API 600/603/623/594/602 TRIM NUMBER CHART

STANDARD TRIM CONFIGURATIONS

The following table details standard trim materials available for Gate, globe & check valves†. Including Nominal Seating Surface, Stem and Backseat Bushing or Weld-deposit Materials and Hardness (where applicable).

API Trim Number	Nominal Trim	Trim code	Stem (or hinge pin) + B/S bushing Ⓟ	Disc/Wedge Surface ①	Seat surface ④	Seating Surface Hardness (HB) Minimum Ⓐ	Seat Surface Material Type Ⓑ	Seat Surface Typical Specification Guide			Stem/Bushing				Trim Material Grade
								Cast	Forged	Welded Ⓜ	Material Type Ⓑ	Typical Specifications Type	Stem Hardness (HB)	Backseat Bushing Hardness (HB)	
1	410 ①	F6	410 (13Cr) (200-275 HBN)	F6 (13Cr) (200 HBN)	F410 (13Cr)	250 Ⓒ	13-Cr	ASTM A217 (CA15)	ASTM A182 (F6a)		13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min	13Cr-0.75Ni-1Mn
2	304 ②	304	304	CF8/304 (18Cr-8Ni)	F304 (18Cr-8Ni)	Note Ⓓ	18Cr-8Ni	N/A	ASTM A182 (F304)	AWS A5.9 ER304	18Cr-8Ni	ASTM A276-T304	Note Ⓔ	Note Ⓔ	19Cr-9.5Ni-2Mn-0.08C
2S	304 - Hard faced ②	304HFS	304	F304 (18Cr-8Ni)	F304 (18Cr-8Ni)+St Gr6	350	Co-Cr A Ⓖ	N/A	ASTM A182 (F304)	AWS A5.9 ER304	18Cr-8Ni	ASTM A276-T304	Note Ⓔ	Note Ⓓ	19Cr-9.5Ni-2Mn-0.08C
3	310	310	310 (25Cr-20Ni)	F310 (25Cr-20Ni)	F310 (25Cr-20Ni) Note Ⓓ	Note Ⓓ	25Cr-20Ni	N/A	ASTM A182 (F310)	AWS A5.9 ER310	25Cr-20Ni	ASTM A276-T310	Note Ⓔ	Note Ⓔ	25Cr-20.5Ni-2Mn
4	410 - Hard (Hard F6)	F6H	410 (13Cr) (200-275 HBN)	F6 (13Cr) (200-275 HBN)	F6a (13Cr)	750 Ⓔ	Hard 13Cr	N/A	Note Ⓕ	N/A	13Cr	ASTM A276-T410 or T420	200 min 275 max	250 min	13Cr-0.75Ni-1Mn
5	410 - Full Hard faced	F6HF	410 (13Cr) (200-275 HBN)	St Gr6 (CoCr Alloy)	St Gr6 (CoCr Alloy)	350 Ⓔ	Co-Cr A Ⓖ	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min	13Cr-0.5Ni-1Mn/Co-Cr-A
5a	410 - Full Hard faced	F6HF	410 (13Cr) (200-275 HBN)	Hardf. NiCr Alloy	Hardf. NiCr Alloy	350 Ⓔ	Ni-Cr	N/A	N/A	Note Ⓗ	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min	13Cr-0.5Ni-1Mn/Co-Cr-A
6	410 (F6) and Cu-Ni	F6HFS	410 (13Cr) (200-275 HBN)	CA15/F6a (CR13)	CA15/F6a (CR13)	250 Ⓙ	13Cr	ASTM A217 (CA 15)	ASTM A182 (F6a)	AWS A5.9 ER410	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min	13Cr-0.5Ni-1Mn/Ni-Cu
						175 Ⓙ	Cu-Ni	N/A	Note Ⓚ	N/A					
7	410 (F6) Hard F6	F6HF+	410 (13Cr) (200-275 HBN)	CA15/F6a (CR13)	F6 (Hard 13Cr) or 13Cr	250 Ⓙ	13Cr	ASTM A217 (CA 15)	AWS A5.9 ER410	AWS A5.9 ER410	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min	13Cr-0.5Ni-1Mo/13Cr-0.5Ni-Mo
						750 Ⓙ	Hard 13Cr	N/A	Note Ⓕ	N/A					
8	F6 (410) - Hard faced	F6HFS	410 (13Cr) (200-275 HBN)	410 (13Cr)	St Gr6 (CoCr Alloy)	250 Ⓙ	13Cr	ASTM A217 (CA 15)	ASTM A182 (F6a)	AWS A5.9 ER410	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min	13Cr-0.75Ni-1Mn/1/2Co-Cr-A
						350 Ⓙ	Co-Cr A Ⓖ	N/A	N/A	AWS A5.13 ECo-Cr-A or AWS A5.21 ERCoCr-A					
8a	F6 (410) - Hard faced	F6HFS	410 (13Cr) (200-275 HBN)	CA15/F6a (CR13)	Hardf. NiCr Alloy	250 Ⓙ	13Cr	ASTM A217 (CA 15)	ASTM A182 (F6a)	AWS A5.9 ER410	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min	13Cr-0.75Ni-1Mn/1/2Co-Cr-A
						350 Ⓙ	Ni-Cr	N/A	N/A	Note Ⓗ					
9	Monel	Monel	Monel® (NiCu Alloy)	Monel 400® (NiCu Alloy)	Monel 400® (NiCu Alloy)	Note Ⓓ	Ni-Cu Alloy	N/A	MFG Standard	N/A	Ni-Cu Alloy	MFG Standard	Note Ⓔ	Note Ⓔ	70Ni-30Cu
10	316	316	316 (18Cr-Ni-Mo)	CF8M/T316 (18Cr-Ni-Mo)	T316 (18Cr-Ni-Mo)	Note Ⓓ	18Cr-8Ni	ASTM A351 (CF8M)	ASTM A182 (F316)	AWS A5.9 ER316	18Cr-8Ni-Mo	ASTM A276-T316	Note Ⓓ	Note Ⓓ	18Cr-12Ni-2.5Mo-2Mn
11	Monel - Hard faced	MonelHFS	Monel® (NiCu Alloy)	Monel 400® (NiCu Alloy)	Monel 400®+St Gr6	Note Ⓓ	Ni-Cu Alloy	N/A	MFG Standard	N/A	Ni-Cu Alloy	MFG Standard	Note Ⓔ	Note Ⓓ	70Ni-30Cu/1/2Co-Cr-A
