

Material Specification for Ball Valves (Body & Trim)

Common Name	ASTM Casting	Applications	ASTM Forging
Carbon Steel	A216 – WCB / WCC	Non-Corrosive application including water, oil & Gas at temperature to -30°C to +425°C	A105 / A105N
LTCS	A352 - LCB/LCC	Low temp. applications to -46°C to +345°C	A352 - LF2
Low Alloy Steel	A217- WC6	High temp. from -28°C to +538°C to min graphitization	A182- F11
	A217 - WC9	High Temp. from -28°C to +538°C greater strength than F11	A182- F22
	A217 - CA15	Corrosive application up to +704°C	A182 - F6a
Austenitic Stainless Steel	A351 - CF8	Corrosive or high temp., non-corrosive (-268°C to +649°C), above +538°C for 0.04% carbon or higher.	A182 -F304
	A351 - CF3	Corrosive or non-corrosive services to +425°C, above +538°C for 0.04% carbon or higher.	A182 -F304L
	A351 - CF8M	Corrosive or low/high temp., non-corrosive (-268°C to +649°C), above +538°C for 0.04% carbon or higher.	A182 -F316
	A351 - CF3M	Corrosive or non-corrosive services to +425°C, above +538°C for 0.04% carbon or higher.	A182 -F316L
Alloy 20	A351- CN7M	Sulphuric Acid, Temp. -46°C to +150°C	----
Alloy 20(New)	A990 - CN3MCu	Sulphuric Acid, Temp. -46°C to +(150°C ~425°C)	----
Precipitate Hardening SS	----	High strength, modest level of corrosion, up to 300°C.	17-4PH
Ferritic-Austenitic Stainless Steel	A-890 Gr 4A	High strength, resistance to corrosion, pitting & stress corrosion in chloride media. Service to +316°C.	A182 -F51
	A-890 Gr 5A	Wear resistance, resistance to corrosion, pitting, stress, widely use in marine, oil & gas, food, chemical processing. Service to +316°C.	A182 -F53
	A-890 Gr 6A		A182 -F55
	A890-CK3MCuN	Very high strength, high resistance to corrosion, service to 316°C	A182 -F44
Aluminum Bronze	B148- C95800	Water, Oil & Gas up to +205°C. Excellent for brine, seawater & marine application.	----
	B148- C95500		----
	----	Water, Oil & Gas up to +205°C. Excellent for brine, seawater & marine application.	B62

Nickel Alloys	A484-CU5MCuC	High temperature service to +538°C	Incoloy 800
	----	High temperature service to +316°C / +648°C	Incoloy 825
	A494- M35-1	Corrosion resistance to organic acid, salt water & resistance to alkaline +400°C. Weld-able grade.	Monel K-400
	----	Resistance to sea water, acid, alkalies, corrosive to +450°C	Monel K-500
	----	Applied where corrosion properties of F316L or F317L are not adequate	904L
	A494 - CY40	High temp., strong corrosive media to +425°C	Inconel 600
	A494 - CW6MC	High temperature service, nuclear applications.	Inconel 625
	A494 - CW12M	Resistance to strong oxidation, high temp., resistance to sulphuric & phosphoric acid to +649°C	Hastalloy C-276
Titanium	B-367 Gr C2	Transition Metal. Good resistance to corrosion, low specific weight.	B-381 Gr. F2
	B-367 Gr C3		B-381 Gr. F3
<p>NOTE:-</p> <ol style="list-style-type: none"> 1) Above table is for reference, information may differ, INVACO cannot held any liability for any damages incurred due to this table. 2) For detailed information kindly refer ASME B16.34 (Pressure – Temperature ratings) & corresponding ASTM Standards. 3) Other NDE Testing is available on request, kindly refer sample Quality, Test & Inspection Plan (QAP) on Web site or contact INVACO. 			

