

Allows easy removal of stem and top works while valve is in service.

Primary Stem Seals or VIH Packing

Multiple Chevron rings or VIH Packing for long life.

Secondary Stem Seal/Packing Injector

A backup safety feature using plastic nonflammable stem sealant.

Top Entry

For in-line maintenance.

Advanced Fabricated Body Construction

Allows choice of body and trim materials, including regular and low temperature designs.

Floating Slab Gate

Utilizing the natural force of line pressure to obtain a dynamically tight down-stream seal in high pressure differential applications.

Spring/Pressure Loaded Seat Rings

With 20# springs and nylon/elastomer seals for a continuous positive seal in low or high pressure differential service.

Full Thru-Conduit Port

For easy passage of pigs, wipers, and scrapers.

Non-Corrosive & Corrosive Trims

Including NACE for sour crude services.

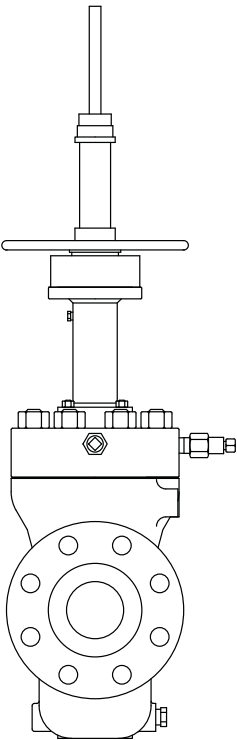
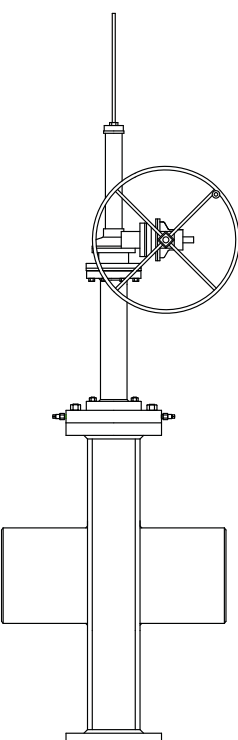
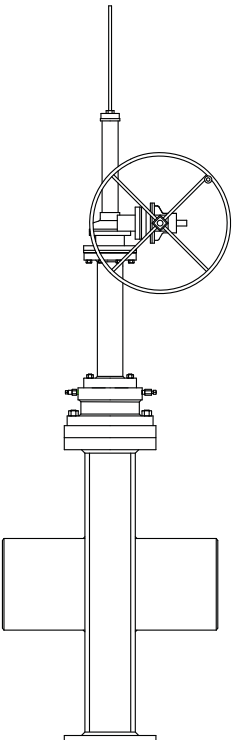
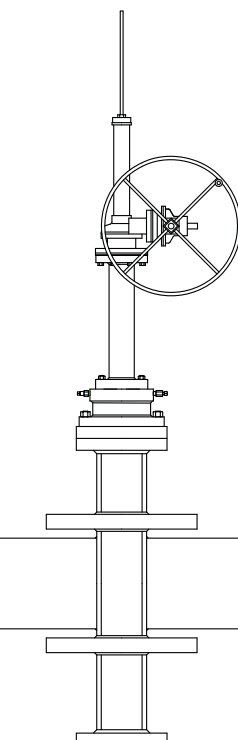
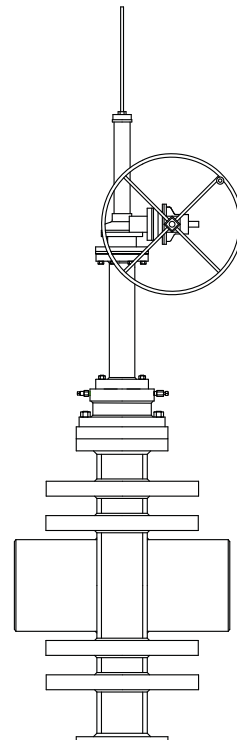
In Oil, Gas, Liquid Products & Secondary Recovery Applications

- Mainline Block Valves
- Tank and Station Valves
- Block & Bleed Valves
- Manifold Valves
- Launcher/Receiver Trap Valves
- Meter Bypass Valves
- Emergency Shutdown Valves (Fail Close)
- Hot Tap Valves



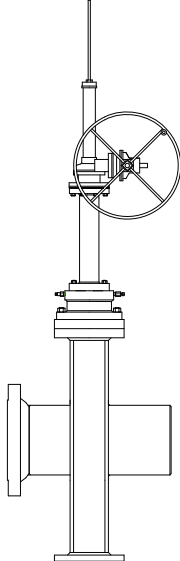
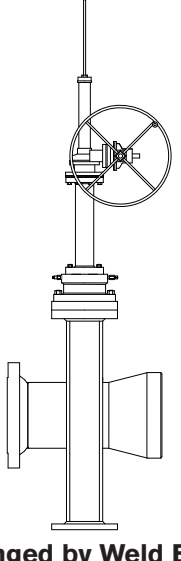
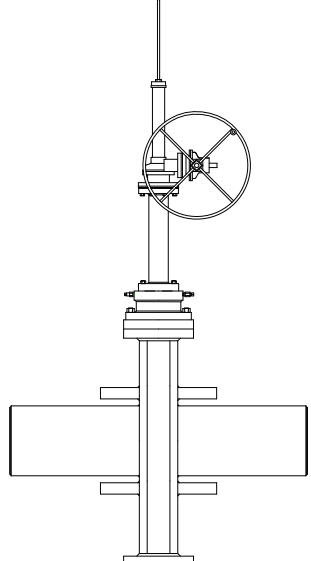
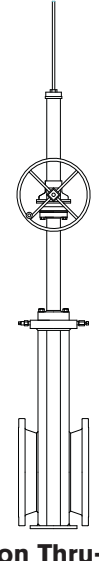
Size and Class

Performance begins with a standard body configuration practical enough for quick assembly line operation.

