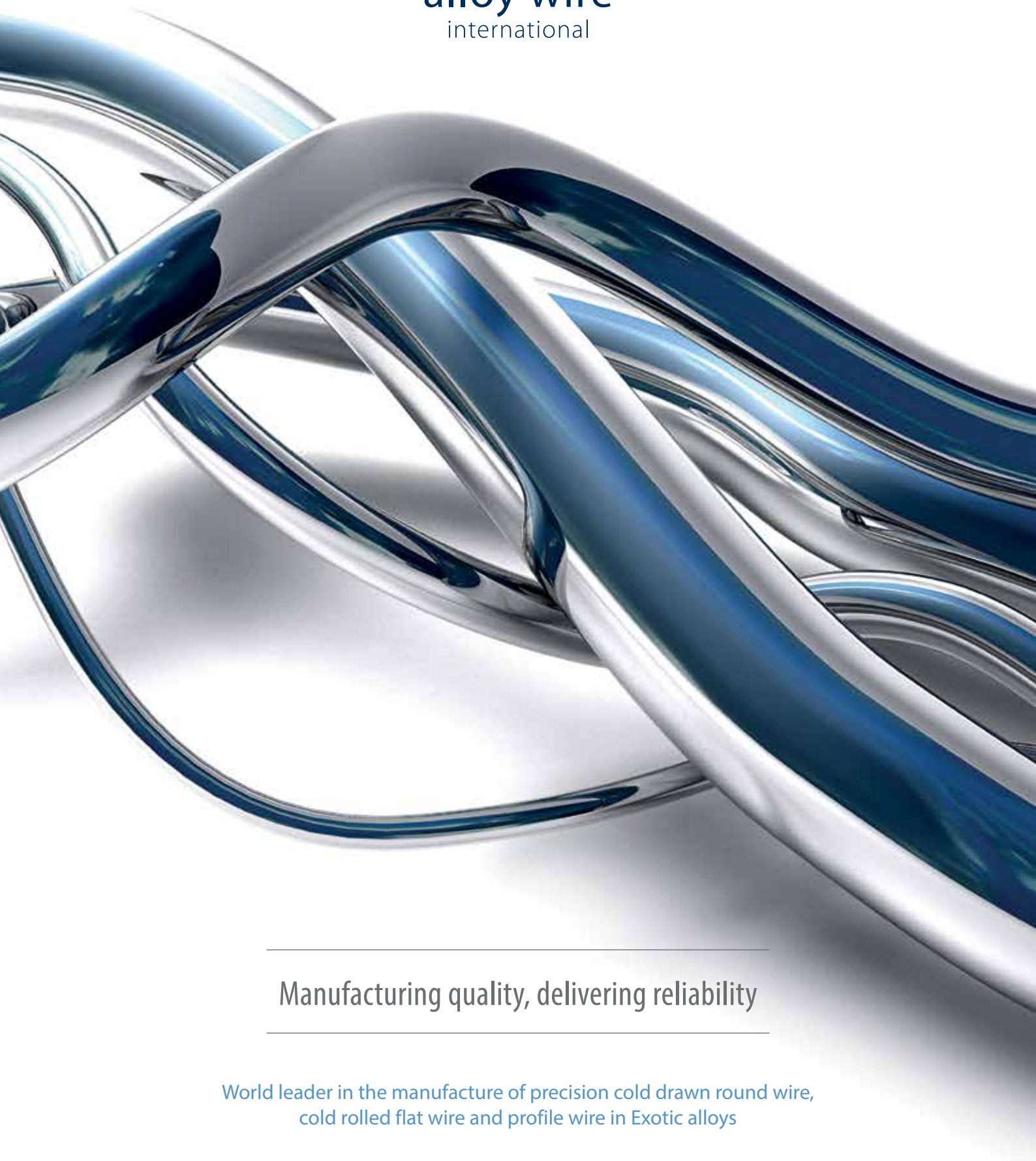
alloy wire®
international



Manufacturing quality, delivering reliability

World leader in the manufacture of precision cold drawn round wire,
cold rolled flat wire and profile wire in Exotic alloys

Contents

Alloy Wire International – an employee owned company taking pride in customer satisfaction

Alloys quick search

®Trade name of Special Metals Group of Companies. †Trade name of Aperam Alloys Imphy. ˜Trade name of Haynes International. *Trade name of SPS Technologies. ¤Trade name of AK Steel. ∞Trade name of General Electric, Inc. ·Trade name of Sandvik AB. ^Trade name of IMI Scott Ltd. ©Trade name of Conceptech, Inc. ¯Trade name of Knight Precision Wire.

Round wire & bars

Alloy Wire International (AWI) manufacture round wire and bars to your specification with very short lead times and, today, is one of the world's premier suppliers of 'High Performance' alloys.

We frequently discuss customers' individual requirements and, through a combination of new or existing material selection, manufacturing flexibility and our technical knowledge, we can offer a bespoke solution.

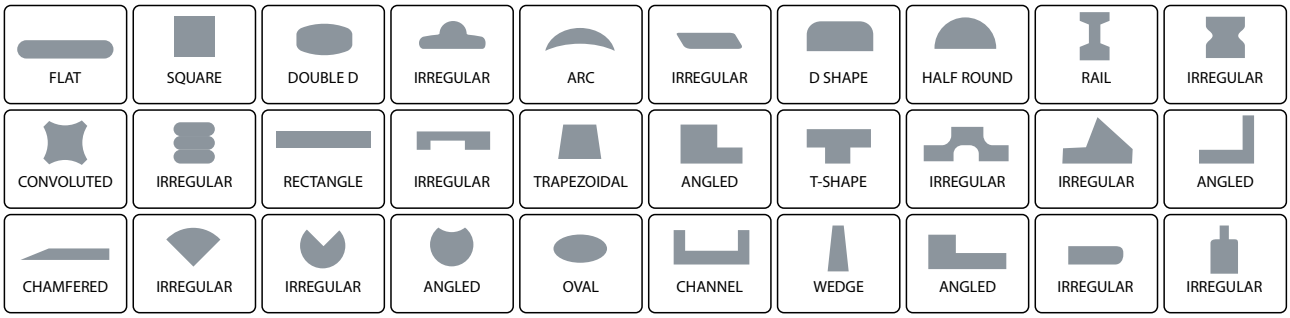
Bars with a ground surface finish also available

Available in:

- all alloys shown in this brochure
- 0.025 mm (.001") to 21 mm (.827")
- quantities from 3 metres to 3 tonnes
- spring temper, bright annealed, No. 1 temper, or your special temper condition
- coils, spools and bulk reels
- cut lengths of 3 mm to 3 metres

"Our lead times are short because we stock in excess of 200 tonnes of more than 60 alloys."