						350 Ⓙ	Co-Cr A Ⓖ	N/A	N/A	See Trim 5 or 5A					
12	316 - Hard faced	316HFS	316 (Cr-Ni-Mo)	CF8M/T316 (18Cr-8Ni-Mo)	316+St Gr6	Note Ⓓ	18Cr-*Ni-Mo	ASTM A351 (CF8M)	ASTM A182 (F316)	AWS A5.9 ER316	18Cr-8Ni-Mo	ASTM A276-T316	Note Ⓓ	Note Ⓓ	18Cr-12Ni-2.5Mo-2Mn1/2Co-Cr-A
						350 Ⓙ	Co-Cr A Ⓖ	N/A	N/A	See Trim 5 or 5A					
13	Alloy 20	Alloy 20	Alloy 20 (19Cr-29Ni)	CN7M/Alloy 20 (19Cr-29Ni)	Alloy 20 (19Cr-29Ni)	Note Ⓓ	19Cr-29Ni	ASTM A351 (CN7M)	ASTM B473	AWS A5.9 ERA20	19Cr-29Ni	ASTM B473	Note Ⓔ	Note Ⓓ	29Ni-19Cr-2.5Mo-0.07C
14	Alloy 20 - Hard faced	Alloy 20HFS	Alloy 20 (19Cr-29Ni)	CN7M/Alloy 20 (19Cr-29Ni)	Alloy 20 St Gr6	Note Ⓓ	19Cr-29Ni	ASTM A351 (CN7M)	ASTM B473	AWS A5.9 ERA20	19Cr-29Ni	ASTM B473	Note Ⓔ	Note Ⓓ	29Ni-19Cr-2.5Mo-0.07C/1/2Co-Cr-A
						350 Ⓙ	Co-Cr A Ⓖ	N/A	N/A	See Trim 5 or 5A					
15	304 - Full Hard faced	304HF	304 HF (18Cr-8Ni-Mo)	304+St Gr6	304+St Gr6	350 Ⓔ	Co-Cr A Ⓖ	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-8Ni	ASTM A276-T304	Note Ⓔ	Note Ⓝ	19Cr-9.5Ni-2Mn-0.08C/1/2Co-Cr-A
16	316 - Full Hard faced	316HF	316 HF (18Cr-8Ni-Mo)	316+St Gr6	316+St Gr6	350 Ⓔ	Co-Cr A Ⓖ	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-8-Ni-Mo	ASTM A276-T316	Note Ⓔ	Note Ⓝ	18Cr-12Ni-2.5Mo-2Mn/Co-Cr-Mo
17	347 - Full Hard faced	347HF	347 HF (18Cr-10Ni-Cb)	347+St Gr6	347+St Gr6	350 Ⓔ	Co-Cr A Ⓖ	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-10Ni-Cb	ASTM A276-T347	Note Ⓔ	Note Ⓝ	18Cr-10Ni-Cb/Co-Cr-A
18	Alloy 20 - Full Hard faced	Alloy 20 HF	Alloy 20 (19Cr-29Ni)	Alloy 20+St Gr6	Alloy 20+St Gr6	350 Ⓔ	Co-Cr A Ⓖ	N/A	N/A	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	19Cr-29Ni	ASTM B473	Note Ⓔ	Note Ⓝ	19 Cr-29Ni/Co-Cr-A
19	Nickel ①					Note Ⓓ	Ni Alloy	MFG Standard ①	MFG Standard ①	MFG Standard	Ni Alloy ①	MFG Standard ①	Note Ⓔ	Note Ⓝ	
19a	Alloy 625	A625	Alloy 625 CW6MC	Alloy 625 CW6MC	Alloy 625 CW6MC	Note Ⓓ	Alloy 625	ASTM A494 (CW6MC)	ASTM B564 UNS N06625	AWS A5.14 ERNiCrMo-3	Alloy 625	ASTM B564 UNS N06625	Note Ⓔ	Note Ⓝ	
19b	Alloy C276	Alloy C276	Alloy C276/CW2M/N10276	Alloy C276/CW2M/N10276		Note Ⓓ	Alloy C276	ASTM A494 (CW2M)	ASTM B564 UNS N10276	AWS A5.14 ERNiCrMo-4	Alloy C276	ASTM B564 UNS N10276	Note Ⓔ	Note Ⓝ	
19c	Alloy 825	A494	A825/N08825	A825/N08825		Note Ⓓ	Alloy 825	ASTM A494 (CU5MCuC)	ASTM B564 UNS N08825	AWS A5.14 ERNiCrMo-3	Alloy 825	ASTM B564 UNS N08825	Note Ⓔ	Note Ⓝ	
20	Nickel and Hard faced					Note Ⓓ	Ni Alloy	MFG Standard ①	MFG Standard ①	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-A	Ni Alloy ①	MFG Standard ①	Note Ⓔ	Note Ⓝ	
						350 Ⓙ	Co-Cr A Ⓖ	N/A	N/A						
20a	Alloy 625 and Hard faced					Note Ⓓ	Alloy 625	ASTM A494 (CW6MC)	ASTM B564 UNS N06625	AWS A5.14 ERNiCrMo-3	Alloy 625	ASTM B564 UNS N06625	Note Ⓔ	Note Ⓝ	
						350 Ⓙ	Co-Cr A Ⓖ	N/A	N/A	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-A					
20b	Alloy C276 and Hard faced					Note Ⓓ	Alloy C276	ASTM A494 (CW2M)	ASTM B564 UNS N10276	AWS A5.14 ERNiCrMo-4	Alloy C276	ASTM B564 UNS N10276	Note Ⓔ	Note Ⓝ	
						350 Ⓙ	Co-Cr A Ⓖ	N/A	N/A	AWS A5.13 ECoCr-A or AWS 5.21 ECoCr-A					
20c	Alloy 825 and Hard faced					Note Ⓓ	Alloy 825	ASTM A494 (CU5MCuC)	ASTM B564 UNS N08825	AWS A5.14 ERNiCrMo-3	Alloy 825	ASTM B564 UNS N08825	Note Ⓔ	Note Ⓝ	
						350 Ⓙ	Co-Cr A Ⓖ	N/A	N/A	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-A					
AA	CoCr-A (or CRA) Hard faced					350 Ⓔ	Co-Cr A Ⓖ	N/A	N/A	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-A	Ni Alloy ①	MFG Standard ①	Note Ⓔ	Note Ⓝ	
Special	Bronze	Bronze	MFG Standard	MFG Standard	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 MR-01-75 requirements.														
Full Stellite	Full Hard faced trim, suitable for abrasive & severe services up to 1200ºF (650ºC).														

