

API 600 STANDARD VALVE TRIM CONFIGURATIONS

API Trim No.	Nominal Trim	Trim Code	Stem and Other Trim Parts	Disc / Wedge Surface (J)	Seat Surface (J)	Min. (A) Seating Surface Hardness (HBW)	Seat Surface Material Type (B)	Seat Surface Typical Specification Guide			Stem / Bushing			Trim Material Grade		
								Cast	Forged	Welded (M)	Material Type (B)	Typical Specifications Type	Stem Hardness (HBW)		Backseat Bushing Hardness (HBW)	
1	410 (1)	F6	410 (13Cr) (200 - 275 HBS)	F6 (13Cr) (200 HBS)	410 (13Cr)	250	13Cr	ASTM A217 CA15	ASTM A182 F6a		13Cr	ASTM A276 t410 or ASTM A276 t420	200 (Min.), 275 (Max.)	250 (Min.)	13Cr-0.75Ni-1Mn	
2	304 (1)	304	304	304 (18Cr-8Ni)	304 (18Cr-8Ni)	Note (D)	18Cr-8Ni	N/A	ASTM A182 F304	AWS A5.9 ER304	18Cr-8Ni	ASTM A276-t304	Note (D)	Note (D)	19Cr-9.5Ni-2Mn-0.08C	
2S	304 Hardfaced	304 HFS	304	304 (18Cr-8Ni)	304 (18Cr-8Ni) + Stellite 6	350	CoCr-A (G)	N/A	ASTM A182 F304	AWS A5.9 ER304	18Cr-8Ni	ASTM A276-t304	Note (D)	Note (D)	19Cr-9.5Ni-2Mn-0.08C	
3	310	310	310 (25Cr-20Ni)	310 (25Cr-20Ni)	310 (25Cr-20Ni) Note (D)	Note (D)	25Cr-20Ni	N/A	ASTM A182 F310	AWS A5.9 ER310	25Cr-20Ni	ASTM A276-t310	Note (D)	Note (D)	25Cr-20.5Ni-2Mn	
4	410 Hard (Hard F6)	F6 H	410 (13Cr) (200 - 275 HBS)	F6 (13Cr) (200-275 HBS)	F6 (13Cr)	750 (E)	Hard 13Cr	N/A	Note (F)	N/A	13Cr	ASTM A276 t410 or ASTM A276 t420	200 (Min.), 275 (Max.)	250 (Min.)	13Cr-0.75Ni-1Mn	
5	410 Full Hardfaced	F6 HF	410 (13Cr) (200 - 275 HBS)	Stellite 6 (CoCr Alloy)	Stellite 6 (CoCr Alloy)	350 (E)	CoCr-A (G)	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	13Cr	ASTM A276 t410 or ASTM A276 t420	200 (Min.), 275 (Max.)	250 (Min.)	13Cr-0.5Ni-1Mn / Co-Cr A	
5a	410 Full Hardfaced	F6 HF	410 (13Cr) (200 - 275 HBS)	Hardfaced NiCr Alloy	Hardfaced NiCr Alloy	350 (E)	Ni-Cr	N/A	N/A	Note (H)	13Cr	ASTM A276 t410 or ASTM A276 t420	200 (Min.), 275 (Max.)	250 (Min.)	13Cr-0.5Ni-1Mn / Co-Cr A	
6	410 (F6) and Cu-Ni	F6 HFS	410 (13Cr) (200 - 275 HBS)	Monel 400 (NiCu Alloy)	CA15 or CuNi	250 (J)	13Cr	ASTM A217 CA15	ASTM A182 F6a	AWS A5.9 ER410	13Cr	ASTM A276 t410 or ASTM A276 t420	200 (Min.), 275 (Max.)	250 (Min.)	13Cr-0.5Ni-1Mn / Ni-Cu	
						175 (J)	Cu-Ni	N/A	Note (K)	N/A						
7	410 (F6) Hard F6	F6 HF+	410 (13Cr) (200 - 275 HBS)	F6 (13Cr)	F6 (Hard 13Cr) or 13Cr	250 (J)	13Cr	ASTM A217 CA15	AWS A5.9 ER410	AWS A5.9 ER410	13Cr	ASTM A276 t410 or ASTM A276 t420	200 (Min.), 275 (Max.)	250 (Min.)	13Cr-0.5Ni-1Mo / 13Cr-0.5Ni-Mo	
						750 (J)	Hard 13Cr	N/A	Note (F)	N/A						