Profile wire



Available in:

- all alloys shown in this brochure, plus other ferrous and non-ferrous materials
- 0.4 mm (.0157") to 10 mm (.394")
- quantities from 3 metres to 3 tonnes
- hard, bright annealed or your special temper condition
- coils, spools and bulk reels
- cut lengths of 50 mm to 3 metres

If you have a special material requirement or you have a specific shape, contact us for your quote

Flat wire – Ribbon / Foil / Tape

Order quantities from 3 metres to 3 tonnes

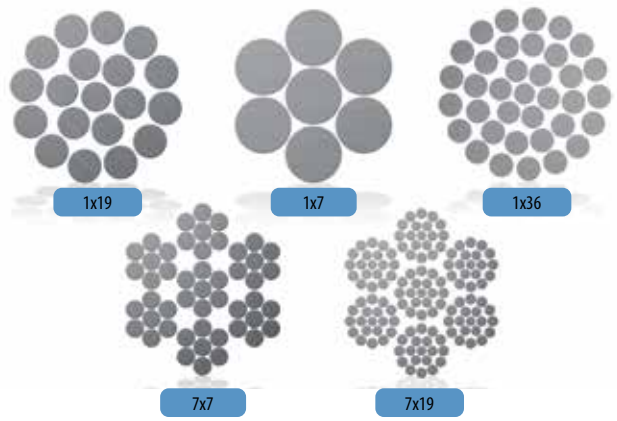
Available in:

- all alloys shown in this brochure, plus other ferrous and non-ferrous materials not listed
- max. width 13 mm (.512")
- min. thickness 0.03 mm (.0015")
- max. ratio width: thickness = 50:1
- order quantities from 3 metres to 3 tonnes
- hard, bright annealed or special temper condition

Wire rope & strand

Another product that AWI specialise in is wire rope and strand in High Performance alloys, for use in highly corrosive or high temperature environments.

Market sectors include oil & gas technology, metering devices, chemical plants, robotics and many more. Stranded wire provides strength, but also flexibility to the overall wire.



Available in:

- all alloys shown in this brochure
- diameters 0.6 mm (.024") to 12 mm (0.472")
- Order quantities from 3 metres to 3000 metres

Available in all alloys
Monel, Hastelloy, MP35N, Inconel, Phynox etc.

Manufacturing sizes from 0.6 mm to 12 mm diameter

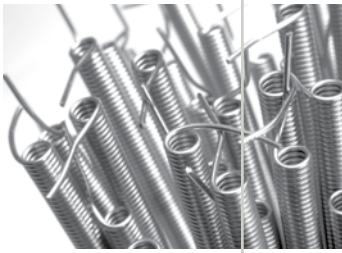
Supporting the spring manufacturer

At AWI we manufacture wire for spring makers worldwide, providing unrivalled technical support in the design of a successful end product.

Our knowledge and experience within this industry enables us to produce wire with the perfect properties required for precision coiling and – when you combine this with our 98% on time delivery performance – ensures our customers are able to deliver springs to schedule with minimal waste. This allows them to save money and grow business through their own client satisfaction.

We regularly supply just enough wire to make 2 or 3 springs for critical repairs or for testing new products.

Wire made to your spring design requirements



Manufacturing spring wire with:

- Soap Coating
- Dead Cast
- Consistent Temper

Flat wire for spring energiser seals

Precision rolled flat wire to exacting dimensional tolerances and specific hardnesses

AWI manufactures precision rolled flat wire to exacting mechanical and dimensional tolerances for a multitude of industries.

Manufacturers of spring energisers around the world call on us to supply their flat wire to achieve all the strict design requirements of their customer – we don't just process wire, we make it to order!

- Phynox (UNS R30003)
- Alloy MP35N
- Hastelloy
- Inconel
- Stainless Steel

Wire for precision electronics

Alloy Wire International manufacture wire for precision electronics, where dimensional tolerances and surface finish are critical. The wire can also be made to differing levels of hardness and can be supplied as the finished straight pin.

Customers using our electrical resistance wire for precision wire wound resistors can specify their round or flat wire to linear resistance. It is available with a bright or oxidised surface finish.

Controlled Expansion Alloys

- NILO® 36 (Invar†)
- NILO® 42
- NILO® 48
- NILO® 52
- NILO® K (Kovar)

Glass to metal seals

Nickel Wire

- NICKEL® 200
- NICKEL® 201
- NICKEL® 205
- NICKEL® 212
- NICKEL® 270

Beryllium-Copper CB101

Wire wound resistors

- 80/20 NiCr (Nichrome)
- 45/55 NiCu (Constantan)
- RW 135 Iron-Chrome-Aluminium

Bright annealed wire and oxidised wire available.

Hot & cold cutting wire

Alloy Wire manufacture wire for both hot and cold cutting applications. Wire choice is made depending upon the strength, ductility and corrosion resistance required of the wire.

Our 'High Strength' hot cutting wire range is used for the cutting of polystyrene (EPS)/Foam and boasts an excellent track record for working continuously on oscillating cutting frames. To achieve the best cut, adjust the temperature and cutting speed.

Our cold cutting wire, with its superior corrosion resistance and ductility, is used within the food industry for the cutting of numerous foods, including cheese.

Wire assemblies

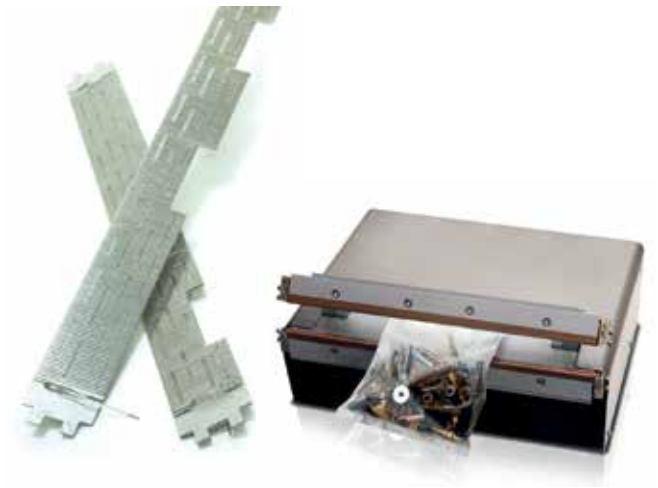
We can supply the complete 'hot cutting' wire assembly for Industrial Foam/EPS cutting machines as an alternative to the customer buying direct from the Original Equipment Manufacturer (OEM).

Our pre-assembled 'wire assemblies' are used for speed, convenience and reducing production downtime.

Electrical resistance wire

Electrical resistance wire for heating elements, resistors and packaging machines. Hot cutting wire for foam cutting.

80/20 NiCr	45/55 NiCu	RW 41	RW 118 - RW 122 - RW 70
Also known as			
RW80, Nichrome 80, Nichrome 5, Brightray C®, Gilphy 80, Tophet A, Nikrothal 80, Cromaloy 5, Cronix 80, Chromel A	RW45, Advance, Ferry®, Eureka, Constantan, Hecnum	Ultra High Strength Hot Cutting Wire, Foam / Polystyrene (EPS) Hot Cutting Wire	High Strength Hot Cutting Wires, Polystyrene (EPS) Hot Cutting Wires
Applications			
Heating Elements Band Heaters Resistors	Resistors Electronics	Hot Cutting Fabrication/Line Bending	



We manufacture and stock electrical resistance wire and flat wire for heating elements, resistors, hot wire cutting and bag sealing.

Not sure what wire to use? Then buy an AWI 'TESTER PACK'

If you are unsure of the wire or ribbon size, or electrical resistance (Ohms/m) you require, you can buy a 'Tester Pack'. This provides you with a selection of different wire or ribbon stock sizes for you to try in your application.

Our resources have allowed us to develop wires for specific applications that perform even better than the standard product. Please ask us about alternatives that may be more cost-effective or durable in your application.