NOTE: Cr = Chromium Ni = Nickel Co = Cobalt Cu = Copper N/A = Not Applicable.

① API lists trim #1 as obsolete under API 600, 602, 603 but is still shown in use for check valves API 594-2018 and ISO 15761-2021 gate, globe & check. Trim #4 replaces Trim #1 for gate & globe valves.

② Trim #2S not reference by API but is historically commonly used by valve industry where trim #2 or 15 is not acceptable or required. Trim #2S is often used for API 603 valves. API 603-2018 does not contain trim charts but 6.2.2 states trim materials to be same as body plus overlays.

Ⓐ **Gate & globe valves only (API 600/603/623/602). Note:- API 594 check valves & ISO 15761 trim chart does not reference seating surface hardness.** HB (formerly BHN) is the symbol for Brinell Hardness per ASTM E10.

Ⓑ Free Machine grades of 13Cr are prohibited.

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

Ⓓ Manufacturer's standard hardness.

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

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

Ⓖ AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A: This classification includes such trademark materials as Stellite 6™, Stoody 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.

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

Ⓙ API 600 (API 603 refers to API 600) & API 602:- Hardness differential between the body and disc seat surfaces shall be the manufacturer's standard. API 623 only:- 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.

Ⓚ Manufacturer's standard with 30 Ni minimum.

Ⓜ Example only.

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

Ⓟ For weld deposit and integral back seat the same nominal material and typical specification shall apply.

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

Important Note: Data valid as per API 600 2021 (table 8) and API 623, API 594, API 603, (API 603 refers to API 600 trim charts), API602. Data provided in this chart is for informational purposes only. Always consult current API publications to verify information.

† The trim chart specifications was originally designed for API 600 Gate valves and has been updated as of 2021. For API 603-2018 gate valves as well as API 623 Globe valves and API 594-2018 (swing, tilt, wafer) Check valves and forged API 602 Gate, Globe & Check valves, the same trim numbers are also specified. API 594 only references up to trim #14 and does not reference seat surface hardness. BS1873 (1975) & BS1868 (1975) is now only used for non-API light industrial applications. Major manufacturers like APV manufacture globe valves to API 623 & swing check valves to API 594. Check valves are also manufactured to API6D specifications. For forged gate, globe & check valves, BS5352 is now obsolete & replaced by ISO 15761-2020 which mirrors API 602 but covers up to 2500LB, whereas API 602 only covers to 1500LB.

TRIM SERVICE APPLICATIONS & OLD BS DESIGNATION

API Trim Number	Service	Old BS Designation
1[1]	For oil and oil vapors and general services with heat treated seats and wedges. General very low erosive or non-corrosive service between -100ºC and 320ºC. 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 370ºC. Oil & Oil vapor 480ºC.	Cr13
2[1]	For moderate pressure in corrosive, low erosive service between -265ºC and 450ºC.	18-8Ti
3	For moderate pressure in corrosive or non corrosive service between -265ºC and 450ºC.	25-20
4	Seats 275 BHN min. As trim 1 but for medium pressure and more corrosive service.	HF
5	High pressure slightly erosive and corrosive service between -265ºC and 650ºC and higher pressure. Premium trim service to 650ºC. 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 593ºC. As trim 5 for moderate pressure and more corrosive service. Steam, gas & general service to 540ºC. 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 450ºC such as acids, alkalies, salt solutions, etc. Very corrosive fluids. Erosive-corrosive service between -240ºC and 480ºC. 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 455ºC. 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 -45ºC and 320ºC.	-
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 800ºC.	18-8 Nb
18	As trim 13 but more corrosive service & higher pressure. Water, gas or low pressure steam to 230ºC.	-
Bronze	Water, oil, gas, or low pressure steam to 232ºC.	-

[1] 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.

Important Note: Data provided in this chart is for informational purposes only. Always consult current API publications to verify information and trim date. Australian Pipeline Valve 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	A4276-410	DIN X12Cr13	1.4006
304	UNS S30400	18-8 Cr-Ni	ASTM A182 F304	A276-304	DIN X5CrNi 18 10	1.4301
316	UNS S31600	18-8 Cr-Ni (18-10-2)	ASTM A182 F316	A276-316	DIN X5CrNiMo 18 10	1.4401
321	UNS S32100	18 Cr-10 Ni-Ti	ASTM A182 F321	A276-321	DIN X6CrNiTi 18 10	1.4541
347	UNS S34700	18 Cr-10 Ni-Cb	ASTM A182 F347	A276-347	DIN X6CrNiNb 18 10	1.455
MONEL®	UNS N04400	67Ni-30Cu	ASTM B564-N04400	B164-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-N06625	ASTM B564-N06625	DIN 17361	2.4865
C276	UNS N10276	54Ni-15Cr-16Mo	ASTM B564-N10276	ASTM B574-N10276	DIN NiMo 16 Cr 15 W	2.4819
17/4PH	UNS S17400	0C417Ni4Cu4Nb	ASTM A4750 UNS S17400	ASTM A4705 UNS S17400	X5CrNiCuNb17-4-4	1.4548
St. Gr6	UNS R30006	Co Cr-A	AMS 5894	Stellite® Gr6		

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

We stock valves in A105, LF2, 304, 304L, 316, 316L, F51, CF8, CF3, CF8M, WC5, WC6, WC9, F11, F22, F5, Bronze, Iron, etc. in Ball, Butterfly, Check, Control, Gate, Globe,

Needle, Parallel slide, Plug, etc. Valves are manufactured to API600, API602, API603, API6A, API6D, BS1868 and numerous other standards.

