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Legend: High carbon · Alloy steel · Stainless · Non-ferrous · High-temp Ni / Co · Specialty · Flat strip carbon

Page 1 — High Carbon, Alloy Steel & Stainless Spring Wire

General guidance from common ASTM / AMS spring-wire and strip grades and industry design practice. Tensile varies with wire diameter and strip thickness. Design stress % and max temperatures are starting points. Confirm selection for load, cycle life, environment, and manufacturability. Specialty alloys often require longer lead times.

Material / Spec	Nominal Chemistry	Tensile psi×10³ [MPa]	E psi×10⁶ [GPa]	Design % TS	G psi×10⁶ [GPa]	Max °F (°C)	Hardness Rockwell	Method / Notes
Music Wire ASTM A228	C 0.70–1.00% Mn 0.20–0.60%	230–399 [1586–2751]	30 [207]	45%	11.5 [79]	250 (121)	C41–60	Cold drawn. High uniform tensile. Quality springs & wire forms. Cyclic use.
Hard Drawn ASTM A227	C 0.45–0.85% Mn 0.60–1.30%	CL1 147–283 [1014–1951] CL2 171–324 [1179–2234]	30 [207]	40%	11.5 [79]	250 (121)	C31–52	Cold drawn. Average stress. Lower cost springs and wire forms.
High Tensile HD ASTM A679	C 0.65–1.00% Mn 0.20–1.30%	238–350 [1641–2413]	30 [207]	45%	11.5 [79]	250 (121)	C41–60	Cold drawn. Higher quality / strength than standard hard drawn.
Oil Tempered ASTM A229	C 0.55–0.85% Mn 0.60–1.20%	CL1 165–293 [1138–2020] CL2 191–324 [1317–2234]	30 [207]	45%	11.5 [79]	250 (121)	C42–55	Cold drawn & heat treated before fabrication. General-purpose spring wire.
Carbon Valve ASTM A230	C 0.60–0.75% Mn 0.60–0.90%	215–240 [1482–1655]	30 [207]	45%	11.5 [79]	250 (121)	C45–49	Heat treated before fabrication. Good surface; cyclic applications.
Grade B Carbon ASTM A1000	C 0.55–0.75% Mn 0.60–0.90%	195–275 [1345–1896]	30 [207]	45%	11.5 [79]	250 (121)	C45–49	Annealed & cold drawn or oil tempered as specified.
Grade C – CrV ASTM A1000	C 0.60–0.70% Mn 0.50–0.90% Cr 0.35–0.60% V 0.10–0.25%	210–270 [1448–1862]	30 [207]	45%	11.5 [79]	425 (218)	C41–55	A1000 chrome vanadium. Annealed & drawn or oil tempered as specified.
Grade A – CrSi ASTM A1000	C 0.51–0.59% Mn 0.50–0.80% Cr 0.60–0.80% Si 1.20–1.60%	231–305 [1593–2103]	30 [207]	45%	11.5 [79]	475 (246)	C48–55	A1000 chrome silicon. Annealed & drawn or oil tempered as specified.
Grade D – CrSiV ASTM A1000	C 0.55–0.68% Mn 0.60–0.90% Cr 0.35–0.60% Si 1.20–1.60%	245–320 [1689–2206]	30 [207]	45%	11.5 [79]	450 (232)	C45–55	A1000 chrome silicon vanadium for higher-demand applications.
Chrome Vanadium ASTM A231	C 0.48–0.53% Cr 0.80–1.10% V 0.15% min	190–300 [1310–2069]	30 [207]	45%	11.5 [79]	425 (218)	C41–55	Heat treated before fabrication. Shock loads; moderately elevated temp.
CrV Valve ASTM A232	C 0.48–0.53% Mn 0.70–0.90% Cr 0.80–1.10% V 0.15% min	190–300 [1310–2069]	30 [207]	45%	11.5 [79]	425 (218)	C41–55	Valve grade CrV. Shock loads; moderately elevated temperature.
CrV Valve Modified ASTM A878	C 0.60–0.75% Mn 0.50–0.90% Cr 0.35–0.60% V 0.10–0.25%	205–290 [1414–2000]	30 [207]	45%	11.5 [79]	430 (221)	C41–55	Annealed & cold drawn, hardened & tempered before fabrication. Shock loads; elevated temp.
Chrome Silicon ASTM A401	C 0.51–0.59% Cr 0.60–0.80% Si 1.20–1.60%	235–300 [1620–2069]	30 [207]	45%	11.5 [79]	475 (246)	C48–55	Heat treated before fabrication. Shock loads; higher temperature service.
CrSi Valve ASTM A877	C 0.51–0.59% Mn 0.50–0.80% Cr 0.60–0.80% Si 1.20–1.60%	245–305 [1690–2103]	30 [207]	45%	11.5 [79]	475 (246)	C48–55	Hardened & tempered before fabrication. Shock loading; higher temp.
302/304 Stainless ASTM A313	Cr 17–19% Ni 8–10%	125–325 [862–2241]	28 [193]	35%	10 [69]	550 (288)	C35–45	General corrosion & heat resistance. Magnetic in spring temper.
316 Stainless ASTM A313	Cr 16–18% Ni 10–14% Mo 2–3%	110–245 [758–1689]	28 [193]	40%	10 [69]	550 (288)	C35–45	Better corrosion resistance than 302/304. Magnetic in spring temper.
17-7 PH Stainless ASTM A313 (631)	Cr 16–18% Ni 6.5–7.5% Al 0.75–1.50%	Cond CH 235–335 [1620–2310]	29.5 [203]	45%	11 [76]	650 (343)	C38–57	Precipitation hardened after fabrication. High strength + corrosion resistance. Slightly magnetic in spring temper.