C303 Cast Body		M-303 Without Cupola Without Ribs		M-303 With Cupola Without Ribs		M-303 With Cupola With 4 Ribs		M-303 With Cupola With 8 Ribs	
									
Class	Size	Class	Size	Class	Size	Class	Size	Class	Size
150	2"-4"	150	6"-12"	150	14"-26"	150	28"-60"	150	O/A
300	2"-4"	300	6"-12"	300	14"-24"	300	26"-48"	300	50"-60"
400	2"-4"	400	6"-12"	400	14"-22"	400	24"-38"	400	40"-60"
600	2"-3"	600	6"-12"	600	14"-18"	600	20"-32"	600	34"-60"
900	2"-3"	900	6"-12"	900	14"-16"	900	18"-24"	900	26"-60"
1500	2"	1500	6"-10"	1500	O/A	1500	12"-24"*	1500	26"-36"

*12" only without cupola. Flanged ends available on all body configurations.

Flexible enough to handle even the toughest non-standard dimensional and pressure rating specifications.

			
Flange by Weld End	Flanged by Weld End (Venturi port)	Special Face-to-Face	RQ-8 Non Thru-Conduit Short Pattern Gate Valve

The Heart of the M-303 Thru Conduit Gate Valve Features Strong Coil Springs, Pressure Loaded Seat Rings, and a Floating Slab Gate

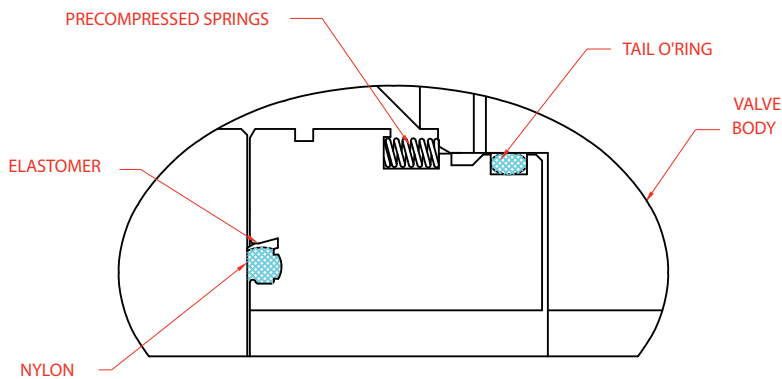
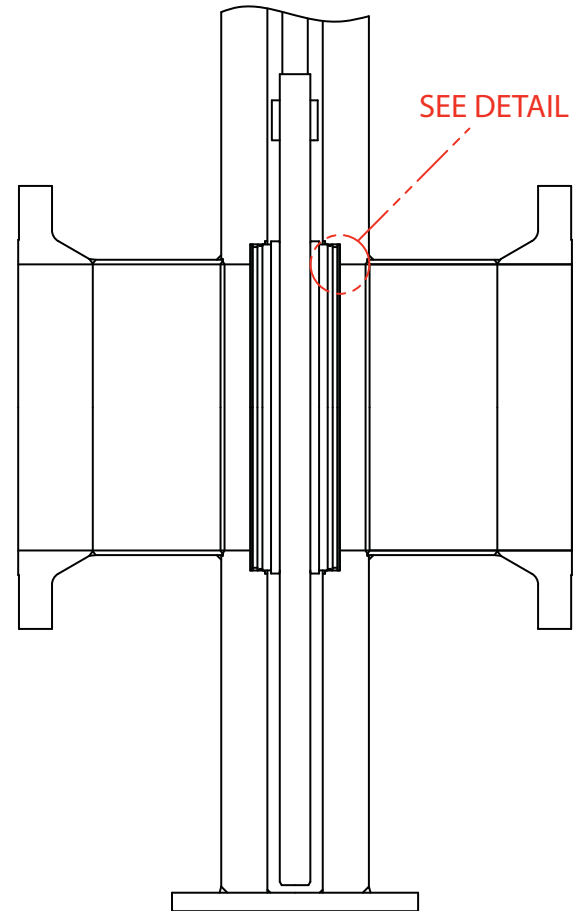


Fig. 1 Seat Ring Position In Seat Pocket After Gate Insertion.

Note: Spring contact with pocket creating additional spring compression



The strong mechanical force of spring pressure starts with the patented M&J seat ring:

- Closely spaced 20# springs are compressed into a specially tapered groove around the entire perimeter of the seat ring.
- A stainless steel band secures and protects the springs during installation and maintenance operations.
- A tail “o” ring seals against fluid and pressure leaking past the seat ring. It also serves as a piston seal allowing the seat ring to become pressure energized.
- A patented nylon/elastomer seal in the same face groove acts as a primary seal in both high and low pressure differential.
- Nylon acts as a high pressure seal and as a resilient load bearing protective surface (preventing metal-to-metal contact) during gate travel.
- Elastomer doubles as a low pressure seal and as a soft wipe to prevent gate scoring by extraneous foreign particles.
- A strong mechanical force, it can maintain a seal while undergoing a sustained 5 psi air seat test.
- A durable mechanical force, it will not lose strength with time.

For low pressure and differential service, the M&J seat rings are mechanically energized when the floating slab gate is assembled into the M-303 valve body. As the gate penetrates downward, the seat rings are pushed back into their seat pockets causing the precompressed springs to engage the recessed seat pocket walls. Instantly, a uniform mechanical force is exerted around the entire (360°) sealing surface of the seat rings as they press to the face of the gate.

Performance is the ability of the M-303 to seal upstream and downstream under a low (5 psi) pressure differential test.
IN ANY SIZE-IN ANY CLASS.

You can calculate it.