- Element wires for heat sealers & impulse sealers
- Vacuum sealing
- 'T' profile heat sealing & impulse sealing
- Plastic bag welding
- Wire for 'L' sealers
- Hot cutting wires for foam (EPS)
- Electric heating elements
- Electrical resistors

Order quantities from 3 metres to 3 tonnes

Resistance & length – 80/20 NiCr Round Wire

SWG	AWG/B & S	inch	mm	ft/lb	Ohms/ft	m/kg	Ohms/m
5		0.212	5.385	7.9	0.014	5.3	0.047
	4	0.2043	5.189	8.5	0.016	5.7	0.051
6		0.192	4.880	9.6	0.018	6.4	0.058
	5	0.1819	4.620	10.7	0.020	7.2	0.064
7		0.176	4.470	11.4	0.021	7.7	0.069
	6	0.162	4.110	13.5	0.025	9.1	0.081
8		0.160	4.060	13.8	0.025	9.3	0.083
	7	0.1443	3.665	17.0	0.031	11.4	0.102
9		0.144	3.660	17.0	0.031	11.4	0.103
	8	0.1285	3.264	21.4	0.039	14.4	0.129
10		0.128	3.250	21.6	0.040	14.5	0.130
11		0.116	2.950	26.2	0.048	17.6	0.158
	9	0.1144	2.906	27.0	0.050	18.1	0.163
12		0.104	2.640	32.7	0.060	22.0	0.197
	10	0.1019	2.588	34.0	0.063	22.9	0.205
13		0.092	2.340	41.6	0.077	28.0	0.251
	11	0.0907	2.304	42.9	0.079	28.9	0.259
	12	0.0808	2.052	54.1	0.099	36.4	0.326
14		0.080	2.030	55.3	0.102	37.2	0.334
15	13	0.072	1.830	68.1	0.125	45.7	0.411
	14	0.0642	1.631	85.7	0.158	57.6	0.517
16		0.064	1.630	85.8	0.158	57.7	0.517
	15	0.0571	1.450	108.4	0.199	72.9	0.654
17		0.056	1.420	113.0	0.208	76.0	0.682
	16	0.0508	1.290	137.0	0.252	92.1	0.826
18		0.048	1.220	153.1	0.282	102.9	0.924
	17	0.0453	1.150	172.4	0.317	115.8	1.040
	18	0.0403	1.024	217.5	0.400	146.2	1.312
19		0.040	1.020	219.1	0.403	147.2	1.322
20		0.036	0.914	272.9	0.502	183.4	1.646
	19	0.0359	0.912	274.1	0.504	184.2	1.653
21	20	0.032	0.813	344.9	0.634	231.8	2.080
	21	0.0285	0.724	434.9	0.799	292.2	2.623
22		0.028	0.710	452.2	0.831	303.9	2.727
	22	0.0253	0.643	551.3	1.014	370.5	3.325
23		0.024	0.610	612.6	1.126	411.7	3.695
	23	0.0226	0.574	691.8	1.272	464.9	4.173
24		0.022	0.560	726.9	1.336	488.5	4.384
	24	0.0201	0.511	874.5	1.608	587.7	5.275
25		0.020	0.508	883.3	1.624	593.6	5.328
26		0.018	0.457	1091.4	2.007	733.5	6.583
	25	0.0179	0.455	1102.7	2.027	741.1	6.651
27		0.0164	0.417	1310.9	2.410	881.0	7.907
	26	0.0158	0.401	1415.3	2.602	951.1	8.537
28		0.0148	0.376	1612.3	2.964	1083.6	9.725

Resistance & length – 80/20 NiCr Round Wire

SWG	AWG/B & S	inch	mm	ft/lb	Ohms/ft	m/kg	Ohms/m
	27	0.0142	0.361	1749.1	3.216	1175.5	10.550
29		0.0136	0.345	1915.1	3.521	1287.0	11.552
	28	0.0126	0.320	2226.0	4.093	1496.0	13.427
30		0.0124	0.315	2297.3	4.223	1543.9	13.857
31		0.0116	0.295	2619.3	4.816	1760.3	15.799
	29	0.0113	0.287	2767.4	5.088	1859.8	16.692
32		0.0108	0.274	3036.2	5.582	2040.5	18.314
33	30	0.0100	0.254	3533.2	6.496	2374.4	21.311
34		0.0092	0.234	4162.9	7.654	2797.7	25.110
	31	0.00893	0.2268	4430.6	8.146	2977.5	26.724
35		0.0084	0.2130	5024.2	9.237	3376.5	30.305
	32	0.00795	0.2020	5586.3	10.270	3754.3	33.696
36		0.0076	0.1930	6119.5	11.251	4112.6	36.912
	33	0.00708	0.1798	7048.5	12.959	4736.9	42.515
37		0.0068	0.1730	7616.2	14.002	5118.4	45.939
	34	0.00630	0.1600	8904.1	16.370	5983.9	53.708
38		0.006	0.1520	9866.0	18.139	6630.4	59.510
	35	0.00561	0.1425	11226	20.640	7544.6	67.715
39		0.0052	0.1320	13082	24.052	8791.8	78.910
	36	0.00500	0.1270	14133	25.983	9497.7	85.245
40		0.0048	0.1220	15315	28.156	10292	92.376
	37	0.00445	0.1130	17842	32.802	11991	107.62
41		0.0044	0.1120	18172	33.408	12212	109.61
42		0.004	0.1020	21909	40.280	14724	132.15
	38	0.00397	0.1008	22417	41.214	15065	135.22
43		0.0036	0.0910	27526	50.607	18499	166.03
	39	0.00353	0.0897	28330	52.084	19039	170.88
44		0.0032	0.0813	34487	63.403	23176	208.02
	40	0.00315	0.0800	35616	65.481	23936	214.83
45	41	0.0028	0.0711	45091	82.900	30303	271.98
	42	0.00249	0.0632	56985	104.77	38297	343.73
46		0.0024	0.0610	61259	112.62	41169	369.50
	43	0.00222	0.0564	71690	131.80	48179	432.42
47		0.002	0.0508	88329	162.39	59361	532.78
	44	0.00198	0.0503	90122	165.69	60566	543.60
	45	0.00176	0.0447	114061	209.70	76654	687.99
48		0.0016	0.0406	138286	254.24	92934	834.11
	46	0.00157	0.0399	143339	263.53	96330	864.59
	47	0.0014	0.0356	179858	330.67	120872	1084.9
	48	0.00124	0.0315	229784	422.46	154425	1386.0
49		0.0012	0.0305	245036	450.50	164675	1478.0
	49	0.00111	0.0282	286759	527.20	192714	1729.7
50		0.001	0.0254	353315.7	649.57	237443	2131.1

These values are for bright annealed wire measured at room temperature.
You can also order to a specific size or electrical resistance.
For 45/55 NiCu, convert using the above Ohms/m or Ohms/ft x 0.454

Resistance & length – 80/20 NiCr Flat Wire / Ribbon / Foil / Tape (mm)

Width (mm)	Thickness (mm)	Ohms/m	Ohms/ft	m/kg	ft/lb
5.00	1.000	0.226	0.069	25	37
5.00	0.470	0.469	0.143	52	78
5.00	0.300	0.729	0.222	81	121
5.00	0.200	1.089	0.332	121	181
4.00	0.120	2.265	0.690	252	375
4.00	0.300	0.915	0.279	102	152
4.00	0.200	1.365	0.416	152	226
3.60	0.180	1.685	0.513	188	279
3.00	0.381	0.971	0.296	108	161
3.00	0.470	0.793	0.242	88	131
3.00	0.250	1.466	0.447	163	243
3.00	0.150	2.426	0.739	270	402
3.00	0.300	1.226	0.374	137	203
3.00	0.200	1.826	0.557	203	303
2.50	0.350	1.272	0.388	142	211
2.50	0.250	1.766	0.538	197	293
2.50	0.190	2.311	0.704	258	383
2.50	0.100	4.357	1.328	486	722
2.40	0.150	3.041	0.927	339	504
2.36	0.320	1.473	0.449	164	244
2.00	0.073	7.455	2.272	831	1236
2.00	0.150	3.659	1.115	408	607
2.00	0.050	10.858	3.310	1210	1800
2.00	0.200	2.759	0.841	307	457
2.00	0.100	5.458	1.664	608	905
1.80	0.150	4.073	1.241	454	675
1.80	0.090	6.739	2.054	751	1117
1.68	0.380	1.778	0.542	198	295
1.60	0.160	4.311	1.314	480	715
1.60	0.150	4.592	1.400	512	761
1.60	0.100	6.842	2.085	762	1134
1.50	0.150	4.905	1.495	547	813
1.50	0.400	1.909	0.582	213	316
1.10	0.090	11.104	3.384	1237	1841
1.02	0.076	14.158	4.315	1577	2347
1.00	0.125	8.877	2.706	989	1472
1.00	0.150	7.439	2.267	829	1233
0.90	0.200	6.300	1.920	702	1044
0.50	0.035	62.653	19.097	6981	10388

