

# VALVE MATERIALS & SERVICE APPLICATIONS

## Valve Casting Materials

ASTM Casting Specification	Common Designation	Service Applications
ASTM A216 Grade WCB	Carbon Steel	Non-corrosive applications including water, oil and gases at temperatures between -20°F (-30°C) and +800°F (+425°C)
ASTM A352 Grade LCB	Low Temp Carbon Steel	Low temperature applications to -50°F (-46°C). Not for use above +650°F (+340°C).
ASTM A352 Grade LCB	Low Temp Carbon Steel	Low temperature applications to -50°F (-46°C). Not for use above +650°F (+340°C).
ASTM A352 Grade LC1	Low Temp Carbon Steel	Low temperature applications to -75°F (-59°C). Not for use above +650°F (+340°C).
ASTM A352 Grade LC2	Low Temp Carbon Steel	Low temperature applications to -100°F (-73°C). Not for use above +650°F (+340°C).
ASTM A352 Grade LC3	3 1/2% Nickel Steel	Low temperature applications to -150°F (-101°C). Not for use above +650°F (+340°C).
ASTM A217 Grade WC6	1 1/4% Chrome 1/2% Moly Steel	Non-corrosive applications including water, oil and gases at temperatures between -20°F (-30°C) and +1100°F (+593°C).
ASTM A217 Grade C9	2 1/4% Chrome	Non-corrosive applications including water, oil and gases at temperatures between -20°F (-30°C) and +1100°F (+593°C).
ASTM A217 Grade C5	5% Chrome 1/2% Moly	Mild corrosive or erosive applications as well as non-corrosive applications at temperatures between -20°F (-30°C) and +1200°F (+649°C).
ASTM A217 Grade C12	9% Chrome 1% Moly	Mild corrosive or erosive applications as well as non-corrosive applications at temperatures between -20°F (-30°C) and +1200°F (+649°C).
ASTM A487 Grade CA6NM	12% Chrome Steel	Corrosive application at temperatures between -20°F (-30°C) and +900°F (+482°C).
ASTM A217 Grade CA15	13% Chrome	Corrosive application at temperatures up to +1300°F (+704°C).
ASTM A351 Grade CF8M	316 SS	Corrosive or either extremely low or high temperature non-corrosive services between -450°F (-268°C) and +1200°F (+649°C). Above +800°F (+425°C) specify carbon content of 0.04% or greater.
ASTM 351 Grade CF8C	347 SS	Primarily for high temperature, corrosive applications between -450°F (-268°C) and +1200°F (+649°C). Above +1000°F (+540°C) specify carbon content of 0.04% or greater.
ASTM A351 Grade CF8	304 SS	Corrosive or extremely high temperatures non-corrosive services between -450°F (-268°C) and +1200°F (+649°C). Above +800°F (+425°C) specify carbon content of 0.04% or greater.
ASTM A351 Grade CF3	304L SS	Corrosive or non-corrosive services to +800°F (+425°C).
ASTM A351 Grade CF3M	316L SS	Corrosive or non-corrosive services to +800°F (+425°C).
ASTM A351 Grade CN7M	Alloy 20	Good resistance to hot sulfuric acid -51°F (-46°C) to +300°F (+150°C).
ASTM A990 Grade CN3MCu*	Alloy 20 (New*)	Good resistance to hot sulfuric acid to -51°F (-46°C) to 300°F~ 800°F (150°C~ 425°C).
ASTM 743 Grade M3-35-1	Monel	Weldable grade. Good resistance to corrosion by all common organic acids and salt water. Also highly resistant to most alkaline solutions to +750°F (+400°C).
ASTM A743 Grade N-12M	Hastelloy B	Is well suited for handling hydrofluoric acid at all concentrations and temperatures. Good resistance to sulphuric and phosphoric acids to +1200°F (+649°C).
ASTM A743 Grade CW-12M	Hastelloy C	Good resistance to strong oxidation conditions. Good properties at high temperatures. Good resistance to sulphuric and phosphoric acids to +1200°F (+649°C).
ASTM A743 Grade CY-40	Inconel	Very good for high temperature service. Good resistance to strongly corrosive media and atmosphere to +800°F (+425°C).
ASTM B62	Bronze	Water, oil or gas: up to 400°F (205°C). Excellent for brine and seawater service.