Using a 30” Class 150 M-303:

$$\text{TOTAL SPRING FORCE BEHIND THE SEAT RING} = \frac{\text{NOMINAL PIPE SIZE}}{\text{SPRING SPACING}} \times \pi \times \text{SPRING FORCE}$$

$$= \frac{30" \times 3.146}{3/4"} \times 20\#$$

$$= 2,520\#$$

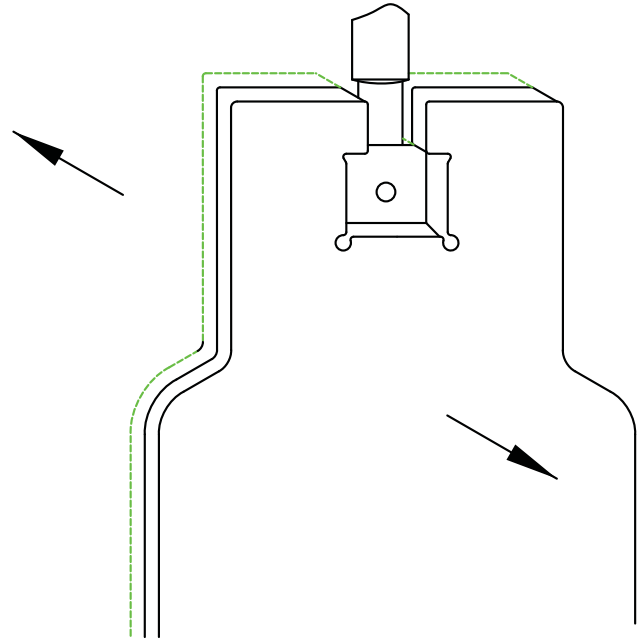
Seat Rings and Gate

The dynamic force of line pressure, harnessed by pressure-loaded seat rings and floating gate is a key feature to the sealing capability of the M-303 gate valve. Unlike trunnion-mounted ball valves, the M-303's floating slab gate is mounted on a T-bar allowing the seat rings and gate to move laterally ($1/16''$) in either direction. Pressure energized, the gate and seat rings move in unison. Like pistons, their load bearing surfaces quickly transmit the full dynamic force of line pressure to sealing areas on both sides of the gate.

An active force, line pressure works on the surface of the seat rings as well as on the flat surface of the floating gate.

A dynamic force, it increases proportionally with line pressure.

A powerful force, it can generate a downstream sealing capability unequalled by trunnion-mounted pipeline ball valves.



Surface Areas and Sealing Force Defined

With the valve in the closed position and the body bleed open, line pressure working on both sides of the M-303 floating slab gate creates two distinct areas of sealing force. The smaller area (UF_{sr_o} and DF_{sr_o}) is located on the back side of each seat ring and is shown by a line from the top of the tail "0" ring to the centerline contact point of the Nylon /Elastomer face seal. This area constitutes the flat surface of a piston -with a hole in it. When line pressure acting upon this surface exceeds those forces already generated by mechanical spring pressure, the seat ring becomes "pressure energized" and presses its sealing surface even harder against the face of the floating slab gate.

A much larger area (UF_g and DF_g) is shown by the center line to center line contact point of the nylon elastomer seal as it faces the floating slab gate. This area constitutes the surface diameter of the M-303 floating slab gate. Under high differential line pressure, the gate exerts proportionately more force on the downstream seat ring seal.

The amount of sealing force generated by line pressure acting upon the surface of the M-303 seat rings and floating slab gate can be easily computed:

Example: A 30" Class 150 M-303 thru-conduit gate valve

S = Outside diameter of the Seal ring 32 1/2"

G = Diameter of the seat seal against the flat surface of the Mating slab Gate = 30"

LP = Working Pressure

u = Upstream = 275 psi

d = Downstream = 10 psi

Upstream Force- seat ring - body bleed open

$$UF_{sr_o} = \frac{\pi}{4} (S^2 - G^2) Pu$$

Upstream Force-gate

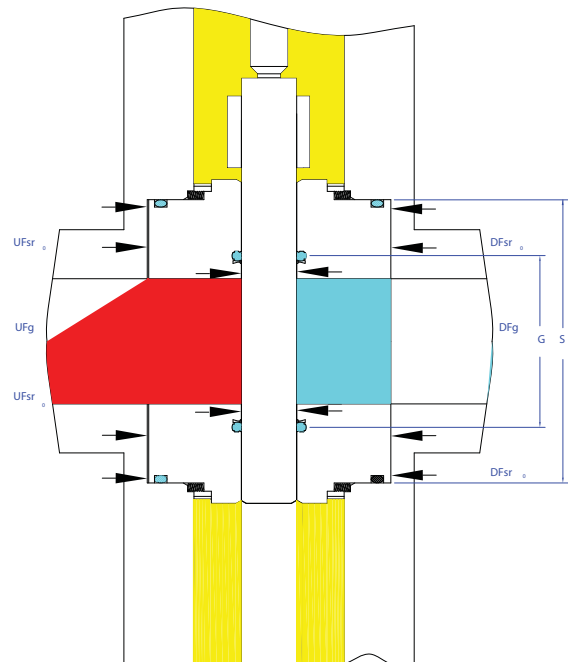
$$UF_g = \frac{\pi}{4} (G^2) Pu$$

Downstream Force-seat ring - body bleed open

$$DF_{sr_o} = \frac{\pi}{4} (S^2 - G^2) Pd$$

Downstream Force - gate

$$DF_g = \frac{\pi}{4} (G^2) Pd$$

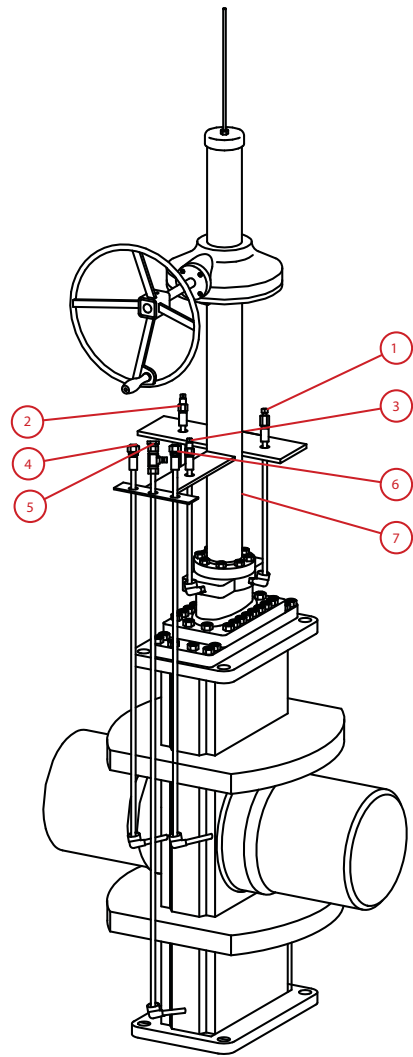


In addition to selecting operator options, M & J customers can request the following accessory items for buried service.