8	F6 (410) - Hardfaced	F6 HFS	410 (13Cr) (200 - 275 HBS)	410 (13Cr)	Stellite 6 (CoCr Alloy)	250 (J)	13Cr	ASTM A217 CA15	ASTM A182 F6a	AWS A5.9 ER410	13Cr	ASTM A276 t410 or ASTM A276 t420	200 (Min.), 275 (Max.)	250 (Min.)	13Cr-0.75Ni-1Mn / 0.5Co-Cr A	
						350 (J)	CoCr-A (G)	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A						
8a	F6 (410) - Hardfaced	F6 HFS	410 (13Cr) (200 - 275 HBS)	F6 (13Cr)	Hardfaced NiCr Alloy	250 (J)	13Cr	ASTM A217 CA15	ASTM A182 F6a	AWS A5.9 ER410	13Cr	ASTM A276 t410 or ASTM A276 t420	200 (Min.), 275 (Max.)	250 (Min.)	13Cr-0.75Ni-1Mn / 0.5Co-Cr A	
						350 (J)	Ni-Cr	N/A	N/A	Note (H)						
9	Monel	Monel	Monel (NiCu Alloy)	Monel 400 (NiCu Alloy)	Monel 400 (NiCu Alloy)	Note (D)	Ni-Cu Alloy	N/A	Mfg. Standard	N/A	Ni-Cu Alloy	Mfg. Standard	Note (D)	Note (D)	70Ni-30Cu	
10	316	316	316 (18Cr-Ni-Mo)	316 (18Cr-Ni-Mo)	316 (18Cr-Ni-Mo)	Note (D)	18Cr-8Ni	ASTM A351 CF8M	ASTM A182 F316	AWS A5.9 ER316	18Cr-8Ni-Mo	ASTM A276-t316	Note (D)	Note (D)	18Cr-12Ni-2.5Mo-2Mn	
11	Monel - Hardfaced	Monel HFS	Monel (NiCu Alloy)	Monel 400 (NiCu Alloy)	Monel 400 + Stellite 6	Note (D)	Ni-Cu Alloy	N/A	Mfg. Standard	N/A	Ni-Cu Alloy	Mfg. Standard	Note (D)	Note (D)	70Ni-30Cu / 0.5Co-Cr A	
						350 (J)	CoCr-A (G)	N/A	N/A	(See Trim 5 or 5a)						
12	316 - Hardfaced	316 HFS	316 (Cr-Ni-Mo)	316 (18Cr-8Ni-Mo)	316 + Stellite 6	Note (D)	18Cr-Ni-Mo	ASTM A351 CF8M	ASTM A182 F316	AWS A5.9 ER316	18Cr-8Ni-Mo	ASTM A276 t316	Note (D)	Note (D)	18Cr-12Ni-2.5Mo-2Mn / 0.5Co-Cr A	
						350 (J)	CoCr-A (G)	N/A	N/A	(See Trim 5 or 5a)						
13	Alloy 20	Alloy 20	Alloy 20 (19Cr-29Ni)	Alloy 20 (19Cr-29Ni)	Alloy 20 (19Cr-29Ni)	Note (D)	19Cr-29Ni	ASTM A351 CN7M	ASTM B473	AWS A5.9 ERA20	19Cr-29Ni	ASTM B473	Note (D)	Note (D)	29Ni-19Cr-2.5Mo-0.07C	
14	Alloy 20 - Hardfaced	Alloy 20 HFS	Alloy 20 (19Cr-29Ni)	Alloy 20 (19Cr-29Ni)	Alloy 20 + Stellite 6	Note (D)	19Cr-29Ni	ASTM A351 CN7M	ASTM B473	AWS A5.9 ERA20	19Cr-29Ni	ASTM B473	Note (D)	Note (D)	29Ni-19Cr-2.5Mo-0.07C / 0.5Co-Cr A	
						350 (J)	CoCr-A (G)	N/A	N/A	(See Trim 5 or 5a)						
15	304 - Full Hardfaced	304 HF	304 HF (18Cr-8Ni-Mo)	304 + Stellite 6	304 + Stellite 6	350 (E)	CoCr-A (G)	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-8Ni	ASTM A276-t304	Note (D)	Note (N)	19Cr-9.5Ni-2Mn-0.08C / 0.5Co-Cr A	
16	316 - Full Hardfaced	316 HF	316 HF (18Cr-8Ni-Mo)	316 + Stellite 6	316 + Stellite 6	350 (E)	CoCr-A (G)	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-8Ni-Mo	ASTM A276-t316	Note (D)	Note (N)	18Cr-12Ni-2.5Mo-2Mn / Co-Cr-Mo	