These values are for bright annealed wire measured at room temperature.
You can also order to a specific size or electrical resistance.
For 45/55 NiCu, convert using the above Ohms/m or Ohms/ft x 0.454

Resistance & length – 80/20 NiCr Flat Wire / Ribbon / Foil / Tape (inches)

Width (inch)	Thickness (inch)	Ohms/ft	Ohms/m	ft/lb	m/kg
1/4	.008	0.257	0.843	140	94
1/4	.004	0.512	1.680	278	187
3/16	.010	0.275	0.903	150	101
3/16	.006	0.457	1.498	248	167
3/16	.0035	0.781	2.561	425	285
5/32	.020	0.168	0.551	91	61
5/32	.010	0.331	1.086	180	121
5/32	.009	0.367	1.205	200	134
1/8	.020	0.211	0.693	115	77
1/8	.015	0.279	0.916	152	102
1/8	.010	0.415	1.363	226	152
1/8	.007	0.590	1.936	321	216
1/8	.006	0.687	2.255	374	251
1/8	.005	0.823	2.702	448	301
1/8	.004	1.028	3.371	559	376
1/8	.008	0.517	1.697	281	189
.100	.008	0.649	2.129	353	237
.100	.006	0.861	2.826	469	315
.100	.0056	0.922	3.026	502	337
.100	.005	1.032	3.384	561	377
.100	.004	1.287	4.221	700	470
3/32	.008	0.693	2.274	377	253
3/32	.006	0.920	3.017	500	336
3/32	.005	1.101	3.612	599	403
3/32	.004	1.373	4.505	747	502
1/16	.0025	3.294	10.81	1792	1204
1/16	.010	0.845	2.773	460	309
1/16	.008	1.049	3.442	571	384
1/16	.007	1.195	3.920	650	437
1/16	.006	1.389	4.558	756	508
1/16	.005	1.661	5.450	904	607
1/16	.004	2.069	6.789	1126	756
1/16	.003	2.750	9.021	1496	1005
1/16	.019	0.460	1.508	250	168
1/16	.009	0.936	3.071	509	342
.059	.0031	2.821	9.257	1535	1031
.050	.008	1.321	4.333	718	483
.050	.006	1.746	5.727	950	638
.050	.005	2.086	6.842	1134	762
.050	.004	2.596	8.516	1412	949
.050	.0035	2.960	9.711	1610	1082
.050	.0033	3.137	10.29	1706	1147
.050	.003	3.446	11.31	1874	1260
.050	.0028	3.689	12.10	2007	1348
1/32	.0025	6.645	21.80	3614	2429
1/32	.010	1.753	5.751	953	641
1/32	.009	1.933	6.343	1052	707
1/32	.006	2.838	9.311	1544	1037
1/32	.0049	3.448	11.31	1875	1260
1/32	.003	5.557	18.23	3023	2031
.025	.002	10.38	34.06	5648	3795
.025	.008	2.739	8.985	1490	1001
.025	.004	5.283	17.33	2874	1931
.025	.003	6.982	22.91	3798	2553
1/64	.0035	9.800	32.15	5331	3582

These values are for bright annealed wire measured at room temperature.
You can also order to a specific size or electrical resistance.
For 45/55 NiCu, convert using the above Ohms/m or Ohms/ft x 0.454

6 key advantages to you, *our customer*

RANGE

Size: 0.025 mm (.001") to 21 mm (.827")

3m 3t

Order quantity: 3 metres to 3 tonnes

DELIVERY 3 WEEKS

Delivery: within 3 weeks

60

Wire, bars & rope in over 60 alloys

Manufactured to your specification

Emergency Manufacturing Service

Industries we serve:

Aerospace
Oil & Gas
Nuclear
Power Generation
Chemical Industries
Marine Engineering
Automotive
Pharmaceuticals
Ceramics

It's more than just wire manufacturing

Founded in 1946, Alloy Wire is the world's preferred manufacturer of nickel alloy wire, providing customers with the assurance of quality, delivery and accuracy – the fundamental reason behind our strapline...

"Manufacturing quality, delivering reliability"

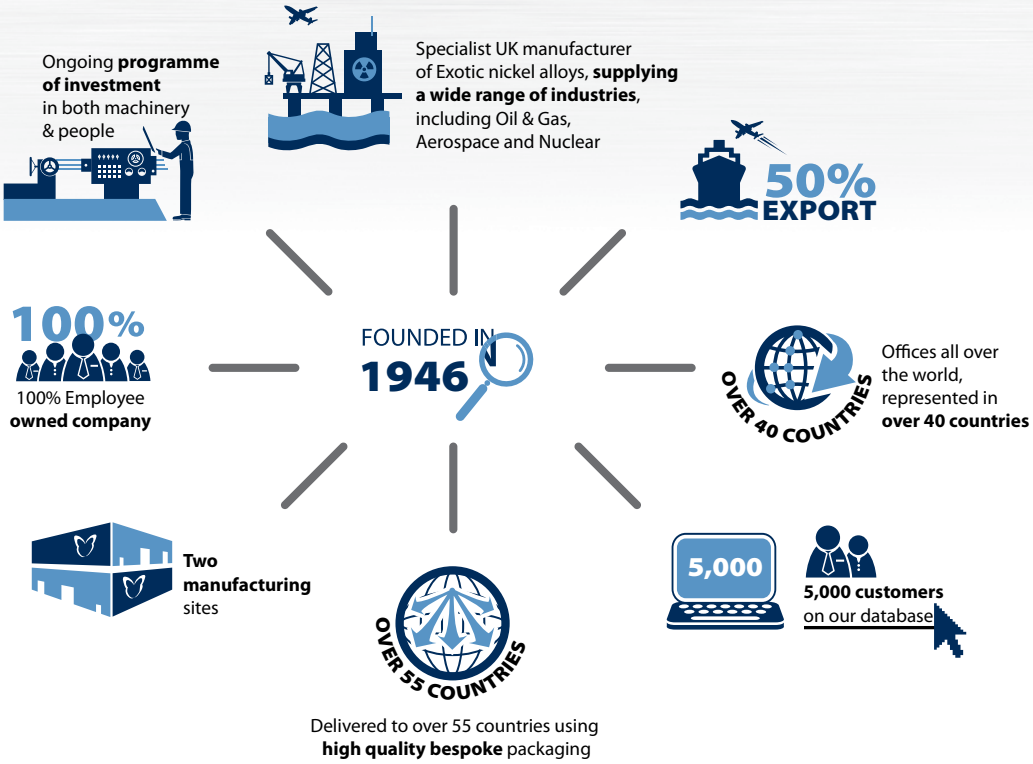
We are a 100% employee owned company; an environment that creates interest, loyalty and commitment from every member of our staff.

