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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5688K

Issued DEC 1939
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Superseding AMS 5688J

Steel, Corrosion Resistant, Wire
18Cr - 9.0Ni (SAE 30302)
Spring Temper

UNS S30200

1. SCOPE:

1.1 Form:

This specification covers a corrosion-resistant steel in the form of wire.

1.2 Application:

This wire has been used typically for springs requiring corrosion and heat resistance up to 500 °F (260 °C), but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS:

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been canceled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2241	Tolerances, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
MAM 2241	Tolerances, Metric, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
AMS 2248	Chemical Check Analysis Limits, Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys.
AMS 2371	Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steels and Alloys, Wrought Products and Forging Stock

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7161 FAX: (724) 776-0243
TO PLACE A DOCUMENT ORDER: (724) 776-4970 FAX: (724) 776-0790
SAE WEB ADDRESS: http://www.sae.org

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 8 Tension Testing of Metallic Materials
ASTM E 8M Tension Testing of Metallic Materials (Metric)
ASTM E 353 Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	min	max
Carbon	--	0.15
Manganese	--	2.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	17.00	19.00
Nickel	8.00	10.00
Molybdenum	--	0.75
Copper	--	0.75

3.1.1 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2248.

3.2 Condition:

Spring temper, cold drawn or rolled to required size.

3.2.1 Wire shall be supplied in coils or as ordered.

3.3 Properties:

Wire shall conform to the following requirements:

3.3.1 Tensile Strength: Round wire, square wire, and rectangular wire having nominal width not greater than four times the nominal thickness shall have tensile strength as shown in Table 2, determined in accordance with ASTM E 8 or ASTM E 8M.

TABLE 2A - Tensile Properties, Inch/Pound Units

Nominal Diameter or Thickness Inch	Tensile Strength ksi Round	Tensile Strength ksi Square and Rectangular
Up to 0.009, incl	325 - 355	295 - 325
0.010	320 - 350	290 - 320
0.011	318 - 348	288 - 318
0.012	316 - 346	286 - 316
0.013	314 - 344	284 - 314
0.014	312 - 342	282 - 312
0.015	310 - 340	280 - 310
0.016	308 - 338	278 - 308
0.017	306 - 336	276 - 306
0.018	304 - 334	274 - 304
0.020	300 - 330	270 - 300
0.022	296 - 326	266 - 296
0.024	292 - 322	262 - 292
0.026	291 - 320	261 - 291
0.028	289 - 318	259 - 289
0.031	285 - 315	255 - 285
0.034	282 - 310	252 - 282
0.037	280 - 308	250 - 280
0.041	275 - 304	245 - 275
0.045	272 - 300	242 - 272
0.050	267 - 295	237 - 267
0.054	265 - 293	235 - 265
0.058	261 - 289	231 - 261
0.063	258 - 285	228 - 258
0.070	252 - 281	222 - 252
0.075	250 - 278	220 - 250
0.080	246 - 275	216 - 246
0.087	242 - 271	212 - 242
0.095	238 - 268	208 - 238
0.105	232 - 262	202 - 232
0.115	227 - 257	197 - 227
0.125	222 - 253	192 - 222
0.135	217 - 248	187 - 217
0.148	210 - 241	180 - 210
0.162	205 - 235	175 - 205
0.177	198 - 228	168 - 198

TABLE 2A - Tensile Properties, Inch/Pound Units (Continued)

Nominal Diameter or Thickness Inch	Tensile Strength ksi Round	Tensile Strength ksi Square and Rectangular
0.192	194 - 225	164 - 194
0.207	188 - 220	158 - 188
0.225	182 - 214	152 - 182
0.250	175 - 205	145 - 175
0.278	168 - 198	138 - 168
0.306	161 - 192	131 - 161
0.331	155 - 186	125 - 155
0.362	150 - 180[1]	118 - 148
0.394	145 - 173[1]	112 - 142
0.438	140 - 170[1]	
0.500	135 - 165[1]	
Over 0.500	130 - 160[1]	

[1]These properties have not been verified in accordance with AMS procedures.