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Page 2 — Non-Ferrous, High-Temperature & Specialty Alloy Wire

Material / Spec	Nominal Chemistry	Tensile psi×10³ [MPa]	E psi×10⁶ [GPa]	Design % TS	G psi×10⁶ [GPa]	Max °F (°C)	Hardness Rockwell	Method / Notes
Phosphor Bronze ASTM B159 Gr A	Cu 94–96% Sn 4–6%	105–145 [724–1000]	15 [103]	40%	6.25 [43]	200 (93)	B98–104	Cold drawn. Good corrosion resistance and electrical conductivity.
Beryllium Copper ASTM B197	Cu ~98% Be ~2%	150–230 [1034–1586]	18.5 [128]	45%	7.0 [48]	400 (204)	C35–42	Cold drawn; may be mill hardened. High strength; good conductivity.
Monel 400 AMS 7233	Ni ~66% Cu ~31.5%	145–180 [1000–1241]	26 [179]	40%	9.5 [66]	450 (232)	C23–32	Cold drawn. Good corrosion resistance at moderately elevated temp.
Monel K-500 QQ-N-286	Ni ~65% Cu ~29.5%	160–200 [1103–1379]	26 [179]	40%	9.5 [66]	550 (288)	C23–35	Excellent corrosion resistance at moderately elevated temperature.
A-286 Alloy No spring specification	Ni 26% Cr 15% Fe 53%	160–200 [1103–1379]	29 [200]	35%	10.4 [72]	950 (510)	C35–42	Precipitation hardened after fabrication. Elevated temperature service.
Inconel 600 ASTM B166	Ni 76% Cr 15.8% Fe 7.2%	100–230 [690–1586]	31 [214]	40%	11 [76]	700 (371)	C35–45	Cold drawn. Good corrosion resistance at elevated temperature.
Inconel 718 No spring specification	Ni 52.5% Cr 18.6% Fe 18.5%	210–250 [1448–1724]	29 [200]	40%	11.2 [77]	1100 (593)	C45–50	Precipitation hardened after fabrication. Elevated temperature corrosion resistance.
Inconel X-750 AMS 5698 / 5699	Ni 73% Cr 15% Fe 6.75%	No. 1 temper: 155 min [1069] Spring temper: 190–230 [1310–1586]	31 [214]	40%	12 [83]	No. 1: 750 (399) Spring: 1100 (593)	No. 1: C34–39 Spring: C42–48	Precipitation hardened after fabrication. Elevated temperature spring service.
Elgiloy (R30003) AMS 5833	Co 39–41% Cr 19–21% Ni 15–16% Mo 6–8% Fe bal	270–330 [1862–2275]	32 [221]	45%	12 [83]	850 (454)	C40–60	Cold drawn & aged. Excellent sour-environment corrosion resistance. Non-magnetic.
MP35N (R30035) AMS 5844	Co bal Ni 33–37% Cr 19–21% Mo 9–10.5%	260 [1793]	34 [235]	45%	11.7 [81]	750 (399)	C35–55	Cold drawn & aged. Excellent corrosion resistance in sour environments.
Ni-Span C (N09902)	Fe bal Ni 41–43.5% Cr 4.9–5.75% Ti 2.2–2.75% Al 0.3–0.8%	150–190 [1034–1310]	24–29 [166–200]	40%	9–10 [62–69]	150 (66)	—	Precipitation hardenable. Constant-modulus alloy; heat-treatment dependent.
Hastelloy C-276 (N10276) ASTM B574	Ni bal Cr 14.5–16.5% Mo 15–17% W 3–4.5% Fe 4–7%	100–200 [690–1379]	30.7 [210]	40%	11.8 [81]	700 (371)	—	High corrosion resistance. Higher temp possible at lower stresses.
Hastelloy C-22 (N06022) ASTM B574	Ni bal Cr 20–22.5% Mo 12.5–14.5% W 2.5–3.5% Fe 2–6%	100–200 [690–1379]	30.8 [212]	40%	11.8 [81]	700 (371)	—	High corrosion resistance. Higher temp possible at lower stresses.
Rene 41 (N07041)	Ni bal Cr 18–20% Mo 9–10.5% Co 10–12% Ti 3.0–3.3% Al 1.4–1.6%	135–200 [931–1379]	31.6 [218]	40%	12.1 [83]	1800 (982)	—	High-temperature applications with good corrosion/oxidation resistance.
Ti Beta-C (Ti 3-8-6-4-4, R58640) AMS 4957	Ti bal Al 3–4% V 7.5–8.5% Cr 5.5–6.5% Mo 3.5–4.5% Zr 3.5–4.5%	180–210 [1241–1448]	15.4 [106]	40%	5.9 [41]	600 (316)	—	Cold drawn & aged. Non-magnetic. High strength-to-weight; low modulus.