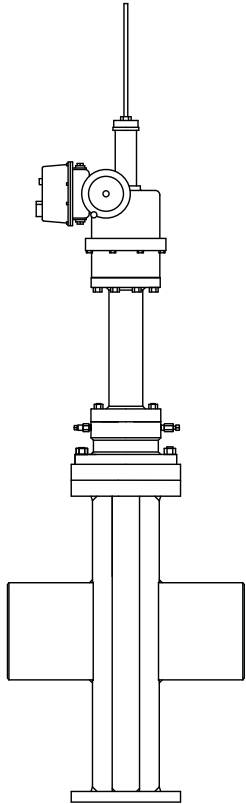
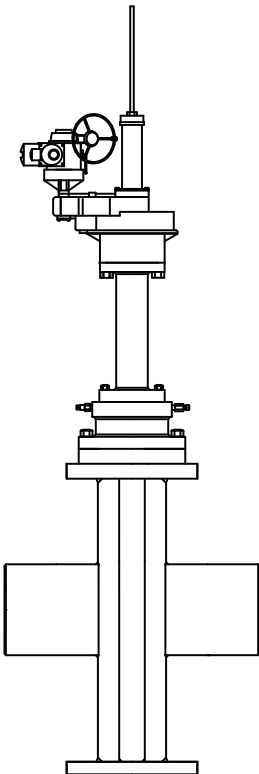
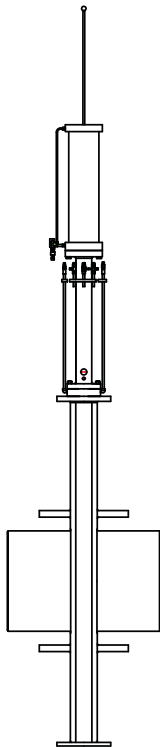
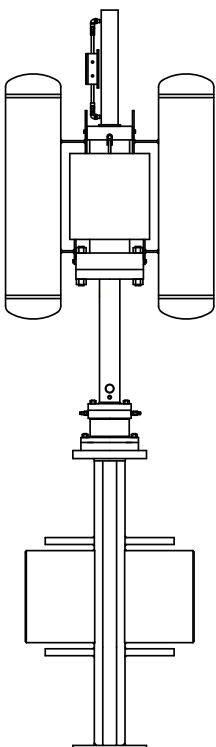
EXTENDED PIPING* FOR

1. Stem packing injector
2. Body pressure relief valve
3. Stem packing release valve
4. Secondary grease fitting-upstream seat
5. Pipe plug (body drain)
6. Secondary grease fitting-downstream seat
7. Yoke tube

*Parts are manufactured to customer specification based on the centerline of bore to operator mounting flange.



Electric/Hydraulic Operators

 <p>Top Mounted Electric Motor operator</p>	 <p>Side Mounted Electric Operator (Operated thru Bevel or Worm Gear)</p>	 <p>Top Mounted Hydraulic Cylinder Operator (Piston Rod Replaces Stem and is Directly Coupled to Gate)</p>	 <p>Top Mounted Hydraulic Cylinder Operator; Normally Mounted on Top of Yoke</p>
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Failclose Valves

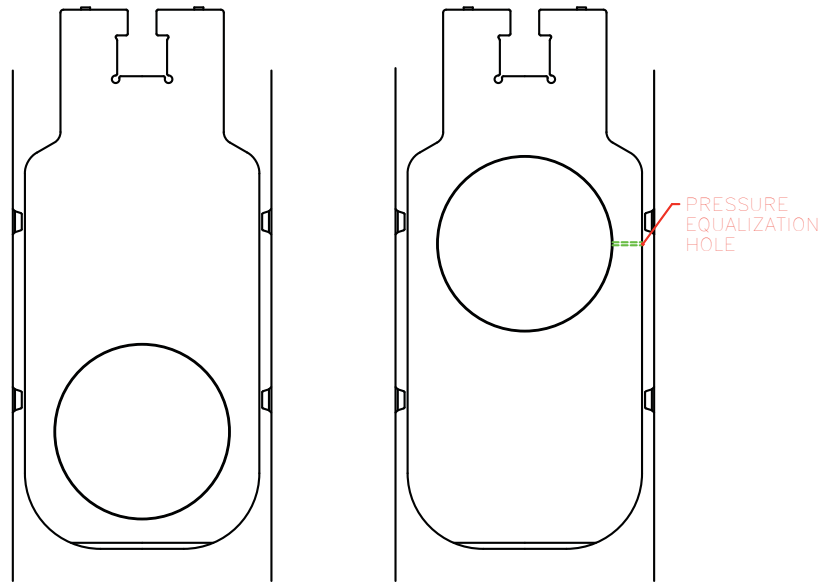
M&J reverse acting gate valves vary from our standard gate valve only in that the hole is bored in the opposite end of the gate. This means the gate moves upward to close. M&J reverse acting gate valves are job-matched with safety/fail-close actuators to make a perfect safety valve system.

To open the valve, actuators are powered by line pressure or external hydraulic or pilot air/gas.

To close the valve, pilot vents actuator pressure and a coil steel spring moves the gate upward.