~ AUSTRALIA'S LARGEST VALVE STOCKIST ~

Table 8—Nominal Seating Surface, Stem and Backseat Bushing or Weld-deposit Materials and Hardness

Trim	Nominal Trim	Seating Surface Hardness (HB) Minimum [a]	Seating Surface Material Type [b]	Seating Surface Typical Specifications Grade			Stem/Backseat Bushing [p]		Stem Hardness (HB)	Backseat Bushing Hardness (HB)
				Cast (Integral)	Forged (Integral)	Welded [m]	Material Type [b]	Typical Specifications Type		
1	F6	TRIM NUMBER 1 IS OBSOLETE								
2	304	Note [d]	18Cr-8Ni	ASTM A351 (CF8)	ASTM A182 (F304)	AWS A5.9 ER308	18Cr-8Ni	ASTM A276-T304	Note [d]	Note [d]
3	F310	Note [d]	25Cr-20Ni	NA	ASTM A182 (F310)	AWS A5.9 ER310	25Cr-20Ni	ASTM A276-T310	Note [d]	Note [d]
4	Hard F6	750 [e]	Hard 13Cr	NA	Note [f]	NA	13Cr	ASTM A276-T410 or T420	200 min 275 max	250 min.
5	Hardfaced	350 [e]	Co-Cr A [g]	NA	NA	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min.
5A	Hardfaced	350 [e]	Ni-Cr	NA	NA	Note [h]	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min.
5B	Hardfaced	350 [e]	UNS R31233	NA	NA	UNS R31233-	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min.
6	F6 and Cu-Ni	250 [i]	13Cr	ASTM A 217 (CA 15)	ASTM A182 (F6a)	AWS A5.9 ER410	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min
		175 [i]	Cu-Ni	NA	Note [k]	NA				
7	F6 and Hard F6	250 [i]	13Cr	ASTM A 217 (CA 15)	ASTM A182 (F6a)	AWS A5.9 ER410	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min.
		750 [i]	Hard 13Cr	NA	Note [f]	NA				
8	F6 and Hardfaced	250 [i]	13Cr	ASTM A 217 (CA 15)	ASTM A182 (F6a)	AWS A5.9 ER410	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min
		350 [i]	Co-Cr A [g]	NA	NA	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A				
8A	F6 and Hardfaced	250 [i]	13Cr	ASTM A 217 (CA 15)	ASTM A182 (F6a)	AWS A5.9 ER410	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min.
		350 [i]	Ni-Cr	NA	NA	Note [h]				
9	Monel [TM] [n]	Note [d]	Ni-Cu Alloy	NA	MFG Standard	NA	Ni-Cu Alloy	MFG Standard	Note [d]	Note [d]

Table 8—Nominal Seating Surface, Stem and Backseat Bushing or Weld-deposit Materials and Hardness (Continued)

Trim	Nominal Trim	Seating Surface Hardness (HB) Minimum [a]	Seating Surface Material Type [b]	Seating Surface Typical Specifications Grade			Stem/Backseat Bushing [p]		Stem Hardness (HB)	Backseat Bushing Hardness (HB)
				Cast (Integral)	Forged (Integral)	Welded [m]	Material Type [b]	Typical Specifications Type		
10	316	Note [d]	18Cr-8Ni	ASTM A351 (CF8M)	ASTM A182 (F316)	AWS A5.9 ER316	18Cr-8Ni-Mo	ASTM A276-T316	Note [d]	Note [d]
11	Monel [TM] and Hardfaced	Note [d]	Ni-Cu Alloy	NA	MFG Standard	NA	Ni-Cu Alloy	MFG Standard	Note [d]	Note [d]
		350 [l]	Trim 5 or 5A	NA	NA	See Trim 5 or 5A				
12	316 and Hardfaced	Note [d]	18Cr-8Ni-Mo	ASTM A351 (CF8M)	ASTM A182 (F316)	AWS A5.9 ER316	18Cr-8Ni-Mo	ASTM A276-T316	Note [d]	Note [d]
		350 [l]	Hardface per Trim 8 or 8A	NA	NA	Hardface per Trim 8 or 8A				
13	Alloy 20	Note [d]	19Cr-29Ni	ASTM A351 (CN7M)	ASTM B473	AWS A5.9 ER320	19Cr-29Ni	ASTM B473	Note [d]	Note [d]
14	Alloy 20 and Hardfaced	Note [d]	19Cr-29Ni	ASTM A351 (CN7M)	ASTM B473	AWS A5.9 ER320	19Cr-29Ni	ASTM B473	Note [d]	Note [d]
		350 [l]	Hardface per Trim 8 or 8A	NA	NA	Hardface per Trim 8 or 8A				
15	Hardfaced	350 [e]	Co-Cr A [g]	NA	NA	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-8Ni	ASTM A276-T304	Note [d]	Note [n]
16	Hardfaced	350 [e]	Co-Cr A [g]	NA	NA	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-8Ni-Mo	ASTM A276-T316	Note [d]	Note [n]
17	Hardfaced	350 [e]	Co-Cr A [g]	NA	NA	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-10Ni-Cb	ASTM A276-T347	Note [d]	Note [n]
18	Hardfaced	350 [e]	Co-Cr A [g]	NA	NA	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	19Cr-29Ni	ASTM B473	Note [d]	Note [n]
19	Nickel [**]	Note [d]	Ni Alloy	MFG Standard [**]	MFG Standard [**]	MFG Standard [**]	Ni Alloy [**]	MFG Standard [**]	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]

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(& referenced in API 603 - 2018) cont'd

Table 8—Nominal Seating Surface, Stem and Backseat Bushing or Weld-deposit Materials and Hardness (Continued)

Trim	Nominal Trim	Seating Surface Hardness (HB) Minimum [a]	Seating Surface Material Type [b]	Seating Surface Typical Specifications Grade			Stem/Backseat Bushing [p]		Stem Hardness (HB)	Backseat Bushing Hardness (HB)
				Cast (Integral)	Forged (Integral)	Welded [m]	Material Type [b]	Typical Specifications Type		
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-3	Alloy 825	ASTM B564 UNS N08825	Note [d]	Note [n]
20	Nickel [**] and Hardfaced	Note [d]	Ni Alloy	MFG Standard [**]	MFG Standard [**]	MFG Standard [**]	Ni Alloy [**]	MFG Standard [**]	Note [d]	Note [n]
		350 [l]	Co-Cr A [g]	NA	NA	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-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 [l]	Co-Cr A [g]	NA	NA	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-A				
20B	Alloy C276 and Hardfaced	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]
		350 [l]	Co-Cr A [g]	NA	NA	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-A				

Table 8—Nominal Seating Surface, Stem and Backseat Bushing or Weld-deposit Materials and Hardness (Continued)