17	347 - Full Hardfaced	347 HF	347 HF (18Cr-10Ni-Cb)	347 + Stellite 6	347 + Stellite 6	350 (E)	CoCr-A (G)	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-10Ni-Cb	ASTM A276-t347	Note (D)	Note (N)	18Cr-10Ni-Cb / Co-Cr A	
18	Alloy 20 - Full Hardfaced	Alloy 20 HF	Alloy 20 (19Cr-29Ni)	Alloy 20 + Stellite 6	Alloy 20 + Stellite 6	350 (E)	CoCr-A (G)	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	19Cr-29Ni	ASTM B473	Note (D)	Note (N)	19 Cr-29Ni / Co-Cr A	
19	Nickel (1)					Note (D)	Ni Alloy	Mfg. Standard (1)	Mfg. Standard (1)	Mfg. Standard	Ni Alloy (1)	Mfg. Standard (1)	Note (D)	Note (N)		
19a	Alloy 625					Note (D)	Alloy 625	ASTM A494 CW6MC	ASTM B564 UNS N06625	AWS A5.14 ERNiCrMo-3	Alloy 625	ASTM B564 UNS N06625	Note (D)	Note (N)		
19b	Alloy C276					Note (D)	Alloy C276	ASTM A494 CW2M	ASTM B564 UNS N10276	AWS A5.14 ERNiCrMo-4	Alloy C276	ASTM B564 UNS N10276	Note (D)	Note (N)		
19c	Alloy 825					Note (D)	Alloy 825	ASTM A494 CU5MCuC	ASTM B564 UNS N08825	AWS A5.14 ERNiCrMo-5	Alloy 825	ASTM B564 UNS N08825	Note (D)	Note (N)		
20	Nickel (1) and Hardfaced					Note (D)	Ni Alloy	Mfg. Standard (1)	Mfg. Standard (1)	AWS A5.13 ECoCr-A or AWS A5.21 ECoCr-A	Ni Alloy (1)	Mfg. Standard (1)	Note (D)	Note (N)		
						350 (J)	CoCr-A (G)	N/A	N/A							
20a	Alloy 625 and Hardfaced					Note (D)	Alloy 625	ASTM A494 CW6MC	ASTM B564 UNS N06625	AWS A5.14 ERNiCrMo-3	Alloy 625	ASTM B564 UNS N06625	Note (D)	Note (N)		
						350 (J)	CoCr-A (G)	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ECoCr-A						
20b	Alloy C276 and Hardfaced					Note (D)	Alloy 276	ASTM A494 CW2M	ASTM B564 UNS N10276	AWS A5.14 ERNiCrMo-4	Alloy C276	ASTM B564 UNS N10276	Note (D)	Note (N)		
						350 (J)	CoCr-A (G)	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ECoCr-A						
20c	Alloy 825 and Hardfaced					Note (D)	Alloy 825	ASTM A494 CU5MCuC	ASTM B564 UNS N08825	AWS A5.14 ERNiCrMo-3	Alloy 825	ASTM B564 UNS N08825	Note (D)	Note (N)		
						350 (J)	CoCr-A (G)	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ECoCr-A						
21	CoCr-A (CRA) Hardfaced					350 (E)	CoCr-A (G)	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ECoCr-A	Ni Alloy (1)	Mfg. Standard (1)	Note (D)	Note (N)		
Special	Bronze	Bronze	410 (13Cr)	Bronze	Bronze											
Special	Alloy 625	Alloy 625	Alloy 625	Alloy 625	Alloy 625											
NACE	Specially treated 316 or 410 trim combined with B7M bolts and 2HM nuts to meet NACE MR0175 requirements.															
Full Stellite	Full Hard faced trim, suitable for abrasive & severe services up to 1200°F (650°C).															