Trim Materials:

Trim Parts for Ball valve are:-

- 1) Ball
- 2) Seat Ring
- 3) Stem &
- 4) Retainer or Seat Carrier (Trunnion Mounted Ball Valve)

BALL, STEM & RETAINER: -

Materials for Ball, Stem and Retainer or Seat Carrier is always superior to the body material i.e. for carbon steel body; material for Ball & Retainer should be stainless steel or ENP coated carbon steel. Material for Ball and Retainer should be in Casting or Forging depends on customer choice.

Stem material is always **in Forging or Bar stock** material.

SEAT RING:-

For Seat Ring material, kindly refer below section after Bolt & Nut.

Material Specification for Bolt & Nut:

Bolting Material	Nut Materials	Temperature Range	Body Material
ASTM A193 Gr. B7	ASTM A194 Gr. 2H	-40°C to +538°C	Carbon Steel
ASTM A193 Gr B7M	ASTM A194 Gr. 2HM	-50°C to +538°C	Low Alloy Steel
ASTM A320 Gr. L7	ASTM A194 Gr. 7/4	-100°C to +371°C	Low Temp. Carbon Steel
ASTM A320 Gr. L7M	ASTM A194 Gr. 7M	-75°C to +538°C	Low Temp. Carbon Steel
ASTM A193 Gr. B8	ASTM A194 Gr. 8	-200°C to +538°C	Stainless Steel
ASTM A193 Gr. B8M	ASTM A194 Gr. 8M / 8MA	-200°C to +538°C	Stainless Steel/Nickel Alloys / AL-Br / Duplex
A453 - B8 - 660 CL A	A453 - B8 - 660 CL A	-30°C to +538°C	Duplex
NOTE:- 1) Above temperature range is for BOLTING, not body materials. 2) Welding repair on Bolting is strictly not allowed. 3) Temperature range & use may vary with requirement like NACE, Impact Test. 4) For more information refer ASME B31.3, B16.34, A193, A194, A320 & A453. 5) Other Bolt & Nut material available on request. 6) VAMACO cannot hold any liability for any damages incurred to this table.			

SEAT RINGS & SEAL (O-Ring) Materials for Ball Valves:

Materials	Temperature Range		Pressure Class Range	
	Min.	Max.	Seat Rings	Seal Rings
V – PTFE	- 46°C	+200°C	Up to 300#	----
R – PTFE	- 100°C	+240°C	Up to 600#	----
Nylon6 (Devlon)	- 100°C	+140°C	Up to 2500#	----
Nylon	- 60°C	+140°C	Up to 2500#	----
Peek	- 100°C	+240°C	Up to 2500#	----
Derlin	- 45°C	+90°C	Up to 1500#	----
Viton B	- 29°C	+180°C	Up to 600#	Up to 2500#

Viton AED	- 40°C	+200°C	Up to 600#	Up to 2500#
Buna N / NBR	- 30°C	+120°C	Up to 600#	Up to 2500#
HNBR	- 40°C	+150°C	Up to 600#	Up to 2500#
Graphite	- 240°C	+560°C	----	Up to 2500#
<p>NOTE:-</p> <p>1) Above table is for reference, information may differ, VAMACO cannot held any liability for any damages incurred due to this table.</p> <p>2) Temperature & Pressure range may vary with different brands manufacturer.</p>				

Static and Dynamic Seals:-

- Graphite Packing / Gasket.
- PTFE, R-PTFE Packing.
- Spiral Wound Gasket - Soft + Metal filled (Graphite/PTFE + SS304 /SS316/ Duplex / Inconel / Monel).
- Metal Gasket (RTJ, BX, T type seal ring).
- Lip Seal (U/O type, radial or face seal).

Plating or Coatings:-

- ENP (Electro-less Nickel plating) - 25 μ to 75 μ.
- Tungsten Carbide Coating
- Chrome Carbide Coating
- Weld Overlay (Min. 3mm) - SS16 , Inconel 625
- Satellite or Hard Face