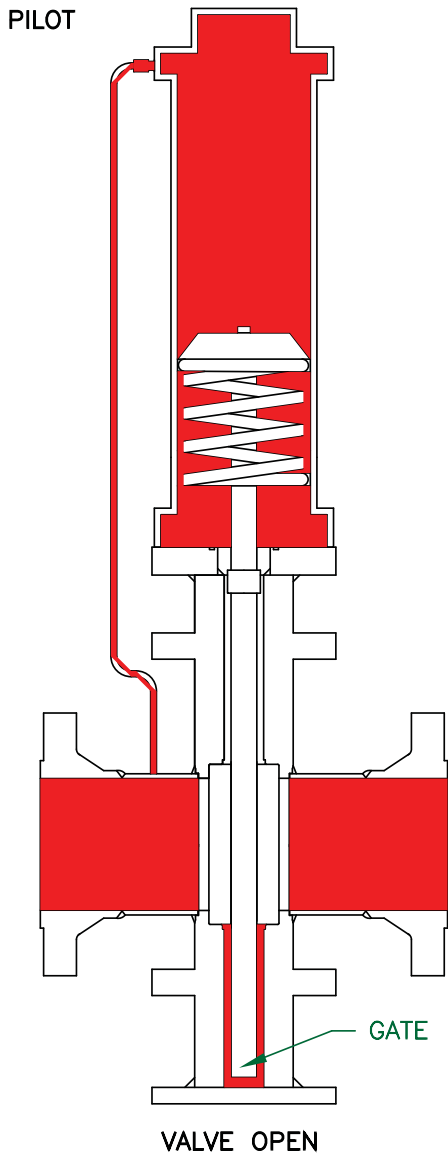
Line pressure in the valve under the stem assists the upward movement of the gate.

M&J reverse acting gate valves have the same tight shutoff and excellent delivery as standard M&J gate valves.