To remain a top supplier of nickel alloy wire, AWI's main priorities are in ongoing investment in new technology, equipment and training.

Our R&D facilities enable us to constantly explore new materials and processes, in order to expand our range of products and services. Customers regularly compliment us on the technical expertise and support we provide.

Aerospace, nuclear, oil & gas – three industries that use Alloy Wire for their safety critical components to withstand high temperatures and corrosive environments

8 things about us



Alloy Wire International is a specialist manufacturer of precision cold drawn round wire, flat wire, shaped wire and wire rope in over 60 different High Performance 'Exotic' nickel alloys.

Why work with us?

Why is AWI such a successful nickel alloy wire specialist?

Firstly, we are completely owned by everyone that works here. This can be seen throughout the organisation when you walk around our factories, or you speak with any of our offices in four different continents. Smiles and knowledge are in abundance and each member of staff shares a desire to ensure their individual roles contribute to the positive experience of the customer.

The offer

We offer wire from 0.025 mm (.001") to 21.0 mm (.827") and currently work with 5000 customers in more than 15 sectors.

Our extensive stockholding of materials (EU/DFARS), ability to provide small batch quantities and 3 week lead times has seen us become a global leader, delivering our wire to more than 55 countries around the world.

"You need a certain culture to achieve employee ownership, one of transparency, trust and togetherness... almost like a family."

Mark Venables, Managing Director

A truly global presence

Representatives in over 40 countries

Worldwide offices

AUSTRALIA
AUSTRIA
BELGIUM
BRAZIL
BULGARIA
CANADA
CHINA
CROATIA
CZECH REPUBLIC
FRANCE
GERMANY
HOLLAND
HUNGARY
INDIA
INDONESIA
ISRAEL
ITALY
JAPAN
LUXEMBOURG
MEXICO
MOLDOVA
NEW ZEALAND
OMAN
POLAND
PORTUGAL
QATAR
ROMANIA
SAUDI ARABIA
SERBIA
SLOVAKIA
SLOVENIA
SOUTH AFRICA
SOUTH KOREA
SPAIN
SWITZERLAND
TAIWAN
THAILAND
TURKEY
UAE
UKRAINE
UNITED KINGDOM
USA
VIETNAM

See our website for full details of your local office

100% employee owned

Alloy Wire International is 100% owned by all its employees

This means they have an invested interest in the success of the business and, therefore, are committed to giving our customers a 'First Class' service. From the Annealing Technicians to the Maintenance Engineers and right through to the Shipping team, all staff are focused on completing your order on time and to specification.

An on-time quality product – with great service – helps our customers receive repeat business and creates another client loyal to Alloy Wire.

"...an on-time quality product – with great service – helps our customers receive repeat business and creates another client loyal to Alloy Wire"

Emergency Manufacturing Service - E.M.S.

Wire required urgently?

If you have an emergency situation and require your wire even faster, ask for our Emergency Manufacturing Service (E.M.S.) This truly special service ensures your wire is manufactured within days and shipped to your door by the fastest route possible.

When you need your wire
manufactured fast!


OIL & GAS


NAVAL


AUTOMOTIVE


AEROSPACE

Processing *your* free issue material

If you have a special grade of material that you require processing to a smaller size and to a precise specification, we can help.

We will convert your free issue wire or bars to your exact requirements. Our expertise in manufacturing small order quantities means very little material is lost in the setting up process and that's why we are entrusted to process customers' high value materials, such as Silver-Palladium.

"... skill in manufacturing small order quantities means very little material is lost in the setting up process"


Silver-Palladium

A full comprehensive service

Hands-on manufacturing

- Over 200 tonnes of stock
- A manufacturing lead time of 3 weeks
- Accepting orders from 3 metres to 3 tonnes

On-site maintenance

- Self-sufficient maintenance
- Bespoke machinery made on site
- Round and shaped wire, produced on machinery specifically designed for Alloy Wire International

Listening to our customers and manufacturing to their needs




Bespoke manufacturing

- Emergency Manufacturing Service available (E.M.S.)
- Manufacturing in coils, on spools or straight bars
- Wire produced to your specification

Multiple size ranges

- **Wire diameters:**
  0.025 mm (.001") to 21.0 mm (.827")
- **Shaped profile wire:**
  widths from 0.4 mm (.0157") to 10.0 mm (.394")
  thickness from 0.025 mm (.001") to 6.0 mm (.236")
- **Bars and ground lengths:**
  3 mm (.118") to 3 m (10 ft)

Technical support

- Providing you with technical support before and after your order, giving you confidence in your purchase and product design

The complete service

- We can re-process your free issue material
- Regular customer visits to understand your needs
- Exhibiting internationally to promote new materials and processes

Shipping

- Positive Material Identification (XRF) done before shipping as part of our 100% final inspection
- High quality bespoke packaging for secure delivery worldwide

Technical support & service

As approved suppliers of nickel alloys into numerous high technology products, we have a wealth of knowledge and experience in the application of the wire and its specific processing to achieve the customer's design. AWI's proficiency of the craft and science behind wire manufacturing is of the very highest level.

We offer you technical support from inception to completion and can answer common questions, such as:

- How do I heat treat?
- What is my maximum operating temperature?
- What tensile strength do I need?
- What is the specification AMS 5699?
- Which alloy for my application?

Answering your technical questions gives you confidence in your product's success

Angus Hogarth - Sales Director

Sales team

Alloy Wire recognise that good business is all about people and service and it is this mind-set that has made us the preferred choice for nickel alloys. A first-class and consistent service is key to repeat business as well as the growth of new business.

Meet our global sales team:
www.alloywire.com/international

Tom Mander
Sales Executive

Natalie Baker
Sales Executive

James Mander
Sales Executive

Stephen Olley
Sales Executive

Scott Smith
Despatch Executive

Paul Chatterley
Sales Executive

Be confident doing business with us

Quality

Alloy Wire International has maintained quality approval ISO 9001 since 1991 and also achieved accreditation to the aerospace quality standard AS 9100 in April 2013. Both of these approvals are in recognition that our manufacturing and processing techniques are defined to the highest industry standards achievable.

Environmental

We are fully committed to the promotion and preservation of our environment. We achieved approval to ISO 14001 in 2015; this demonstrates our commitment to exceed our moral environmental responsibility.

Health & Safety

In 2019 we were awarded the NEW International Health & Safety approval ISO 45001 (replacing our BS OHSAS 18001 of 2015). This demonstrates the importance we place on exceeding our legal and moral obligations for the for the well-being and safety of all employees and visitors.