Trim	Nominal Trim	Seating Surface Hardness (HB) Minimum [a]	Seating Surface Material Type [b]	Seating Surface Typical Specifications Grade			Stem/Backseat Bushing [p]		Stem Hardness (HB)	Backseat Bushing Hardness (HB)
				Cast (Integral)	Forged (Integral)	Welded [m]	Material Type [b]	Typical Specifications Type		
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 [l]	Co-Cr A [g]	NA	NA	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-A				
21	Hardfaced **	350 [e]	Co-Cr A [g]	NA	NA	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-A	Ni Alloy **	MFG Standard **	Note [d]	Note [n]

NOTE Cr = Chromium; Ni = Nickel; Co = Cobalt; Cu = Copper; NA = Not Applicable.
* Monel is used strictly as an example of any nickel-copper alloy 400 matching UNS N04400 specifications. It does not constitute any endorsement of any specific product or company by API.
** 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.

[a] HB (formerly BHN) is the symbol for the Brinell hardness per ASTM E10.
[b] Free machining grades of 13Cr are prohibited.
[c] Not used
[d] Manufacturer's standard hardness.
[e] Differential hardness between the body and disc seating 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™ *, Stoody 6™ * and Wallex 6™ *. For Plasma Transfer Arc Welding (PTAW) process powder with the metallurgy equivalent 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. * Trademarks are examples only and do not constitute an endorsement of this product by API.
[h] Manufacturer's standard hardfacing with a maximum iron content of 25 %.
[i] Hardness differential between the body and disc seating surfaces shall be the manufacturer's standard.
[j] Not used.
[k] Manufacturer's standard with 30 Ni minimum.
[l] Not used.
[m] Typical backseat seating surface hardfacing or overlay, when specified.
[n] Per manufacturer's standard if not hardfaced, 250 HB minimum if hardfaced.
[p] For weld deposit on an integral backseat, the same nominal material and typical specification shall apply.

Table 13 *(continued)*

Part	Combination number	Trim material description	Brinell hardness, HB
Seating surfaces	1	13Cr	250 min[b]
	2	18Cr8Ni	[c]
	3	25Cr20Ni	[c]
	4	13Cr	750 min
	5	HF HFA	350 min
	5A		350 min
	6	13Cr/CuNi	250 min/175 min
	7	13Cr/13Cr	250 min/750 min
	8	13Cr/HF	250 min/350 min
	8A	13Cr/HFA	250 min/350 min
	9	NiCu alloy	[c]
	10	18Cr-8NiMo	[c]
	11	NiCu alloy/HF	350 min[c]
	11A	NiCu alloy/HFA	350 min[c]
	12	18Cr-8Ni-Mo/HF	350 min[c]
	12A	18Cr-8Ni-Mo/HFA	350 min[c]
	13	19Cr-29Ni	[c]
	14	19Cr-29Ni/HF	350 min[c]
	14A	19Cr-29Ni/HFA	350 min[c]
	15,16,17 or 18	HF	350 min

NOTE Abbreviations: Cr = chromium; Ni = nickel; Co = cobalt; Mo = molybdenum; Cb = columbium; Cu = copper; HF = hard facing using CoCr welding alloy; HFA = hard facing using NiCr welding alloy.

[a] Stems shall be of wrought material.

[b] A differential hardness of at least 50 Brinell points is required between mating surfaces.

[c] Not specified.

Table 14 — Alternative CN numbers

Specified CN	1	2	5A	6	8A	8	15	10	13
Alternative CN	5, 5A, 8 or 8A	10	5	8	5, 5A, 8	5	16	12 or 12A	14 or 14A

Table 15 — Materials for valve parts other than trim items

Part	Material[a]
Body and bonnet[b,c]	A forging or casting material as selected from ASME B16.34
Cover plate[a,b]	A forging, casting, or plate material as selected from ASME B16.34
Bonnet extension and union nut	A material of the same nominal composition as the bonnet as selected from the list of material from which the body was selected
Bellows	See B.6
Bellows fittings	Attachment rings and other bellows fittings shall be of materials suitable for attachment welding of the bellows to the valve body, bonnet or stem as applicable

[a] Metallic parts cannot be treated with zinc or cadmium coatings.

[b] A preference for body and bonnet or cover material form (e.g. forging or casting) requires specification by the purchaser (see Annex E).

[c] For valve sizes DN ≤ 50, the reference standard design specifies forging material for the body and bonnet, or cover, see 5.1.

Table 12—Nominal Seating Surfaces, Stem, or Weld-Deposited Materials and Hardness

Trim No. (CN)	Nominal Trim	Seating Surface Hardness (HB) Min. [a]	Seating Surface Material Type [b]	Seating Surface Typical Specifications Grade			Stem		
				Cast	Forged	Welded [m]	Material Type [b]	Typical Specifications Type	Stem Hardness (HB)
2	304	Note [d]	18Cr-8Ni	ASTM A351 (CF8)	ASTM A182 (F304)	AWS A5.9 ER308	18Cr-8Ni	ASTM A276-T304	Note [d]
3	F310	Note [d]	25Cr-20Ni	NA	A182 (F310)	AWS A5.9 ER310	25Cr-20Ni	A276-T310	Note [d]
4	Hard F6	750 [e]	Hard 13Cr	NA	Note [f]	NA	13Cr	A276-T410 or T420	200 min 275 max
5	Hard-faced	350 [e]	CoCr-A [g]	NA	NA	AWS A5.13 E or R CoCr-A	13Cr	A276 T410 or T420	200 min 275 max
5A	Hard-faced	350 [e]	Ni-Cr	NA	NA	Note [h]	13Cr	A276 T410 or T420	200 min 275 max
6	F6 and Cu-Ni	250 [i]	13Cr	A 217 (CA 15)	A182 (F6a)	AWS A5.9 ER410	13Cr	A276 T410 or T420	200 min 275 max
		175 [i]	Cu-Ni	NA	Note [k]	NA			
7	F6 and hard F6	250 [i]	13Cr	A 217 (CA 15)	A182 (F6a)	AWS A5.9 ER410	13Cr	A276 T410 or T420	200 min 275 max
		750 [i]	Hard 13Cr	NA	Note [f]	NA			
8	F6 and hard-faced	250 [i]	13Cr	A 217 (CA 15)	A182 (F6a)	AWS A5.9 ER410	13Cr	A276 T410 or T420 NA	200 min 275 max
		350 [i]	CoCr-A [g]	NA	NA	AWS A5.13 E or R CoCr-A			
8A	F6 and hard-faced	250 [i]	13Cr	A 217 (CA 15)	A182 (F6a)	AWS A5.9 ER410	13Cr	A276 T410 or T420	200 min 275 max
		350 [i]	Ni-Cr	NA	NA	Note [h]			
9	Monel*	Note [d]	Ni-Cu alloy	NA	MFG standard	NA	Ni-Cu alloy	MFG standard	Note [d]