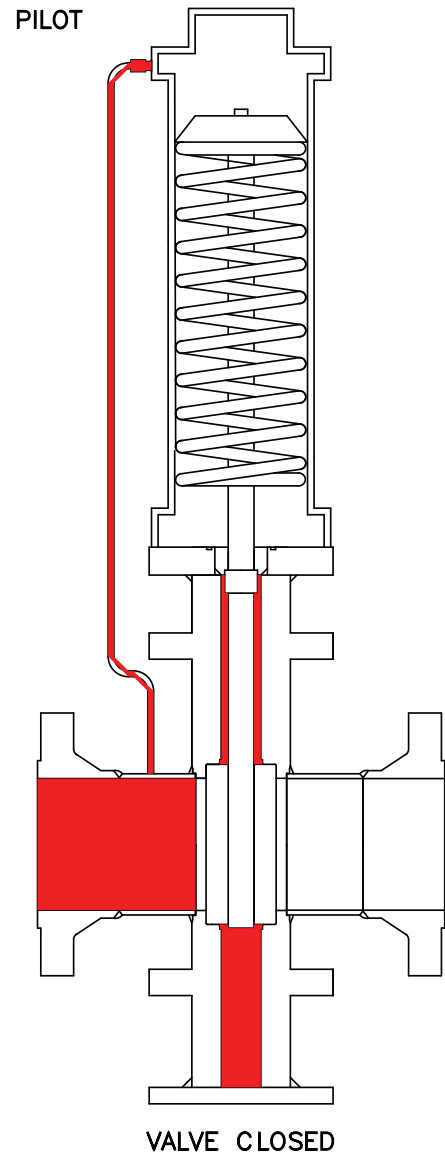


Regular Gate

Reverse Gate



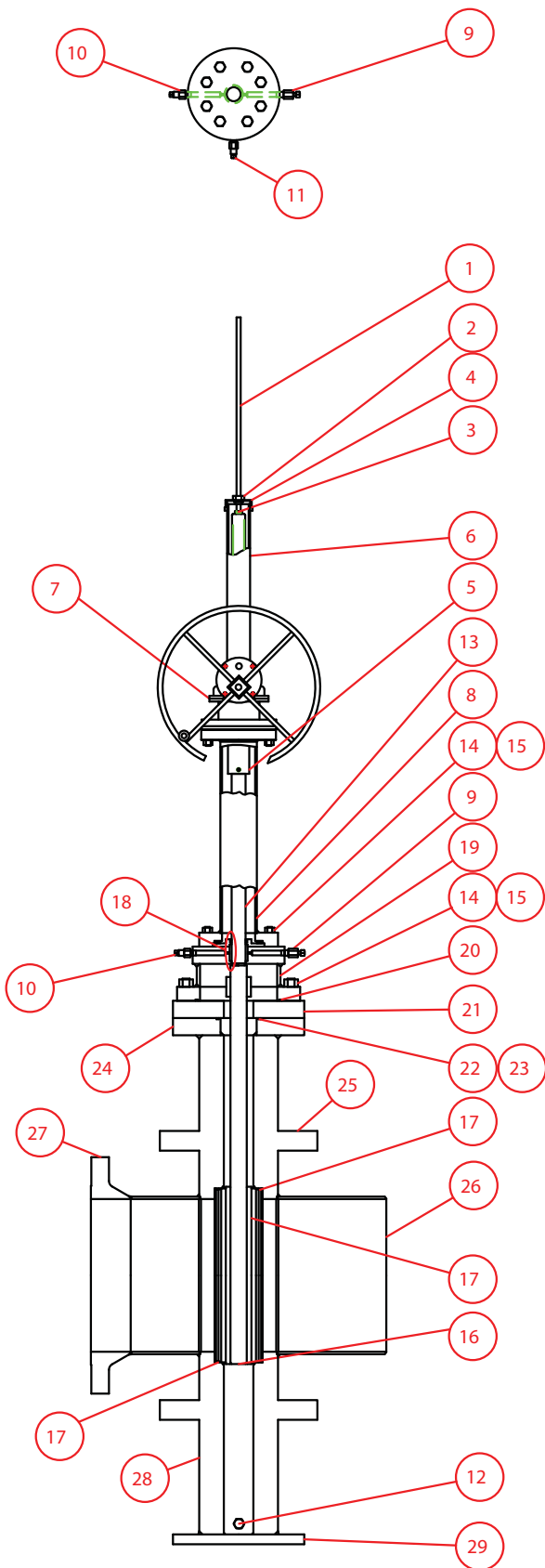
VALVE OPEN



VALVE CLOSED

Standard Materials of Construction*

M-303 Thru-Conduit Gate Valve with Cupola and Ribs



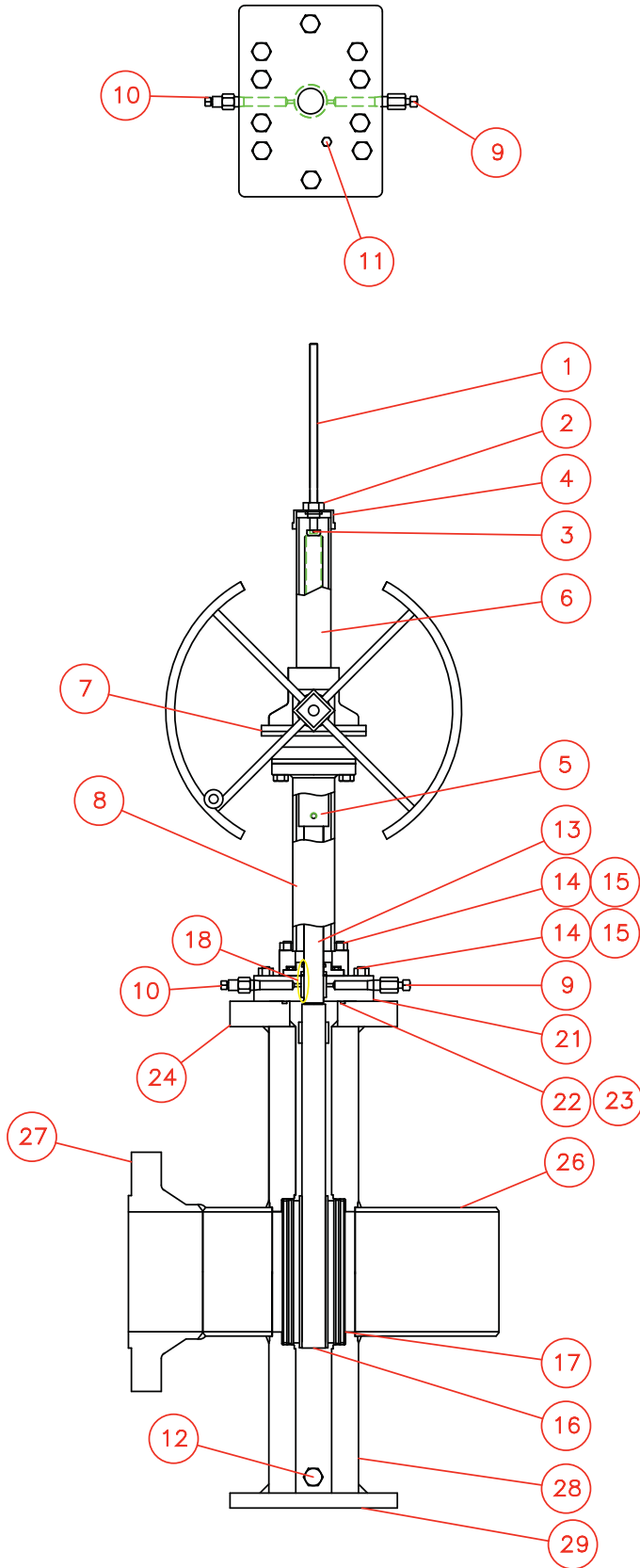
	Regular Service -20°F to +150°F (-29°C to +121°C)	Low Temperature -50°F to +150°F (-46°C to +121°C)
1. Position Indicator Rod	304SS	304SS
2. Indicator Rod Seal Assembly	TFE	TFE
3. Pin	LC Steel	LC Steel
4. Stem Protector Cap	Malleable Iron	Malleable Iron
5. Downstop Coupling	1018 CF	1018 CF
6. Stem Protector	ASTM A 53	ASTM A 53
7. Bevel Gear Assembly		
8. Yoke	ASTM A106B- API-5L	ASTM A333Gr.6 or API 5L
9. Packing Injector	1215	4140
10. Stem Packing Release Valve (1/2")	12 L 14	1018
11. Body Pressure Bleed Valve (1/2")	12 L 14	1018
12. Body Drain Plug	ASTM A105 Cl. 2	ASTMA182-F304 or ASTMA350-LF2
Trim Parts		
13. Stem Assembly	AISI 4140 Electroless Nickel Coated	AISI 4140 Heat Treated & Electroless Nickel Coated
14. Studs	ASTM A193 B7	ASTM A320 L7
15. Hex Nuts	ASTM A194 2H	ASTM A194 2H
16. Gate	ASTM A36 Coated*	ASTM A516 Gr. 70
17. Seat Rings	ASTM A36 Coated*	ASTM A516 Gr. 70 or A350LF2
Springs	302 SS	302 SS
Seat Seals	Viton/Nylon	LT Nitrile
"O" Rings	Viton	LT Nitrile
Other Pressure/Temperature Related Parts		
18. Stem Packing	Viton	Graphite
19. Cupola	ASTM A106, 5LX A36 or A537 Cl.1	ASTM A333 Gr. 6 or A516 Gr. 70
20. Cupola Gasket	Viton	Low Temp Nitrile
21. Bonnet	ASTM A36	ASTM A516 Gr. 70
22. Bonnet Gasket	Viton	Low Temp Nitrile
23. Bonnet Gasket Retainer	N/A	N/A
24. Bolting Flange	ASTM A36	ASTM A516 Gr. 70
25. Ribs**	ASTM A36	ASTM A516 Gr. 70
26. Transition Pipe	API 5LX or A381Y50	ASTM A333 Gr. 6, API 5L, or A381Y50
27. Flanges (RF or RTJ)	ASTM A105	ASTM A350 LF2
28. Body Tube	ASTM A36	ASTM A516 Gr. 70
29. Bottom Plate	ASTM A36	ASTM A516 Gr. 70

*Electroless Nickel or POLYIMIDE: A baked-on fluoropolymer (thermoplastic resin) formulations designed for applications where operating conditions require a non-stick, abrasive resistant, self-lubricating surface within a temperature range of -50°F to + 500°F. Excellent resistance to fluids, both fuel and lubricant, and to a great many alkalis, acids, and waste effluents.