AS 9100 Aerospace & Defence

ISO 9001 Quality Management

ISO 14001 Environmental

ISO 45001 Health & Safety

Associate Member of the Chicago Spring Manufacturing Institute

IST MEMBER

REACH +RoHS REGULATED

SMI Spring Manufacturers Institute

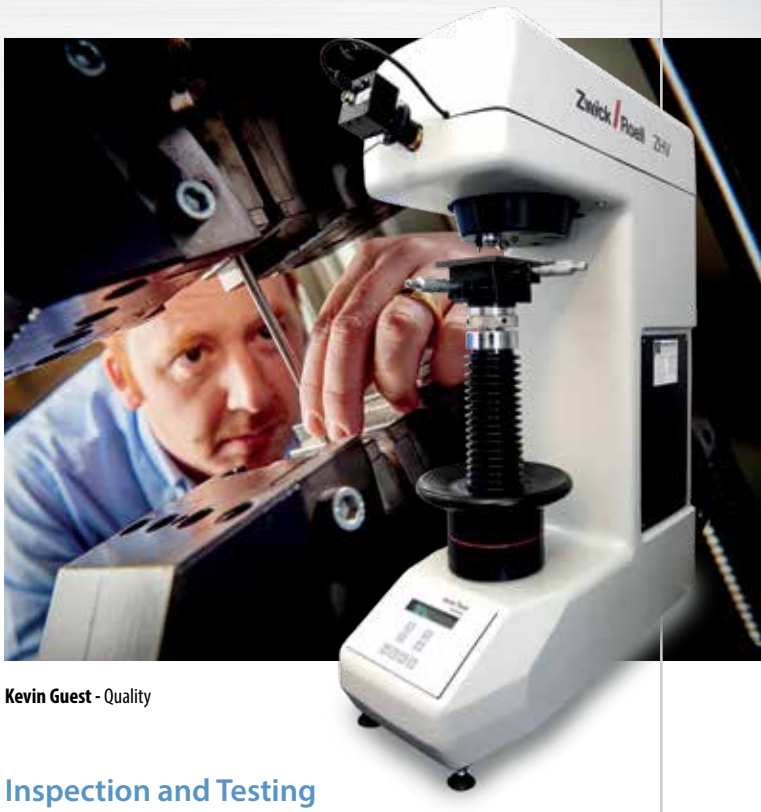
ANCEM

DFARS COMPLIANT

BAE SYSTEMS

JSMA Japan Spring Manufacturers Association
一般社団法人 日本ばね工業会

Our wire is used for various component parts in aero engines – where quality and dependability is essential



Kevin Guest - Quality

Inspection and Testing

All incoming materials are visually inspected and P.M.I. (Positive Material Identification) tested before processing begins. In-process inspection is carried out at every stage of production and full traceability maintained throughout.

Final Inspection on all finished material may include:

- Dimensional Checks
- Surface Finish
- Tensile Strength
- Proof Stress
- Elongation
- Breaking Loads
- Hardness*
- Wrap Test
- Bend Test
- Torsion Test
- Post-Heat Treatment Tests
- Positive Material Identification (P.M.I.)

*** All hardness tests are measured in Vickers and converted using conversion tables in ASTM E140.**

In addition, we have examination facilities that allow visual inspection up to 400x, linked to computer software that can produce digital or photographic images. We also have equipment that enables preparation and examination of cross-sections of material and can also offer access to 3rd party external testing.

Tolerances

Here are our standard tolerances.
If you require tighter tolerances, please ask.

Wire Diameter Tolerances					
mm			inch		
wire diameter	up to but excluding	tolerance	wire diameter	up to but excluding	tolerance
0.0254	0.203	± 0.0051	.001	.008	± .0002
0.203	0.376	± 0.0076	.008	.015	± .0003
0.376	0.813	± 0.0100	.015	.032	± .0004
0.813	1.220	± 0.0127	.032	.048	± .0005
1.220	2.030	± 0.0152	.048	.080	± .0006
2.030	3.250	± 0.0203	.080	.128	± .0008
3.250	4.470	± 0.0254	.128	.176	± .0010
4.470	5.890	± 0.0381	.176	.232	± .0015
5.890	8.000	± 0.0510	.232	.315	± .0020
8.000	10.00	± 0.0635	.315	.395	± .0025
10.00	21.00	± 0.0762	.395	.827	± .0030

Wire Ovality Tolerances					
mm			inch		
wire diameter	up to but excluding	tolerance	wire diameter	up to but excluding	tolerance
0.0254	0.0508	0.0051	.001	.002	.0002
0.0508	1.02	0.0076	.002	.040	.0003
1.02	2.03	0.0100	.040	.080	.0004
2.03	4.47	0.0127	.080	.176	.0005
4.47	8.00	0.0152	.176	.315	.0006
8.00	21.00	0.0203	.315	.827	.0008

Flat Wire Tolerances			
mm		inch	
dimensions	tolerance	dimensions	tolerance
Width	± 5%	Width	± 5%
Thickness ≤0.20	±.0100	Thickness ≤.008	± .0004
Thickness >0.20	± 5%	Thickness >.008	± 5%

Section Tolerances					
mm			inch		
from	up to but excluding	tolerance	from	up to but excluding	tolerance
-	2.0	± 0.04	-	.0787	± .0016
2.0	4.0	± 0.07	.0787	.157	± .0027
4.0	-	± 0.15	.157	-	± .0059

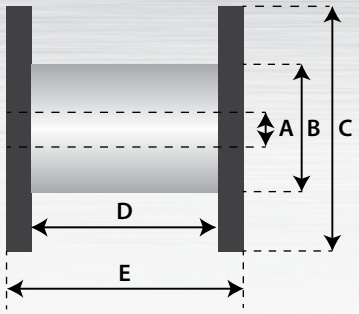
Straight Length Tolerances					
mm			inch		
diameter	length	tolerance	diameter	length	tolerance
up to 2.5	up to 1000	± 1.00	up to .098	up to 40	± .040
up to 2.5	1000 – 2000	± 2.00	up to .098	40 – 80	± .080
up to 2.5	2000 – 3000	± 2.50	up to .098	80 – 120	± .098
2.5 – 5.0	up to 1000	± 2.00	.098 – .197	up to 40	± .080
2.5 – 5.0	1000 – 2000	± 2.50	.098 – .197	40 – 80	± .098
2.5 – 5.0	2000 – 3000	± 3.00	.098 – .197	80 – 120	± .120
5.0 – 12.0	up to 1000	± 4.00	.197 – .472	up to 40	± .160
5.0 – 12.0	1000 – 2000	± 5.00	.197 – .472	40 – 80	± .200
5.0 – 12.0	2000 – 3000	± 6.00	.197 – .472	80 – 120	± .240

Electrical Resistance Tolerances					
mm			inch		
wire diameter	up to but excluding	tolerance	wire diameter	up to but excluding	tolerance
0.0254	0.0508	± 12%	.001	.002	± 12%
0.0508	0.076	± 10%	.002	.003	± 10%
0.076	0.15	± 7%	.003	.006	± 7%
0.15		± 5%	.006		± 5%
Flat wire		± 5%	Flat wire		± 5%

Mechanical results are achieved utilising the latest in-house computer aided testing equipment, giving high levels of accuracy and increased efficiency in our testing.

Packaging

To ensure your order arrives in perfect condition, we use specifically designed high quality packaging and proven reliable international couriers.



Coils

Wire Diameter		Coil Diameter		Maximum Coil Weights	
mm	inch	mm	inch	kg	lb
0.25 – 0.70	.010 – .0275	200	8	20	44
0.7 – 1.6	.0275 – .063	300	12	50	110
1.6 – 6.0	.063 – .236	600	24	100	220
6.0 – 10.0	.236 – .394	800	30	200	440
10.0 – 21.0	.394 – .827	1000	40	400	880