TABLE 2B - Tensile Properties, SI Units

Nominal Diameter or Thickness Millimeters	Tensile Strength MPa Round	Tensile Strength MPa Square and Rectangular
Up to 0.23, incl	2241 - 2448	2034 - 2241
0.25	2206 - 2413	2000 - 2207
0.28	2193 - 2399	1986 - 2193
0.30	2179 - 2386	1972 - 2179
0.33	2165 - 2372	1958 - 2165
0.36	2151 - 2358	1944 - 2151
0.38	2137 - 2344	1931 - 2137
0.41	2124 - 2331	1917 - 2124
0.43	2110 - 2317	1903 - 2110
0.46	2096 - 2303	1889 - 2096
0.51	2068 - 2275	1862 - 2068
0.56	2041 - 2248	1834 - 2041
0.61	2013 - 2220	1806 - 2013
0.66	2006 - 2206	1800 - 2006
0.71	1993 - 2193	1786 - 1993

TABLE 2B - Tensile Properties, SI Units (Continued)

Nominal Diameter or Thickness Millimeters	Tensile Strength MPa Round	Tensile Strength MPa Square and Rectangular
0.79	1965 - 2172	1758 - 1965
0.86	1944 - 2137	1738 - 1944
0.94	1931 - 2124	1724 - 1931
1.04	1896 - 2096	1689 - 1896
1.14	1875 - 2068	1669 - 1875
1.27	1841 - 2034	1634 - 1841
1.37	1827 - 2020	1620 - 1827
1.47	1800 - 1993	1593 - 1800
1.60	1779 - 1965	1572 - 1779
1.78	1738 - 1937	1531 - 1737
1.90	1724 - 1917	1517 - 1724
2.03	1696 - 1896	1489 - 1696
2.21	1669 - 1869	1462 - 1669
2.41	1641 - 1848	1434 - 1641
2.67	1600 - 1806	1393 - 1600
2.92	1565 - 1772	1358 - 1565
3.18	1531 - 1744	1324 - 1531
3.43	1496 - 1710	1289 - 1496
3.76	1448 - 1662	1241 - 1448
4.11	1413 - 1620	1207 - 1413
4.50	1365 - 1572	1158 - 1365
4.88	1338 - 1551	1131 - 1338
5.26	1296 - 1517	1089 - 1296
5.72	1255 - 1476	1048 - 1255
6.35	1207 - 1413	1000 - 1207
7.06	1158 - 1365	952 - 1158
7.77	1110 - 1324	903 - 1110
8.41	1069 - 1282	862 - 1069
9.19	1034 - 1241[1]	814 - 1020
10.01	1000 - 1193[1]	772 - 979
11.11	965 - 1172[1]	
12.70	931 - 1138[1]	
Over 12.70	896 - 1103[1]	

[1]These properties have not been verified in accordance with AMS procedures.

3.3.1.1 Tensile strength requirements for each size of straightened or flattened cut lengths, when ordered, may be reduced by 10% of the applicable tensile strength value shown in Table 2.

3.3.1.2 Tensile strength requirements for intermediate sizes shall be as specified for the next larger standard size.

3.3.2 Wrapping: Round wire shall withstand, without cracking, wrapping at room temperature five full, closely spaced turns around a diameter equal to the nominal diameter of the wire.

3.3.3 Coiling: Round wire, 0.180 inch (4.57 mm) and under in nominal diameter, shall show a uniform pitch with no splits or fractures when wound into a tightly closed coil on an arbor of the size specified in Table 3 and the resultant coil stretched to a permanent set of four times its as-wound length.

TABLE 3A - Coiling Arbor Diameter, Inch/Pound Units

Nominal Wire Diameter Inch	Arbor Diameter Inch
Up to 0.034, incl	0.102
Over 0.034 to 0.045, incl	0.145
Over 0.045 to 0.055, incl	0.212
Over 0.055 to 0.125, incl	0.250
Over 0.125 to 0.180, incl	0.380

TABLE 3B - Coiling Arbor Diameter, SI Units

Nominal Wire Diameter Millimeters	Arbor Diameter Millimeters
Up to 0.86, incl	2.59
Over 0.86 to 1.14, incl	3.68
Over 1.14 to 1.40, incl	5.33
Over 1.40 to 3.18, incl	6.35
Over 3.18 to 4.57, incl	9.65

3.4 Quality:

3.4.1 Wire, as received by purchaser, shall be uniform in quality and condition, sound, and free from kinks, twists, scrapes, splits, cold shuts, and other imperfections detrimental to usage of the wire.

3.4.2 Wire shall have a bright, smooth, cold drawn or rolled surface free from pits, abrasions, and other surface imperfections. Wire for coiling on automatic spring winding machines shall be furnished with a lubricating coating suitable for such purpose.