



Chemical Composition

ASTM A351 gr. CF8M 316 Stainless Steel

C	Cr	Mn	Mo	Ni	P	S	SI
MAX		MAX			MAX	MAX	MAX
0.035	16.0 - 20.0	2.00	2.0 - 3.0	10.0 - 15.0	0.040	0.030	0.75

ASTM A351 gr. CF3M 316L low carbon Stainless Steel

C	Cr	Mn	Mo	Ni	P	S	SI
MAX		MAX			MAX	MAX	MAX
0.03	16.0 - 20.0	2.00	2.0 - 3.0	10.0 - 15.0	0.040	0.030	0.75

ASTM A351 gr. CF8 304 Stainless Steel

C	Cr	Mn	Ni	P	S	SI
MAX		MAX		MAX	MAX	MAX
0.08	18.0 - 20.0	2.0	8.0 - 13.0	0.040	0.030	0.75

ASTM A351 gr. CF3 304L Low carbon Stainless Steel

C	Cr	Mn	Ni	P	S	SI
MAX		MAX		MAX	MAX	MAX
0.03	18.0 - 20.0	2.0	8.0 - 13.0	0.040	0.030	0.75

ASTM A351 gr. CN7M Alloy 20

C	Cb	Cr	Cu	Mn	Mo	Ni	P	S	SI	Ta
MAX	8 times			MAX			MAX	MAX	MAX	8 times
0.07	Carbon-1.00	19.0-21.0	3.0-4.0	2.0	2.0-3.0	32.0-38.0	0.045	0.035	1.0	Carbon-1.00

ASTM A296 gr. CW-12M Hastelloy C

C	Co	Cr	Fe	Mn	Mo	Ni	P	S	Si	V	W
MAX	MAX			MAX			MAX	MAX	MAX	MAX	
0.01	2.5	14.5-16.5	4.0-7.0	1.0	15.0-17.0	BAL	0.04	0.03	0.08	0.35	3.0-4.5

ASTM A296 gr. M-35 Monel

C	Cb	Cr	Cu	Mn	Mo	Ni	P	S	SI	Ta
MAX	8 times			MAX			MAX	MAX	MAX	8 times
0.07	Carbon-1.00	19.0-21.0	3.0-4.0	2.0	2.0-3.0	32.0-38.0	0.045	0.035	1.0	Carbon-1.00

ASTM A216 gr. WCB Carbon Steel

C	Co	Cr	Fe	Mn	Mo	Ni	P	S	Si	V	W
MAX	MAX			MAX			MAX	MAX	MAX	MAX	
0.01	2.5	14.5-16.5	4.0-7.0	1.0	15.0-17.0	BAL	0.04	0.03	0.08	0.35	3.0-4.5



Actuator Sizing

The torque value required to turn a ball valve through its 90° travel.

Normal torque requirements at these five basic locations:

- A - breakopen torque: the torque required to unseat the closed valve. 100% of stated torque
- B - opening torque: the torque needed to move the valve to the fully open position. 70% of stated torque
- C - open breakout torque: the torque required to move the valve from the fully open position. 70% of stated torque
- D - closing torque: the torque required to reseat a closing valve. 85% of stated torque
- E - running torque: the torque needed to keep the ball moving through its travel. 50% of stated torque

Four Elements That Affect Ball Valve Operating Torque.

For a particular size and differential pressure, the torque values of soft seated ball valves depend on many factors. Use the torque multipliers stated below along with the selected valves stated torque as needed by your application:

Seat Material The friction force or stiction depends on the seat material

Seat Material	Seat Multiplier
15% - 25% Glass RPTFE - R seats	1.0
Virgin PTFE - T seats	.8
Carbon Graphite RPTFE - C seats	1.0
PEEK - P seats	2.5
Delrin - D seats	2.0

Fluid Influence: Torque values depend on fluid type: torque tends to be higher with dry gases or liquids with solids and lower with oils. Torque multipliers are shown in table.

Fluid	Fluid Multiplier
Gas or superheated steam, clean / dry	1.2 - 1.3
Viscous fluid	1.4 - 1.6
Liquids containing abrasive solids	1.3 - 2.0
Clean / non-lubricating	1.0
Clean / lubricating	.8

Frequency of Operation: When a valve remains in closed position for extended periods of time, the breakout torque increases.

Frequency	Frequency Multiplier
Once per day or greater	1.0
Once per week or greater	1.3
Once per month or greater	1.4
Once per 4 months or greater	1.6
Valve for key position or esd location	2.0

Temperature Influence: For operating temperature from 212°F to 425°F, use the torque multiplier given. For operating temperatures less than 0°F, consult CF factory.

$\text{Temperature Multiplier} = \text{Temp } ^\circ\text{F} / 212$