Trim No. (CN)	Nominal Trim	Seating Surface Hardness (HB) Min. [a]	Seating Surface Material Type [b]	Seating Surface Typical Specifications Grade			Stem		
				Cast	Forged	Welded [m]	Material Type [b]	Typical Specifications Type	Stem Hardness (HB)
10	316	Note [d]	18Cr-8Ni-Mo	A351 (CF8M)	A182 (F316)	AWS A5.9 ER316	18Cr-8Ni-Mo	A276-T316	Note [d]
11	Monel* and hard-faced	Note [d]	Ni-Cu alloy	NA	MFG standard	NA	Ni-Cu alloy	MFG standard	Note [d]
		350 [i]	Trim 5 or 5A	NA	NA	See Trim 5 or 5A			
12	316 and hard-faced	Note [d]	18Cr-8Ni-Mo	A351 (CF8M)	A182 (F316)	AWS A5.9 ER316	18Cr-8Ni-Mo	A276-T316	Note [d]
		350 [i]	Trim 5 or 5A	NA	NA	See Trim 5 or 5A			
13	Alloy 20	Note [d]	19Cr-29Ni	A351 (CN7M)	B462	AWS A5.9 ER320	19Cr-29Ni	B473	Note [d]
14	Alloy 20 and hard-faced	Note [d]	19Cr-29Ni	A351 (CN7M)	B473	AWS A5.9 ER320	19Cr-29Ni	B473	Note [d]
		350 [i]	Trim 5 or 5A	NA	NA	See Trim 5 or 5A			
15	Hard-faced	350 [e]	CoCr-A [g]	NA	NA	AWS 5.13 Eco Cr-A	18Cr-8Ni	A276-T304	Note [d]
16	Hard-faced	350 [e]	CoCr-A [g]	NA	NA	AWS 5.13 Eco Cr-A	18Cr-8Ni-Mo	A276-T316	Note [d]
17	Hard-faced	350 [e]	CoCr-A [g]	NA	NA	AWS 5.13 Eco Cr-A	18Cr-10Ni-Cb	A276-T347	Note [d]
18	Hard-faced	350 [e]	CoCr-A [g]	NA	NA	AWS 5.13 Eco Cr-A	19Cr-29Ni	B473	Note [d]
19	Nickel [o]	Note [d]	Ni alloy	MFG standard [o]	MFG standard [o]	MFG standard	Ni alloy [o]	MFG standard [o]	Note [d]
19A	Alloy 625	Note [d]	22Cr-58Ni	ASTM A494 (CW6MC)	ASTM B564 UNS N06625	AWS A5.14 ERNi CrMo-3	22Cr-58Ni	ASTM B564 UNS N06625	Note [d]
19B	Alloy C276	Note [d]	15Cr-54Ni	ASTM A494 (CW2M)	ASTM B564 UNS N10276	AWS A5.14 ERNiCrMo-4	15Cr-54Ni	ASTM B564 UNS N10276	Note [d]

Trim No. (CN)	Nominal Trim	Seating Surface Hardness (HB) Min. [a]	Seating Surface Material Type [b]	Seating Surface Typical Specifications Grade			Stem		
				Cast	Forged	Welded [m]	Material Type [b]	Typical Specifications Type	Stem Hardness (HB)
19C	Alloy 825	Note [d]	21.5Cr-42Ni	ASTM A494 (CU5M CuC)	ASTM B564 UNS N08825	AWS A5.14 ERNiCrMo-3	21.5Cr-42Ni	ASTM B564 UNS N08825	Note [d]
20	Nickel [o] and hard-faced	Note [d]	Ni Alloy	MFG standard [o]	MFG standard [o]	NA	Ni Alloy [o]	MFG standard [o]	Note [d]
		350 [i]	CoCr-A[g]	NA	NA	AWS 5.13 ECoCr-A AWS 5.21 ERCoCr- A			
20A	Alloy 625 and hard-faced	Note [d]	22Cr-58Ni	ASTM A494 (CW6MC)	ASTM B564 UNS N06625	AWS A5.14 ERNiCrMo-3	22Cr-58Ni	ASTM B564 UNS N06625	Note [d]
		350 [i]	CoCr-A [g]	NA	NA	AWS 5.13 ECoCr-A AWS 5.21 ERCoCr- A			
20B	Alloy C276 and hard-faced	Note [d]	15Cr-54Ni	ASTM A494 (CW2M)	ASTM B564 UNS N10276	AWS A5.14 ERNiCrMo-4	15Cr-54Ni	ASTM B564 UNS N10276	Note [d]
		350 [i]	CoCr-A [g]	NA	NA	AWS 5.13 EcoCr-A or AWS 5.21 EcoCr-A			
20C	Alloy 825 and hard-faced	Note [d]	21.5Cr-42Ni	ASTM A494 (CU5M CuC)	ASTM B564 UNS N08825	AWS A5.14 ERNi CrMo-3	21.5Cr-42Ni	ASTM B564 UNS N08825	Note [d]
		350 [i]	CoCr-A [g]	NA	NA	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-A			

Trim No. (CN)	Nominal Trim	Seating Surface Hardness (HB) Min. [a]	Seating Surface Material Type [b]	Seating Surface Typical Specifications Grade			Stem		
				Cast	Forged	Welded [m]	Material Type [b]	Typical Specifications Type	Stem Hardness (HB)
21	Hard-faced [o]	350 [e]	CoCr-A [g]	NA	NA	AWS 5.13 ECoCr-A AWS 5.21 ERCoCr-A	Ni alloy [o]	MFG standard [o]	Note [d]

NOTE Cr = Chromium; Ni = Nickel; Co = Cobalt; Cu = Copper; NA = Not Applicable.