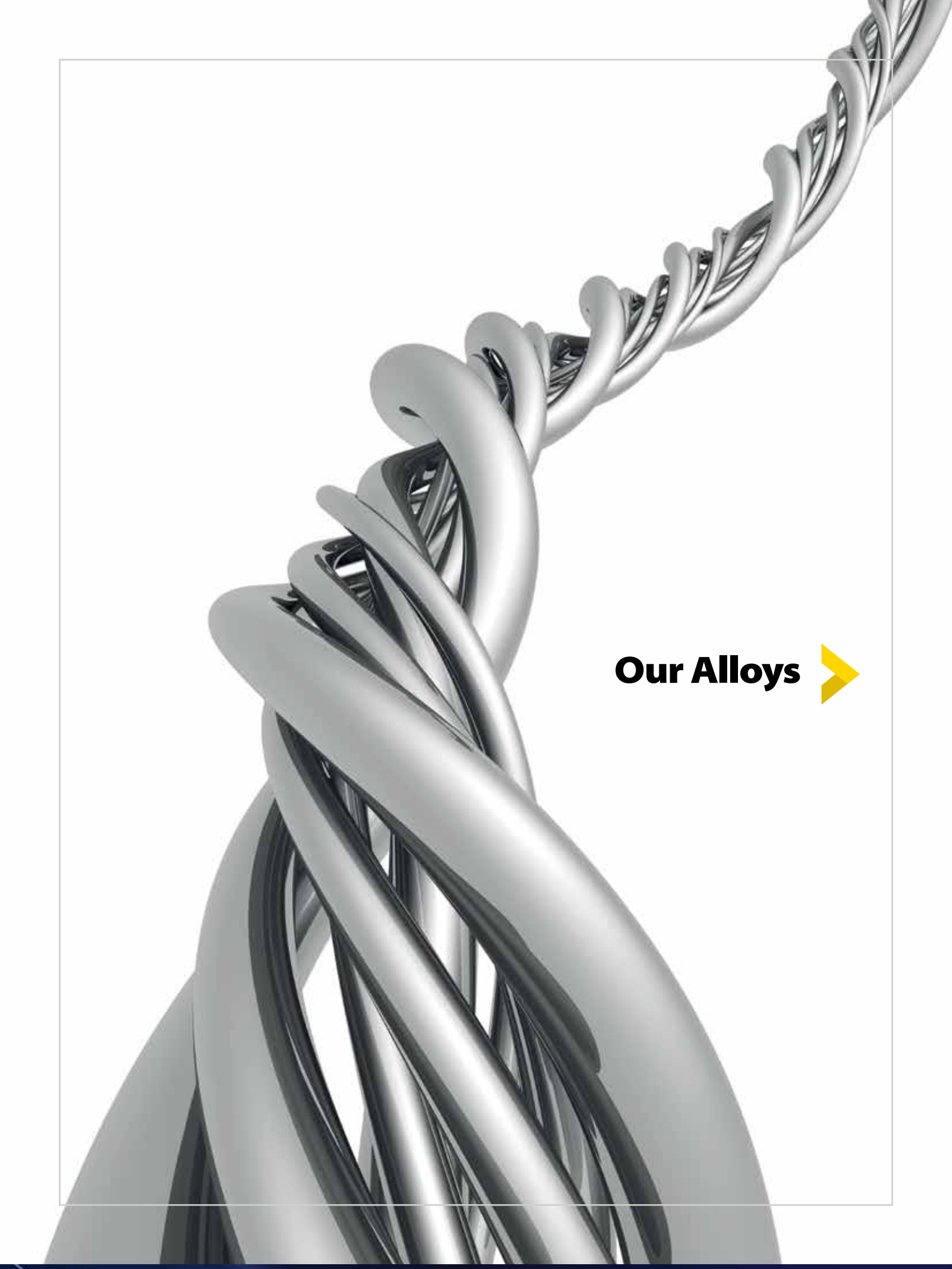
Spools

Spool Type	A	B	C	D	E	Wire Diameter Range	Max. Weight
DIN 80	16 mm	50 mm	80 mm	64 mm	80 mm	Up to 0.25 mm	0.800 kg
	.630"	2.00"	3.15"	2.50"	3.15"	Up to .010"	1.7 lb
DIN 100	16 mm	64 mm	100 mm	80 mm	100 mm	0.19 – 0.4 mm	1.500 kg
	.630"	2.50"	3.90"	3.15"	3.90"	.0076" – .016"	3.3 lb
DIN 125	16 mm	80 mm	125 mm	100 mm	125 mm	0.19 – 0.55 mm	3 kg
	.630"	3.15"	4.90"	3.90"	4.90"	.0076" – .022"	6.5 lb
DIN 160	22 mm	100 mm	160 mm	128 mm	160 mm	0.25 – 0.71 mm	5 kg
	.865"	3.90"	6.300"	5.040"	6.300"	.010" – .028"	11 lb
DIN 200	36 mm	125 mm	200 mm	160 mm	200 mm	0.4 – 0.81 mm	10 kg
	1.400"	4.920"	7.875"	6.300"	7.875"	.016" – .032"	22 lb
DIN 250	36 mm	160 mm	250 mm	160 mm	200 mm	0.4 – 1.5 mm	20 kg
	1.400"	6.300"	10.000"	6.300"	7.875"	.016" – .060"	44 lb
DIN 355	36 mm	225 mm	355 mm	162 mm	200 mm	1.0 – 3.0 mm	40 kg
	1.400"	8.75"	14.000"	6.25"	8"	.040" – .118"	88 lb
DIN 500	36 mm	316 mm	500 mm	180 mm	250 mm	1.2 – 3.0 mm	75 kg
	1.400"	12.440"	19.690"	7.090"	9.840"	.047" – .118"	165 lb
SK 460	305mm	318 mm	460 mm	91 mm	105 mm	0.25 – 1.8 mm	45 kg
	12.000"	12.520"	18.110"	3.580"	4.134"	.010" - .072"	95 lb
SK 255	216 mm	222 mm	253 mm	30 mm	36 mm	0.25 – 1.0 mm	1 kg
	8.500"	8.740"	10.000"	1.200"	1.420"	.010" - .040"	2.20 lb
Locking Reel	16 mm	70 mm	102 mm	38 mm	45 mm	0.25 – 1.0 mm	0.500 kg
	.630"	2.750"	4.000"	1.500"	1.770"	.010" – .040"	1.00 lb
¼ Cat	16 mm	43 mm	63 mm	51 mm	60mm	Up to 0.25 mm	0.300 kg
	.630"	1.700"	2.500"	2.000"	2.360"	Up to .010"	0.60 lb
½ Cat	16 mm	43 mm	63 mm	76 mm	86 mm	Up to 0.25 mm	0.500 kg
	.630"	1.700"	2.500"	3.000"	3.390"	Up to .010"	1.00 lb
Argon / Mig	52 mm	208 mm	300 mm	90 mm	102 mm	0.5 – 1.64 mm	12 kg
	2.050"	8.190"	11.810"	3.540"	4.020"	.020" – .064"	25 lb

Straight Lengths, Bars, or Pins

Dia mm	Dia inch	Length mm	Length inch	Surface finishes
0.3 – 12.0	.0118 – .472	3.0 – 4500	.118 – 177	Bright or ground or oxidised

If you require neutral labels or labels with your branding, let us know.



Our Alloys

INCONEL® 600

Chemical Composition		
Element	Min %	Max %
Ni	72.00	-
Cr	14.00	17.00
Fe	6.00	10.00
Mn	-	1.00
C	-	0.10
Cu	-	0.50
Si	-	0.50
S	-	0.015
P	-	0.04
Co	-	1.00
Nb/Cb	-	1.00
Ti	-	0.50
Ta	-	0.05
Al	-	0.35

Specifications

AMS 5665
AMS 5687
ASTM B166
BS 3075 NA 14
BS 3076 NA 14
DTD 328A
QQ-W-390

Designations

W.Nr. 2.4816
UNS N06600
AWS 010

Key Features

Good Oxidation Resistance
Good Corrosion Resistance at high temperatures
**High temperature static applications

Typical Applications

Furnace components
Chemical Processing
Food Processing
Nuclear Engineering

Density	8.47 g/cm^3	0.306 lb/in^3
Melting Point	1413°C	2575 °F
Coefficient of Expansion	13.3 µm/m °C (20 – 100 °C)	7.4 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	75.6 kN/mm^2	10965 ksi
Modulus of Elasticity	206 kN/mm^2	29878 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	460	860	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature depending on load** and environment**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	600 – 850	87 – 123	-200 to +1000	-330 to +1830
Spring Temper	900 – 1450	131 – 210	-200 to +1000	-330 to +1830
Slight magnetism may occur below 120 °C (184 °F)				

The above tensile strength ranges are typical. If you require different please ask.

