

## MAJOR VALVE BODY MATERIALS, COMPOSITIONS & APPLICATIONS

### VALVE BODY MATERIALS

The following are examples of the most common valve body material types and their applications:

#### **ASTM A351 gr. CF8M 316 Stainless Steel**

The corrosion resistant alloy Type 316 is molybdenum steel possessing improved resistance to pitting for solutions containing chlorides and other halides. In addition it provides excellent elevated temperature, tensile, creep, stress and rupture strengths.

#### **ASTM A216 gr. WCB Carbon Steel**

Standard service. Normally supplied with CR13SS/ stellite or 316SS trim. Body is externally coated for protection against weather.

#### **ASTM A216 gr. LCB**

Also for standard service with the same corrosion properties as WCB but is utilised when a lower temperature rating is required (-46°C).

#### **ASTM A351 gr. CF3M 316L Low Carbon Stainless Steel**

The use of 316L is recommended when exposure in the carbide precipitation range is unavoidable and where annealing after welding is not practical.

#### **ASTM A351 gr. CF8 304 Stainless Steel**

General purpose corrosion resistant alloy. Has low carbon content and is non-magnetic. May be susceptible to chloride stress corrosion cracking.

#### **ASTM A351 gr. CF3 304L Low Carbon Stainless Steel**

Type 304L has a carbon content of 0.035% or less. This alloy can be used in the as-welded condition without becoming susceptible to inter-granular corrosion. May be susceptible to chloride stress corrosion cracking. Commonly used where field working is employed.

#### **ASTM A351 gr. CN7M Alloy 20**

Superior resistance to stress corrosion cracking in boiling 20 to 40% sulfuric acid. Excellent general corrosion resistance to sulfuric acid. Excellent resistance to chloride stress corrosion cracking. Excellent mechanical properties and fabricability.

#### **ASTM A296 gr. CW-12M Hastelloy C**

Outstanding corrosion resistance in oxidizing environments. Excellent resistance to pitting and stress corrosion cracking and maintains corrosion resistance in weld joints.

#### **ASTM A296 gr. M-35 Monel**

Superior resistance to corrosion in many chemical applications and excellent resistance to salt water.

*See cross reference chart at this website for forged equivalents.*

## AVAILABLE VALVE BODY MATERIAL CATEGORIES

Australian Pipeline Valve valves can be manufactured in the following body materials:

- Carbon Steel
- Low Temperature Carbon Steel
- Low Alloys
- 13%Cr Stainless Steel
- Austenitic Stainless Steel
- Precipitation Hardening Stainless Steel
- Duplex & Super Duplex Stainless Steel
- Bronze
- Ni Alloys (825, 625, 718)
- Titanium

*We can manufacture exotic grades like Nickel, Super Duplex F55 and Monel (ASTM A494-M35-1), Cd4M-Cu, Hastelloy C (ASTM A-494 CW12MW), 317 (C8G8M) in short lead-time.*

*For other ANSI, ASME, ISO, API, BS, API valve related technical cross reference charts and tables relating to standards, codes, pressure, temperature, application, suitability, equivalents, body & trim materials, valve manufacturing & test standards, etc., go to the technical section of our website.*

*We manufacture valves in API600, API602, API6D, BS1868, API603, API6A and numerous other standards including Ball, Butterfly, Check, Gate, Globe, Needle and Plug valves.*

## CHEMICAL COMPOSITION

The following is the chemical composition (metallurgical requirements) of valve body materials supplied by Global Supply Line.

### ASTM A351 gr. CF8M-316 Stainless Steel

C	Cr	Mn	Mo	Ni	P	S	Si
MAX		MAX			MAX	MAX	MAX
0.08	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	2.00	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
0.035	18.0 - 20.0	2.00	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	MAX
0.07	Carbon 1.00	19.0 - 21.0	3.0 - 4.0	2.00	2.0 - 3.0	32.0 - 38.0	0.045	0.035	1.0	Carbon 1.00

### ASTM A296 gr. CW-12M Hastelloy C

Cb	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

Cb	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

For technical reference and ASTM/ASME cross reference information on stainless, duplex, chrome-moly and alloy steel used in valves & piping systems in the petrochemical and refining go to our website:-  
<http://www.australianpipelinevalve.com.au>

## MATERIAL SERVICE & SUITABILITY INDUSTRIAL VALVES

VALVE BODY	USAGE
<b>Cast Iron/Steel</b> Grey cast iron Malleable iron Nodular (SG) iron Austenitic (Ni-resist) iron	Water, steam, alkaline conditions, dry solutions, organic substances, strong sulphuric acid. Grey cast iron and carbon steel are unsuitable for use in sea water without protection (such as cathodic protection or coating). Sea water, brackish water, waste water.
<b>Stainless Steels</b> Martensitic Austenitic Duplex Super Austenitic Super Duplex	Generally good corrosion resistance to waters, alkalis, some acids and dry solvents. Oil and gas process fluids. Unsuitable for use in sea water. Type 304 unsuitable for use in sea water. Type 316 may be used in sea water but can suffer crevice corrosion unless subject to galvanic protection. Alloy 20 used for sulphuric and phosphoric acid duties. More corrosion resistant than type 316 especially to chloride SCC. Excellent corrosion resistance to a wide range of fluids including sea water, produced waters, brines, caustic and mineral acids.
<b>Copper Alloys</b> Brass	Water, steam, unsuitable for use in sea water.
<b>Bronze</b> Gunmetal Phosphor Bronze Aluminium Bronze Nickel Aluminium Bronze	Generally good corrosion resistance in waters including sea waters. Unsuitable for strong alkalis. Brackish water, sea water. NAB has good corrosion resistance in sea water. Should not be used where water is 'sour' i.e. contains hydrogen sulphide.
<b>Aluminium</b> Aluminium and Alloys	Not usually used in chemical plant.
<b>Nickel Alloys</b> Alloy 400 Alloy 625 Alloy 825 Alloy B-2 Alloy C-276	Generally good resistance to a wide range of acids and alkalis. Resistance to sea water and brine but can suffer crevice corrosion. Excellent sea water crevice corrosion resistance. Resistant to organic alkalis and salts, H <sub>2</sub> S and some acids. Principally used for HCl under reducing conditions (all strengths). Good resistance to a wide range of waters and chemicals.
<b>Titanium and Alloys</b> Tantalum	Suitable for a wide range of acids, alkalis and sea water. Poor under reducing conditions.
<b>Non Metallics</b> Glass Reinforced Plastic (GRP) Polyvinylchloride (PVC) Polypropylene PVDF, FEB, PTFE	Suitable for water, sea water. Used for acids and alkalis. Acids, alkalis, solvents and other organic substances.
<b>Ceramics</b> Sintered Solids Coatings	Used for valve balls & seats wear ring. Resistant to a wide range of fluids. Care should be taken to ensure that materials containing binders are acceptable for given duty.
<b>Linings and Coatings</b> Glass/Enamel Ebonite, natural rubber, Polypropylene PVDF, FEB, PTFE Note	All conditions except pure water, hydrofluoric acid and hot alkalis. Non-oxidising acids and alkalis. Most organic substances, acids and alkalis. Holes in linings and coatings can result in severe corrosion. It is vital that the surface be correctly prepared before coating and tested after coating.

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Valve Body Casting Trim Material R2 - AS