[a] HB (formerly BHN) is the symbol for the Brinell hardness per ASTM E10.

[b] Free machining grades of 13Cr are prohibited.

[c] Body and closure element seating surfaces should be 250 HB minimum with a 50 HB minimum differential between the body and closure element seating surfaces.

[d] Manufacturer's standard hardness.

[e] Differential hardness between the body and closure element seating surfaces is not required.

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

[g] This classification includes such trademark materials as Stellite 6™ *, Stoody 6™ * and Wallex 6™ *, the use of CoCr-E (Stellite 21™ *) or equal is an acceptable substitution for CoCr-A in globe and check valves.

[h] Manufacturer's standard hardfacing with a maximum iron content of 25 %.

[I] Hardness differential between the body and closure element seating surfaces shall be the manufacturer's standard.

[J] Not used.

[k] Manufacturer's standard with 30 Ni minimum.

[l] Not used.

[m] Not used.

[n] Not used.

[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.

* Monel is used strictly as an example of any nickel-copper alloy 400 matching UNS N04400 specifications. API standards do not endorse or require the purchase or use of proprietary products or services as a condition of implementing the standard.

Table 4—Seating-surface and Hinge Pin Nominal Trim Material

Trim No.	Nominal Trim	Seat Surface Material Type	Seat Surface Typical Specification Grade			Hinge Pin	
			Cast	Forged	Welded	Material Type	Typical Specification Type
1	F6	13 Cr	ASTM A217 (CA15)	ASTM A182 (F6)	AWS A5.9 (ER410)	13 Cr	ASTM A276-T410
2	304	18 Cr-8 Ni	ASTM A351 (CF8)	ASTM A182 (F304)	AWS A5.9 (ER308)	18 Cr-8Ni	ASTM A276-T304
5	Hard-faced	Co-Cr-A	N/A	N/A	AWS A5.13 (E or R Co-Cr-A)	13 Cr	ASTM A276-T410
5A	Hard-faced	Ni-Cr	N/A	N/A	Manufacturer's standard	13 Cr	ASTM A276-T410
8	F6 and hard-faced	13 Cr Co-Cr-A	ASTM A217 (CA15) N/A	ASTM A182 (F6) N/A	AWS A5.9 (ER410) AWS A5.13 (E or R Co-Cr-A)	13 Cr	ASTM A276-T410
9	Monel	Ni-Cu alloy	ASTM A494 (M-35–1)	ASTM B564 (UNS N04400)	Manufacturer's standard	Ni-Cu alloy	Manufacturer's standard
10	316	18 Cr-8 Ni-Mo	ASTM A351 (CF8M)	ASTM A182 (F316)	AWS A5.9 (ER316)	18 Cr-8 Ni-Mo	ASTM A276-T316
12	316 and hard-faced	18 Cr-8 Ni-Mo Trim 5 or 5A	ASTM A351 (CF8M)	ASTM A182 (F316)	AWS A5,9 (ER316) Trim 5 or 5A	18 Cr-8 Ni-Mo	ASTM A276-T316
13	Alloy 20	19 Cr-29 Ni	ASTM A351 (CN7M)	ASTM B473	AWS A5.9 (ER320)	19 Cr-29 Ni	ASTM B473
14	Alloy 20 and hard-faced	19 Cr-29 Ni Trim 5 or 5A	ASTM A351 (CN7M)	ASTM B473	AWS A5.9 (ER320) Trim 5 or 5A	19 Cr-29 Ni	ASTM B473
16	Hard-faced	Co-Cr-A[a]	NA	NA	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-8NiMo	ASTM A276-T316
AA	Bronze	Bronze		Manufacturer's standard	—	—	—

NOTE 1 AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A: This classification includes such trademark materials as Stellite 6™ *, Stoody 6™ * and Wallex 6™ *. For plasma transfer arc welding (PTAW), process powder with the metallurgy equivalent to UNS R30006 can also be used. CoCr-E (Stellite 21™ * or equal) may be used only with purchaser approval. Typical CoCr-E alloys include AWS A5.13 ECoCr-E or AWS A5.21 ERCoCr-E. Trademarks are examples only and do not constitute an endorsement of this product by API.
NOTE 2 Monel is used strictly as an example of any nickel-copper alloy 400 matching UNS N04400 specifications. It does not constitute any endorsement of any specific product or company by API.

6.5 Springs

Unless otherwise specified in the purchase order, the spring material shall be as follows:

a) For valves rated for temperatures of 315 °C (600 °F) and above, spring material shall be nickel-chromium alloy UNS N07750.

Table 8—Nominal Seating Surface, Stem, and Backseat Bushing or Weld Deposited Materials and Hardness

Trim Number	Nominal Trim	Seat Surface Hardness (HB) Minimum [a]	Seat Surface Material Type [b]	Seat Surface Typical Specifications Grade			Stem/Bushing		Stem Hardness (HB)	Backseat Bushing Hardness (HB)
				Cast	Forged	Welded [c]	Material Type [b]	Typical Specifications Type		
1	F6	TRIM NUMBER 1 IS OBSOLETE								
2	304	Note [d]	18Cr-8Ni	ASTM A351 (CF8)	ASTM A182 (F304)	AWS A5.9 ER308	18Cr-8Ni	ASTM A276-T304	Note [d]	Note [d]
3	F310	Note [d]	25Cr-20Ni	NA	ASTM A182 (F310)	AWS A5.9 ER310	25Cr-20Ni	ASTM A276-T310	Note [d]	Note [d]
4	Hard F6	750 [e]	Hard 13Cr	NA	Note [f]	NA	13Cr	ASTM A276-T410 or T420	200 min 275 max	250 min
5	Hardfaced	350 [e]	Co-Cr A [g]	NA	NA	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min
5A	Hardfaced	350 [e]	Ni-Cr	NA	NA	Note [h]	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min
6	F6 and Cu-Ni	250 [i] 175 [i]	13Cr and Cu-Ni	ASTM A217 (CA 15) NA	ASTM A182 (F6a) Note [k]	AWS A5.9 ER410 NA	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min
7	F6 and Hard F6	250 [i] 750 [i]	13Cr and Hard 13Cr	ASTM A217 (CA 15) NA	ASTM A182 (F6a) Note [f]	AWS A5.9 ER410 NA	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min
8	F6 and Hardfaced	250 [i] 350 [i]	13Cr and Co-Cr A [g]	ASTM A217 (CA 15) NA	ASTM A182 (F6a) NA	AWS A5.9 ER410 AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min
8A	F6 and Hardfaced	250 [i] 350 [i]	13Cr and Ni-Cr	ASTM A217 (CA 15) NA	ASTM A182 (F6a) NA	AWS A5.9 ER410 Note [h]	13Cr	ASTM A276 T410 or T420	200 min 275 max	250 min
9	Monel ™ [j]	Note [d]	Ni-Cu Alloy	NA	MFG Standard	NA	Ni-Cu Alloy	MFG Standard	Note [d]	Note [d]
10	316	Note [d]	18Cr-8Ni-Mo	ASTM A351 (CF8M)	ASTM A183 (F316)	AWS A5.9 ER316	18Cr-8Ni-Mo	ASTM A276-T316	Note [d]	Note [d]