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Page 3 — Flat Strip — Carbon, Stainless, Alloy, Non-Ferrous, High-Temperature & Specialty

Material / Spec	Nominal Chemistry	Tensile psi×10³ [MPa]	E psi×10⁶ [GPa]	Design % TS	G psi×10⁶ [GPa]	Max °F (°C)	Hardness Rockwell	Method / Notes
Medium Carbon Strip AISI 1050 / ASTM A682	C 0.47–0.55% Mn 0.60–0.90%	160–280 [1103–1931]	30 [207]	—	—	250 (121)	Ann.: B85 max Temp.: C38–50	Cold rolled annealed or tempered. General-purpose flat spring applications.
Regular Carbon Strip AISI 1074 / ASTM A682	C 0.69–0.80% Mn 0.58–0.80%	160–320 [1103–2206]	30 [207]	—	—	250 (121)	Ann.: B85 max Temp.: C38–50	Cold rolled annealed or tempered. Most popular grade for flat springs.
High Carbon Strip AISI 1095 / ASTM A682	C 0.90–1.04% Mn 0.30–0.50%	180–340 [1241–2344]	30 [207]	—	—	250 (121)	Ann.: B88 max Temp.: C40–52	Cold rolled annealed or tempered. High-stress flat springs.
301 Stainless Strip ‡ ASTM A666	Cr 16–18% Ni 6–8%	240–270 [1655–1862]	28 [193]	—	—	300 (149)	C48–52	Cold rolled to high yield strength. Magnetic in spring temper.
302 Stainless Strip ASTM A666	Cr 17–19% Ni 8–10%	185–230 [1276–1586]	28 [193]	—	—	550 (288)	C42–48	Cold rolled. General-purpose corrosion & heat resistance. Magnetic in spring temper.
316 Stainless Strip AISI 316	Cr 16–18% Ni 10–14% Mo 2–3%	170–230 [1172–1586]	28 [193]	—	—	550 (288)	C38–48	Cold rolled. Better corrosion resistance than 302. Magnetic in spring temper.
17-7 PH Stainless Strip ASTM A693 (631) / AMS 5529	Cr 16–18% Ni 6.5–7.5% Al 0.75–1.5%	Cond CH 240 min [1655]	29 [200]	—	—	650 (343)	C46 min	Cold rolled; precipitation hardened after fabrication. High strength + corrosion resistance.
Chrome Vanadium Strip AMS 6455	C 0.48–0.53% Cr 0.80–1.10% V 0.15% min	200–250 [1379–1724]	30 [207]	—	—	425 (218)	C42–48	Cold rolled; heat treated after fabrication. Shock loads; moderately elevated temp.
Chrome Silicon Strip AISI 9254	C 0.51–0.59% Cr 0.50–0.80% Si 1.20–1.60%	250–325 [1724–2241]	30 [207]	—	—	475 (246)	C47–51	Cold rolled; heat treated after fabrication. Shock loads; moderately elevated temp.
Phosphor Bronze Strip ASTM B103 Gr A	Cu 94–96% Sn 4–6%	95–110 [655–758]	15 [103]	—	—	200 (93)	B94–98	Cold rolled. Good corrosion resistance and electrical conductivity.
Beryllium Copper Strip ASTM B194	Cu ~98% Be ~2%	180–200 [1241–1379]	16–18.5 [111–128]	—	—	400 (204)	C39	Cold rolled; may be mill hardened. High strength; good conductivity.
Monel 400 Strip AMS 4544	Ni ~66% Cu ~31.5%	100–140 [690–965]	26 [179]	—	—	450 (232)	B98 min	Cold rolled. Good corrosion resistance at moderately elevated temp.