\* The specially controlled process of this alloy, provides castings with heat resistance near or equal to wrought grades of alloy 20, that is say 800°F (425°C) but at time of this publication this had not yet been established by ANSI B16.34.

## Common Forged Valve Materials

ASTM Designation	Description	Common Service Recommendations Body/Bonnet Material	Casting Comparison
A105(1)	Carbon Steel	General service such as oil, oil vapor, gas, steam and water at temperatures -20° to 1000°F (-28°C to 537°C).	A216-WCB
A350-LF2 CL1	Low Temperature Carbon Steel	Suitable for temperatures -50°F and not above 650°F (-46°C and not above 343°C).	A352-LCB
A182-F11 CL2	1¼% Cr, ½% Mo Alloy Steel	For high temperatures from -20° to 1100°F to minimise graphitisation (-28°C to 593°C).	A217-WC6
A182-F22 CL3 (2)	2¼ % Cr, 1% Mo Alloy Steel	For services requiring greater strength than F11 at temperatures from -20° to 1100°F (-28°C to 593°C).	A217-WC9
A182-F5	5% Cr, ½% Mo Alloy Steel	For corrosive/erosive refinery use requiring resistance at temperatures from -20° to 1100°F (-28°C to 593°C).	A217-C5
A182-F9	9% Cr, 1% Mo Alloy Steel	For services involving media with higher sulphur content to combat oxidation to 1100°F (593°C).	A217-C12
A182-F304	18% Cr, 8% Ni Stainless Steel	For corrosive services and atmospheres from -450° to 1000°F (-268° to 537°C)	A351-CF8
A182-F316	18% Cr, 8% Ni, 2% Mo Stainless Steel	For superior resistance to corrosion from -450° to 1000°F (-268° to 537°C).	A351-CF8M

(1) Permissible but not recommended for prolonged use above 800°F (425°C)

(2) Consideration should be given to the possibility of excessive oxidation (scaling) when used above 1050°F (563°C)

## Special Forged Valve Materials

Material	Description	Service Recommendations
HASTELLOY	Nickel Alloy	Good high temperature properties. Excellent corrosion resistance in hydrochloric acid.
INCONEL INCOLOY	Nickel Alloy	For high temperature service. Used for nuclear applications.
MONEL	Nickel-Copper Alloy	For corrosive service up to 842°F (450°C). Resistant to sea water, acids, alkalies.
TITANIUM	Transition Metal	Good resistance to corrosion together with low specific weight.
ASTM A182 F20	Alloy 20 - Specialty Alloy	For corrosive service such as hot sulphuric acid. Resists -49° to 600°F (-45° to 316°C).
ASTM A182 F51	Ferritic-Austenitic Stainless Steel	Very high strength, resistance to corrosion, pitting and stress corrosion in chloride media.
ASTM A182 F44	Austenitic Stainless Steel	Very high strength, high resistance to corrosion.

## Common Trim Materials

Trim Description	Application
13% Cr, Type 410 Stainless Steel	For oil and oil vapors and general services with heat treated seats and wedges.
13% Cr, Type 410 plus Hardfacing	Universal trim for general service requiring long service life up to 1100°F (593°C).*
Type 316 Stainless	For liquids and gases which are corrosive to 410 Stainless Steel, up to 1000°F (537°C).*
Monel	For corrosive service to 842°F (450°C) such as acids, alkalies, salt solutions, etc.
Alloy 20	For corrosive service such as hot acids -49° to 608°F (-45° to 320°C).
NACE	Specially treated 316 or 410 trim combined optionally with B7M Bolts and 2HM nuts to meet NACE MR-01-75 requirements.
Full Stellite	Full hard faced trim, suitable for abrasive & severe services up to 1200°F (650°C).*

\* Dependant upon base material grade.

Note: These charts are for general reference only. Australian Pipeline Valve recommends that customers' engineers analyse service requirements and specify the materials they consider optimum for their service conditions. Temperatures shown will vary depending on pressure, media type, manufacturer. Many of the body and trim material temperatures are indicative and can vary widely depending on manufacturers: - grade, form, class of valve, end connections, duration, carbon content, annealing process, impact testing, fluid type, application, etc. Note: - Body cold working pressure rating (CWP) decreases as temperature increases. Refer to ASTM P/T charts.

For technical references 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>

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.

~ SHORT LEAD TIME VALVE MANUFACTURER ~

Valve Materials Service R3 - AA