NOTES:

This table details standard trim materials available for API600 bolted bonnet gate valves. Including API 600 Nominal Seating Surface, Stem and Backseat Bushing or Weld-deposit Materials and Hardness.

Co - Cobalt, Cr - Chromium, Cu - Copper, Ni - Nickel, N/A - Not Applicable.

(1) API lists as obsolete but still used in the valve industry. (Trim# 1 is still used for API 600 gates as well as globe & check valves). Trim #4 replaces Trim #1. Also, even though API no longer references trim # 2, for API 603 gate, globe & check, (and in some commodity API 600 gate valves in lower classes and under 300 NB) it is still manufactured as it is specified by clients.

(A) HBW (formerly HBS) is the symbol for Brinell Hardness per ASTM E10.

(B) Free Machine grades of 13Cr are prohibited.

(C) Body and disc seat surfaces should be 250HB minimum with a 50HB minimum differential between the body and disc seat surfaces.

(D) Manufacturer's standard hardness.

(E) Differential hardness between the body and disc seat surfaces is not required.

(F) Case hardness by nitriding to a thickness of 0.13 mm (0.005 in.) minimum.

(G) AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A: This classification includes such trademark materials as Stellite 6™, Stody 6™ and Wallex 6™. For Plasma Transfer Arc Welding (PTAW) process powder with the metallurgy equivalents to UNS R30006 can also be used. CoCr-E (Stellite 21™* or equal) may be used only with purchaser approval and typical CoCr-E alloys include AWS A5.13 ECoCr-E or AWS A5.21 ERCoCr-E.

(H) Manufacturer's standard hardfacing with a maximum iron content of 25%.

(J) Hardness differential between the body and disc seat surfaces shall be the manufacturer's standard. Trim materials and base material for HF trim items, shall have a corrosion resistance and temperature limit at least equal to the valve body's corrosion resistance and pressure temperature rating.

(K) Manufacturer's standard with 30 Ni minimum.

(M) Example only.

(N) Per manufacturer's standard if not Hard faced, 250 HB minimum if Hard faced.

(O) Trim materials, including stem and base material for HF trim items, shall have a corrosion resistance and temperature limit at least equal to the valve body's corrosion resistance and pressure temperature rating.

* This term is used as an example only, and does not constitute an endorsement of this product by Profluid.

Data provided in this chart is for informational purposes only. Always consult current API publications to verify information (as of Feb 2017 API Table 8). NoteAPI600 is only designed for steel bolted bonnet gate valves and specific hardness requirements. Do not literally apply to globe & check valves. Profluid recommend that customer's engineers analyse service requirements and specify the materials they consider optimum for their service conditions. Temperatures shown will vary depending on service applications, pressure and media type.

The API 600 trim chart specifications are primarily designed for API 600 gate valves. For API603 gate valves as well as globe valves and check valves, the same trim numbers are more loosely applied (API603 does not reference a trim chart as of 2017). In regard to globe and check valve, the hardness differentials shown above on the disc and seat aren't mandatory by many end users (and manufacturers are not required to follow the latest version of API 600 unless client requires it) as wear, galling, sticking etc., is not such an issue with globe & check valves. In large parts of the world globe valves and check valves are ordered as BS 1873 & BS 1868 not API (BS spec is now converted to ISO specification). However, major manufacturers like Profluid manufacture globe valves to API 623 & swing check valves to API 594. Check valves are also manufactured to API 6D specifications. In regard to API 602, the same identical trim chart is specified in the latest version of API 602. Once again, for globe and check valves traditionally the BS specification (now ISO specification) has been adopted by many manufacturers.