Monel K-500 Strip QQ-N-286	Ni ~65% Cu ~29.5%	170–200 [1172–1379]	26 [179]	—	—	550 (288)	C34 min	Excellent corrosion resistance at moderately elevated temperature.
A-286 Strip AMS 5525	Ni 26% Cr 15% Fe 53%	160–200 [1103–1379]	29 [200]	—	—	950 (510)	C30–40	Cold rolled; precipitation hardened after fabrication. Elevated temperature service.
Inconel 600 Strip AMS 5540 / ASTM B168	Ni 76% Cr 15.8% Fe 7.2%	145–170 [1000–1172]	31 [214]	—	—	700 (371)	C30 min	Good corrosion resistance at elevated temperature.
Inconel 718 Strip AMS 5596 / 5597	Ni 52.5% Cr 18.6% Fe 18.5%	180–204 [1241–1407]	29 [200]	—	—	1100 (593)	C36	Cold rolled; precipitation hardened after fabrication. Elevated temperature service.
Inconel X-750 Strip AMS 5542	Ni 73% Cr 15% Fe 6.75%	150 min [1034]	31 [214]	—	—	750–1100 (399–593)	C30 min	Cold rolled; precipitation hardened after fabrication. Elevated temperature service.
Elgiloy Strip (R30003) AMS 5875	Co 39–41% Mo 6–8% Cr 19–21% Fe bal Ni 15–16%	170–325 [1172–2241]	32 [221]	45%	12 [83]	850 (454)	C40–58	Cold rolled & aged. Excellent sour-environment corrosion resistance. Non-magnetic.
MP35N Strip (R30035)	Co bal Cr 19–21% Ni 33–37% Mo 9–10.5%	200 [1379]	34 [235]	45%	11.7 [81]	750 (399)	C35–50	Cold rolled & aged. Excellent corrosion resistance in sour environments.
Ni-Span C Strip (N09902) AMS 5221 / 5223 / 5225	Fe bal Ti 2.2–2.75% Ni 41–43.5% Al 0.3–0.8% Cr 4.9–5.75%	150–190 [1034–1310]	24–29 [166–200]	40%	9–10 [62–69]	150 (66)	—	Precipitation hardenable. Constant-modulus alloy; heat-treatment dependent.
Hastelloy C-276 Strip ASTM B575	Ni bal W 3–4.5% Cr 14.5–16.5% Fe 4–7% Mo 15–17%	100–200 [690–1379]	30.7 [210]	40%	11.8 [81]	700 (371)	—	High corrosion resistance. Higher temp possible at lower stresses.
Hastelloy C-22 Strip ASTM B575	Ni bal W 2.5–3.5% Cr 20–22.5% Fe 2–6% Mo 12.5–14.5%	100–200 [690–1379]	30.8 [212]	40%	11.8 [81]	700 (371)	—	High corrosion resistance. Higher temp possible at lower stresses.

How to Use This Chart 1) Define load, cycle life, temperature, and corrosion needs. 2) Select a family and candidate grade. 3) Confirm tensile for actual wire diameter or strip thickness. 4) Apply design stress conservatively for fatigue/shock. 5) Request OCS engineering review for specialty alloys, elevated temperature, or designs near stress limits.

‡ Grade inferred from chemistry (Cr 16–18%, Ni 6–8%). Design stress and G are not listed for flat strip; flat springs are designed on bending stress. Values are guidance only and not a substitute for application-specific engineering validation.

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