Table 8—Nominal Seating Surface, Stem, and Backseat Bushing or Weld Deposited Materials and Hardness (Continued)

Trim Number	Nominal Trim	Seat Surface Hardness (HB) Minimum [a]	Seat Surface Material Type [b]	Seat Surface Typical Specifications Grade			Stem/Bushing		Stem Hardness (HB)	Backseat Bushing Hardness (HB)
				Cast	Forged	Welded [c]	Material Type [b]	Typical Specifications Type		
11	Monel™ [j] and Hardfaced	Note [d] 350 [l]	Ni-Cu Alloy and Trim 5 or 5A	NA	MFG Standard	NA See Trim 5 or 5A	Ni-Cu Alloy NA	MFG Standard NA	Note [d]	Note [d]
12	316 and Hardfaced	Note [d] 350 [j]	18Cr-8Ni-Mo and Trim 5 or 5A	ASTM A351 (CF8M)	ASTM A182 (F316)	AWS A5.9 ER316 See Trim 5 or 5A	18Cr-8Ni-Mo NA	ASTM A276-T316 NA	Note [d]	Note [d]
13	Alloy 20	Note [d]	19Cr-29Ni	ASTM A351 (CN7M)	ASTM B473	AWS A5.9 ER320	19Cr-29Ni	ASTM B473	Note [d]	Note [d]
14	Alloy 20 and Hardfaced	Note [d] 350 [l]	19Cr-29Ni and Trim 5 or 5A	ASTM A351 (CN7M) NA	ASTM B473 NA	AWS A5.9 ER320 See Trim 5 or 5A	19Cr-29Ni NA	ASTM B473 NA	Note [d]	Note [d]
15	Hardfaced	350 [e]	Co-Cr A [g]	NA	NA	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-8Ni	ASTM A276-T304	Note [d]	Note [m]
16	Hardfaced	350 [e]	Co-Cr A [g]	NA	NA	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-8Ni-Mo	ASTM A276-T316	Note [d]	Note [m]
17	Hardfaced	350 [e]	Co-Cr A [g]	NA	NA	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	18Cr-10Ni-Cb	ASTM A276-T347	Note [d]	Note [m]
18	Hardfaced	350 [e]	Co-Cr A [g]	NA	NA	AWS A5.13 ECoCr-A or AWS A5.21 ERCoCr-A	19Cr-29Ni	ASTM B473	Note [d]	Note [m]
19	Nickel [l]	Note [d]	Ni Alloy	MFG Standard [l]	MFG Standard [l]	MFG Standard	Ni Alloy [l]	MFG Standard [l]	Note [d]	Note [m]

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cont'd

Table 8—Nominal Seating Surface, Stem, and Backseat Bushing or Weld Deposited Materials and Hardness (Continued)

Trim Number	Nominal Trim	Seat Surface Hardness (HB) Minimum [a]	Seat Surface Material Type [b]	Seat Surface Typical Specifications Grade			Stem/Bushing		Stem Hardness (HB)	Backseat Bushing Hardness (HB)
				Cast	Forged	Welded [c]	Material Type [b]	Typical Specifications Type		
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 [m]
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 [m]
19C	Alloy 825	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 [m]
20	Nickel [l] and Hardfaced	Note [d]	Ni Alloy	MFG Standard [l]	MFG Standard [l]	NA	Ni Alloy [l]	MFG Standard [l]	Note [d]	Note [m]
		350 [l]	CoCr-A [g]	NA	NA	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-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 [m]
		350 [l]	CoCr-A [g]	NA	NA	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-A				

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cont'd

Table 8—Nominal Seating Surface, Stem, and Backseat Bushing or Weld Deposited Materials and Hardness (Continued)

Trim Number	Nominal Trim	Seat Surface Hardness (HB) Minimum [a]	Seat Surface Material Type [b]	Seat Surface Typical Specifications Grade			Stem/Bushing		Stem Hardness (HB)	Backseat Bushing Hardness (HB)
				Cast	Forged	Welded [c]	Material Type [b]	Typical Specifications Type		
20B	Alloy C276 and Hardfaced	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 [m]
		350 [l]	CoCr-A [g]	NA	NA	AWS 5.13 ECoCr-A or AWS 5.21 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 [m]
		350 [l]	CoCr-A [g]	NA	NA	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-A				
21	Hardfaced [l]	350 [e]	Co-Cr A [g]	NA	NA	AWS 5.13 ECoCr-A or AWS 5.21 ECoCr-A	Ni Alloy [l]	MFG Standard [l]	Note [d]	Note [m]

NOTE Cr = chromium; Ni = nickel; Co = cobalt; Cu = copper; NA = not applicable.

[a] HB (formerly BHN) is the symbol for the Brinell hardness per ASTM E10.

[b] Free machining grades of 13Cr are prohibited.

[c] Typical backseat weld deposit material.

[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 5.13 ECoCr-A or AWS 5.21 ERCoCr-A. This classification includes trademark materials. For plasma transfer arc welding (PTAW), process powder with the metallurgy equivalent to UNS R30006 can also be used. CoCr-E 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 %.

[i] Hardness differential between the body and disc seat surfaces shall be the manufacturer's standard.

[j] Monel is used strictly as an example of any nickel-copper alloy 400 matching UNS N04400 specifications. It does not constitute any endorsement of any specific product or company by API.

[k] Manufacturer's standard with 30 Ni minimum.

[l] 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.

[m] Per manufacturer's standard if not hardfaced, 250 HB minimum if hardfaced.