TRIM SERVICE APPLICATIONS AND OLD BS DESIGNATION

API Trim No.	Service	Old BS Designation
1*	For oil and oil vapors and general services with heat treated seats and wedges. General very low erosive or non-corrosive service between -100°C and 320°C. This stainless steel material lends itself readily to hardening by heat treatment and is excellent for contacting parts such as stems, gates, and discs. Steam, gas & general service to 370°C. Oil & Oil vapor 480°C.	Cr13
2*	For moderate pressure in corrosive, low erosive service between -265°C and 450°C.	18-8Ti
3	For moderate pressure in corrosive or non corrosive service between -265°C and 450°C.	25-20
4	Seats 275 BHS min. As trim 1 but for medium pressure and more corrosive service.	HF
5	High pressure slightly erosive and corrosive service between -265°C and 650°C and higher pressure. Premium trim service to 650°C. Excellent for high pressure water and steam service.	HF
5a	As trim 5 where Co is not allowed.	HF
6	As trim 1 and more corrosive service.	Cr and Cu-Ni
7	Seats 750 BHN min. As trim 1 but for higher pressure and more corrosive/erosive service.	Cr and Cu-Ni
8	Universal trim for general service requiring long service life up to 593°C. As trim 5 for moderate pressure and more corrosive service. Steam, gas & general service to 540°C. Standard trim for gate valves.	Cr + HF
8a	As trim 5a for moderate pressure and more corrosive service.	Cr + HF
9	For corrosive service to 450°C such as acids, alkalies, salt solutions, etc. Very corrosive fluids. Erosive-corrosive service between -240°C and 480°C. Resistant to sea water, acids, alkalies. Has excellent corrosion resistance in chlorine and alkylation service.	Ni-Cu
10	For superior resistance to corrosion for liquids and gases which are corrosive to 410 stainless steel up to 455°C. As trim 2 but a higher level of corrosive service. Provides excellent resistance to corrosive media at high temperatures and toughness for service at low temperatures. Low temperature service standard for 316SS valves.	18/10/2002
11	As trim 9 but for medium pressure and more corrosive service.	Hf-Ni
12	As trim 10 but for medium pressure and more corrosive or abrasive service.	-
13	Very corrosive service. For moderate pressure between -45°C and 320°C.	-
14	As trim 13 but for medium pressure and more corrosive service.	-
15	As trim 2 but more erosive service & higher pressure.	-
16	As trim 10 but more erosive service & higher pressure.	-
17	As trim 13 but more corrosive service & higher pressure. Combines good corrosion resistance with high temperature resistance up to 800°C.	18-8 Nb
18	As trim 13 but more corrosive service & higher pressure. Water, gas or low pressure steam to 230°C.	-
Bronze	Water, oil, gas, or low pressure steam to 232°C.	-

NOTES:
 * API lists as obsolete but still used in the valve industry. (Trim# 1 is still used for API603 gates as well as globe & check valves). Also, even though API no longer references trim# 2, for API603 gate, globe & check, (and in some commodity API600 gate valves in lower classes and under 300NB) it is still manufactured as it is specified by clients

Data provided in this chart is for informational purposes only. Always consult current API publications to verify information and trim date. Profluid recommend that customer's engineers analyse service requirements and specify the materials they consider optimum for their service conditions. Temperatures shown will vary depending on service applications, pressure and media type.

TRIM MATERIAL EQUIVALENT GRADES

Trim	UNS	Type	Grade (Forged)	ASTM (Wrought)	DIN	DIN W No.
F6	UNS S41000	13Cr	ASTM A182 F6a	ASTM A276 t410	DIN X12Cr13	1.4006
304	UNS S30400	18-8 Cr-Ni	ASTM A182 F304	ASTM A276 t304	DIN X5CrNi 18 10	1.4301
316	UNS S31600	18-8 Cr-Ni (18-10-2)	ASTM A182 F316	ASTM A276 t316	DIN X5CrNiMo 18 10	1.4401
321	UNS S32100	18 Cr-10 Ni-Ti	ASTM A182 F321	ASTM A276 t321	DIN X6CrNiTi 18 10	1.4541
347	UNS S34700	18 Cr-10 Ni-Cb	ASTM A182 F347	ASTM A276 t347	DIN X6CrNiNb 18 10	1.455
Monel	UNS N04400	67Ni-30Cu	ASTM B164 UNS N04400	ASTM B164 UNS N04400	DIN 17743	2.436
Alloy 20	UNS N08020	28Ni-19Cr-Cu-Mo	ASTM A182 F20*	ASTM B473	DIN 14500	2.466
Alloy 625	UNS N06625	60Ni-22Cr-9Mo-3.5Cb	ASTM B564 UNS N06625	ASTM B564 UNS N06625	DIN 17361	2.4865
C276	UNS N10276	54Ni-15Cr-16Mo	ASTM B564 UNS N10276	ASTM B564 UNS N10276	DIN NiMo 16 Cr 15 W	2.4819
17-4PH	UNS S17400	0C417Ni4Cu4Nb	ASTM A475 UNS S17400	ASTM A475 UNS S17400	X5CrNiCuNb17-4-4	1.4548
Stellite 6	UNS R30006	CoCr-A	SAE AMS5894		Stellite 6	

NOTES:
 * No longer listed in ASME B16.34 - 2009.