**Number of ribs vary with size and pressure class.

Standard Materials of Construction*

M-303 Thru-Conduit Gate Valve without Cupola and without Ribs

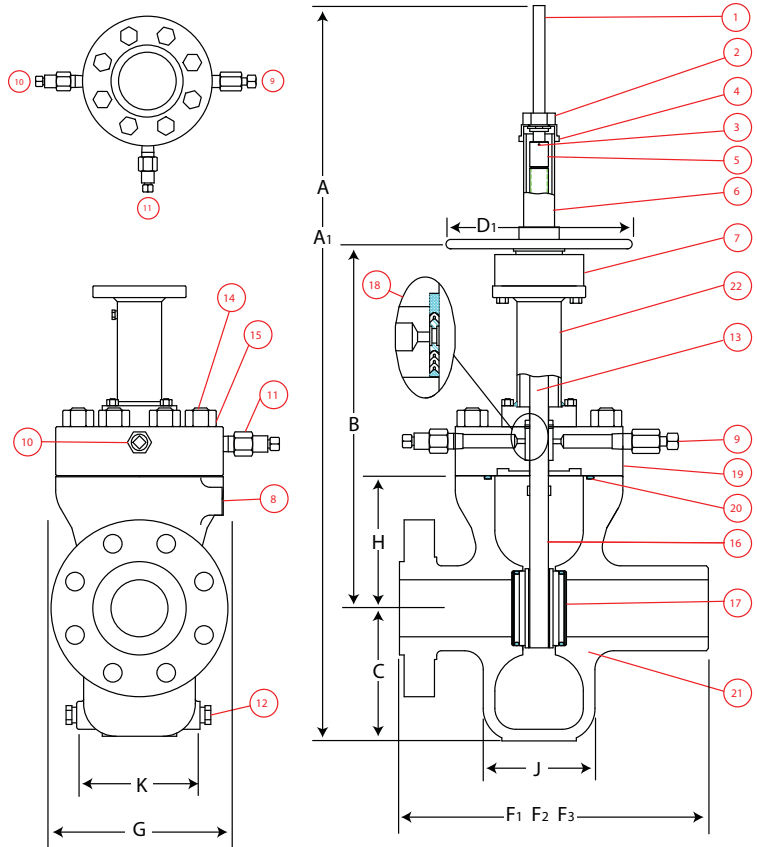


	Regular Service -20°F to +150°F (-29°C to +121°C)	Low Temperature -50°F to +150°F (-46°C to +121°C)
1. Position Indicator Rod	304SS	304SS
2. Indicator Rod Seal Assembly	TFE	TFE
3. Pin	LC Steel	LC Steel
4. Stem Protector Cap	Malleable Iron	Malleable Iron
5. Downstop Coupling	1018 CF	1018 CF
6. Stem Protector	ASTM A 53	ASTM A 53
7. Bevel Gear Assembly		
8. Yoke	ASTM A106B- API-5L	ASTM A333Gr.6 or API 5L
9. Packing Injector	1215	4140
10. Stem Packing Release Valve (1/2")	12 L 14	1018
11. Body Pressure Bleed Valve (1/2")	12 L 14	1018
12. Body Drain Plug	ASTM A105 Cl. 2	ASTMA182-F304 or ASTMA350-LF2
Trim Parts		
13. Stem Assembly	AISI 4140 Electroless Nickel Coated	AISI 4140 Heat Treated & Electroless Nickel Coated
14. Studs	ASTM A193 B7	ASTM A320 L7
15. Hex Nuts	ASTM A194 2H	ASTM A194 2H
16. Gate	ASTM A36 Coated*	ASTM A516 Gr. 70
17. Seat Rings	ASTM A36 Coated*	ASTM A516 Gr. 70 or A350LF2
Springs	302 SS	302 SS
Seat Seals	Viton/Nylon	LT Nitrile
"O" Rings	Viton	LT Nitrile
Other Pressure/Temperature Related Parts		
18. Stem Packing	Viton	Graphite
19. Cupola	ASTM A106, 5LX A36 or A537 Cl.1	ASTM A333 Gr. 6 or A516 Gr. 70
20. Cupola Gasket	Viton	Low Temp Nitrile
21. Bonnet	ASTM A36	ASTM A516 Gr. 70
22. Bonnet Gasket	Viton	Low Temp Nitrile
23. Bonnet Gasket Retainer	N/A	N/A
24. Bolting Flange	ASTM A36	ASTM A516 Gr. 70
25. Ribs	ASTM A36	ASTM A516 Gr. 70
26. Transition Pipe	API 5LX or A381Y50	ASTM A333 Gr. 6, API 5L, or A381Y50
27. Flanges (RF or RTJ)	ASTM A105	ASTM A350 LF2
28. Body Tube	ASTM A36	ASTM A516 Gr. 70
29. Bottom Plate	ASTM A36	ASTM A516 Gr. 70

*Electroless Nickel or POLYIMIDE: A baked-on fluoropolymer (thermoplastic resin) formulations designed for applications where operating conditions require a non-stick, abrasive resistant, self-lubricating surface within a temperature range of -50°F to + 500°F. Excellent resistance to fluids, both fuel and lubricant, and to a great many alkalies, acids, and waste effluents.

C-303

	Regular Service -20°F to +150°F (-29°C to +121°C)	Low Temperature -50°F to +150°F (-46°C to +121°C)
1. Position Indicator Rod	304SS	304SS
2. Indicator Rod Seal Assembly	TFE	TFE
3. Cotter Pin	Steel	Steel
4. Stem Protector Cap	Malleable Iron	Malleable Iron
5. Downstop Bolt	AISI 1018	AISI 1018
6. Stem Protector	Malleable Iron	Malleable Iron
7. Handwheel Assembly	A536/1018	A536/1018
8. ½" NPT	ASTM A105	ASTM A182 F304 or ASTM A350-LF2
9. Packing Injector	1018CF	1018CF
10. Stem Packing Release Valve (½")	12 L 14	316SS
11. Body Pressure Bleed Valve (½")	12 L 14	316SS
12. Body Drain Plug (½")	ASTM A105	ASTMA182-F304 or ASTMA350-LF2
Trim Parts		
13. Stem Assembly	AISI 4140 Heat Treated Electroless Nickel Coated	AISI 4140 Heat Treated Electroless Nickel Coated
14. Studs	ASTM A193 B7	ASTM A320 L7
15. Hex Nuts	ASTM A194 2H	ASTM A194 Gr. 4
16. Gate	ASTM A-216 WCC/ A36	ASTM A-352 LCC/ 516
17. Seat Rings	AISI 1018	AISI 1018
Wave Springs	Carbon Steel	Inconel
Seat Seals	Viton	L. T. Buna N
"O" Rings	Viton	L. T. Buna N
Other Pressure/Temperature Related Parts		
18. Stem Packing	Viton	Graphite
19. Bonnet	ASTM A36	ASTM A-516 Gr. 70
20. Bonnet Gasket	Viton	L. T. Buna N
21. Body	ASTM A-216 WCC	ASTM A-352 LCC Gr.6
22. Yoke	A-516/x-52	A-516/A333



C-303 Dimensions & Weights

Valve Size	A Open	A1 Close	B	C	D1 HWO	D2 BGO	E	F1 FE	F2 WE	F3 RTJ	G	H	J	K	BGO Ratio	Weight Flanged Ends Lbs/kg	Weight Weld Ends Lbs/kg
ANSI 150																	
2	in	35.18	32.31	18.44	5.50	10	-	7	8.5	7.5	8	6	2.5	5.25	-	155	145
	mm	893.8	820.7	468.3	139.7	254.0	-	177.8	215.9	190.5	203.2	152.4	63.5	133.3	-	70.3	65.8
3	in	39.25	35.63	19.56	6.63	10	-	8	11.13	8.5	8	7.12	2.5	5.75	-	170	150
	mm	997.0	904.9	496.9	168.1	254.0	-	203.2	282.7	215.9	203.2	181	63.5	146.1	-	77.1	68
4	in	50	44.5	-	9.63	13.00	-	9	12	9.5	-	10.63	3.75	8.25	-	270	270
	mm	1270	1130.3	-	244.6	330.2	-	228.6	304.8	241.3	-	270	95.25	209.5	-	122.5	122.5
ANSI 300																	
2	in	35.18	32.31	18.44	5.63	10	-	8.5	8.5	9.12	8	6	2.75	5.5	-	155	145
	mm	893.8	820.7	468.3	142.9	254.0	-	215.9	215.9	213.8	203.2	152.4	69.9	139.7	-	70.3	65.8
3	in	39.25	35.63	19.56	6.82	10	-	11.13	11.13	11.75	9	7.13	6	6.63	-	170	150
	mm	997.0	904.9	496.9	173.0	254.0	-	282.6	282.6	298.5	228.6	181	152.4	168.3	-	77.1	68
4	in	50	44.5	23.63	9.63	13.00	-	12	12	12.63	11	10.63	4.25	8.25	-	305	305
	mm	1270	1130.3	587.5	244.6	330.2	-	304.8	304.8	320.8	279.4	270	108	209.5	-	138.3	138.3
ANSI 600																	
2	in	35.18	32.31	18.44	5.63	10	-	11.5	11.5	11.63	8	6	2.75	5.5	-	160	150
	mm	893.8	820.7	468.3	142.9	254.0	-	292.1	292.1	295.3	203.2	152.4	69.9	139.7	-	72.6	68
3	in	39.25	35.63	19.56	6.82	10	-	14	14	14.13	9	7.13	6	6.63	-	180	160
	mm	997.0	904.9	496.9	173.0	254.0	-	355.6	355.6	358.8	228.6	181	152.4	168.3	-	81.6	72.6
4	in	50	44.5	23.63	9.63	13.00	-	17	17	17.13	11	10.63	8	8.5	-	400	400
	mm	1270	1130.3	600.2	244.6	330.2	-	431.8	431.8	435.1	279.4	270	203.2	215.9	-	181.4	181.4
ANSI 900																	
2	in	35.18	32.31	18.44	5.63	10	-	14.5	14.5	14.63	8.75	6	2.75	6.25	-	195	160
	mm	893.8	820.7	468.3	142.9	254.0	-	365.8	365.8	371.5	222.3	152.4	69.9	158.8	-	88.5	72.6
3	in	39.25	35.63	19.56	6.82	10	-	15	15	15.13	9	7.13	6	6.63	-	210	175
	mm	997.0	904.9	496.9	173.0	254.0	-	381	381	384.2	228.6	181	152.4	168.3	-	95.3	79.4
4	in	56.88	51.38	23.63	9.94	13.00	-	18	18	18.13	11	10.63	8.63	9	-	500	500
	mm	1444.7	1305.1	600.2	252.5	330.2	-	457.2	457.2	460.5	279.4	270	219.2	228.6	-	226.8	226.8
ANSI 1500																	
2	in	35.56	32.69	18.44	6	13	-	14.5	14.5	14.63	10	6	6	6.38	-	230	185
	mm	903.3	830.1	468.3	152.4	330.2	-	365.8	365.8	371.5	254.0	152.4	152.4	161.9	-	104	83.9
3	in	39.75	36.13	19.56	7.31	13	-	18.5	18.5	18.63	10	7.13	6.88	7.25	-	260	195
	mm	1009.7	917.6	469.9	177.8	330.2	-	469.9	469.9	465.8	254	181	174.6	184.1	-	118	88.5
ANSI 2500																	
2	in	36.19	33.31	18.44	6.63	13	-	17.75	17.75	17.88	10.88	6	7.25	7.63	-	310	250
	mm	919.9	846.1	468.1	168.3	330.2	-	450.9	450.9	454	276.2	152.4	184.2	193.7	-	140.6	113.4
3	in	49	45.38	21	7.56	-	12	22.75	22.75	23	13.38	7.13	7.38	7.5	4:1	375	260
	mm	1244.6	1152.5	533.4	192.1	-	304.8	577.9	577.9	584.2	339.7	181	187.3	190.5	4:1	170.1	117.9

Notes



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