****Static applications** = *still/fixed/motionless/rigid*

INCONEL® 601

Chemical Composition		
Element	Min %	Max %
Ni	58.00	63.00
Cr	21.00	25.00
S	-	0.015
Mn	-	1.00
Al	1.00	1.70
C	-	0.10
Cu	-	1.00
Si	-	0.50
Fe	BAL	

Specifications

ASTM B166

Designations

W.Nr. 2.4851
UNS N06601
AWS 011

Key Features

Outstanding resistance to oxidation & other forms of high temperature corrosion

Higher mechanical properties at elevated temperatures than Inconel 600

**High temperature static applications

Typical Applications

Petrochemical - Processing

Industrial Furnaces Gas Turbine -

Components Heat Treating - Equipment

Density	8.11 g/cm^3	0.293 lb/in^3
Melting Point	1411 °C	2571 °F
Coefficient of Expansion	13.75 µm/m °C (20 – 100°C)	7.6 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	81.2 kN/mm^2	11777 ksi
Modulus of Elasticity	206.5 kN/mm^2	29951 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	480 – 870	900 – 1600	1	Air
Temperature depends on composition and amount of cold work					

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature depending on load** and environment**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	700 – 900	102 – 131	-200 to +1000	-330 to +1830
Spring Temper	1200 – 1450	174 – 210	-200 to +1000	-330 to +1830

The above tensile strength ranges are typical. If you require different please ask.

****Static applications** = *still/fixed/motionless/rigid*

INCONEL® 625

Chemical Composition		
Element	Min %	Max %
C	-	0.10
Mn	-	0.50
Si	-	0.50
P	-	0.015
S	-	0.015
Cr	20.00	23.00
Co	-	1.00
Mo	8.00	10.00
Fe	-	5.00
Al	-	0.40
Ti	-	0.40
Ni	58.00	-
Nb/Cb	3.15	4.15
Ta	-	0.05
Cu	-	0.5

Specifications

AMS 5666
ASTM B446
BS 3076 NA 21
ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 2.4856
UNS N06625
AWS 012

Key Features

Excellent corrosion resistance in a wide range of corrosive media

Especially resistant to pitting and crevice corrosion

Good for sea water applications

Typical Applications

Marine Industries
Aerospace Industries
Chemical Processing
Nuclear Reactors
Pollution Control

Density	8.44 g/cm^3	0.305 lb/in^3
Melting Point	1350 °C	2460 °F
Coefficient of Expansion	12.8 µm/m °C (20 – 100 °C)	7.1 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	79 kN/mm^2	11458 ksi
Modulus of Elasticity	205.8 kN/mm^2	29849 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	260 – 370	500 – 700	0.5 – 1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	< 1050	< 152	-200 to + 340	-330 to + 645
Spring Temper	1300 – 1600	189 – 232	up to + 200	up to + 395

The above tensile strength ranges are typical. If you require different please ask.

INCONEL® 718

Chemical Composition		
Element	Min %	Max %
C	-	0.08
Mn	-	0.35
Si	-	0.35
P	-	0.015
S	-	0.015
Cr	17.00	21.00
Ni	50.00	55.00
Mo	2.80	3.30
Nb/Cb	4.75	5.50
Ti	0.65	1.15
Al	0.20	0.80
Co	-	1.00
Ta	-	0.05
B	-	0.006
Cu	-	0.30
Pb	-	0.0005
Bi	-	0.00003
Se	-	0.0003
Fe	BAL	

Specifications

AMS 5662
AMS 5663
AMS 5832
AMS 5962
ASTM B637
GE B5OTF14/15
GE B14H89
ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 2.4668
UNS N07718
AWS 013

Key Features

Good creep rupture strength at high temperatures

Higher strength than Inconel X-750

Better mechanical properties at lower temperatures than Nimonic 90 and Inconel X-750

Age hardenable

^^High temperature dynamic applications

Typical Applications

Gas Turbines
Rocket Motors
Space Craft
Nuclear Reactors
Pumps

Density	8.19 g/cm^3	0.296 lb/in^3
Melting Point	1336 °C	2437 °F
Coefficient of Expansion	13.0 µm/m °C (20 – 100 °C)	7.2 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	77.2 kN/mm^2	11197 ksi
Modulus of Elasticity	204.9 kN/mm^2	29719 ksi

Heat Treatment of Finished Parts

Condition as supplied by Alloy Wire	Type	Temperature		Time (Hr)	Cooling
		°C	°F		
No. 1 Temper or Spring Temper	Anneal Age Harden Total Age	980 720 620	1800 1330 1150	1 8 18	Air Furnace Air
No. 1 Temper or Spring Temper *(for ISO 15156-3 / NACE MR 0175)*	Anneal Age Harden	1010 790	1850 1455	2 6	Air Air
No. 1 Temper or Spring Temper	Age Harden Total Age	720 620	1330 1150	8 18	Furnace Air

Properties

Condition	Approx. tensile strength		Approx. operating temperature depending on load^^ and environment	
	N/mm^2	ksi	°C	°F
Annealed	800 – 1000	116 – 145	-	-
No. 1 Temper	1000 – 1200	145 – 175	-	-
Spring Temper	1250 – 1550	180 – 225	-	-
No. 1 Temper + Annealed + Aged	1250 – 1450	181 – 210	-200 to +550	-330 to +1020
No. 1 Temper + Aged	1520 – 1720	220 – 250	Contact Alloy Wire Technical Dept.	
Spring Temper + Annealed + Aged	1250 – 1450	181 – 210	-200 to +550	-330 to +1020
Spring Temper + Aged	1700 – 1950	247 – 283	Contact Alloy Wire Technical Dept.	

The above tensile strength ranges are typical. If you require different please ask. **^^Dynamic applications** = *active/lively/changing*

INCONEL® X-750

Chemical Composition		
Element	Min %	Max %
C	-	0.08
Mn	-	1.00
Si	-	0.50
S	-	0.01
Cr	14.00	17.00
Ni	70.00	-
Nb/Cb	0.70	1.20
Ti	2.25	2.75
Al	0.40	1.00
Fe	5.00	9.00
Co	-	1.00
Ta	-	0.05
Cu	-	0.50

Specifications

AMS 5667
AMS 5671
AMS 5698 (No 1 Spring Temper)
AMS 5699 (Spring Temper)
ASTM B637
BS HR 505
GE B14H41
ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 2.4669
UNS N07750
AWS 014

Key Features

Good creep rupture strength at high temperatures

Not as strong as Nimonic 90

Very good at cryogenic temperatures

Age hardenable

^^High temperature dynamic applications

Typical Applications

Nuclear reactors
Gas turbines
Rocket engines
Pressure vessels
Aircraft structures

Density	8.28 g/cm^3	0.299 lb/in^3
Melting Point	1430 °C	2600 °F
Coefficient of Expansion	12.6 µm/m °C (20 – 100 °C)	7.0 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	75.8 kN/mm^2	10994 ksi
Modulus of Elasticity **(Spring Temper + Aged)** **(Spring Temper + 3 Part Heat Treated)** **(No.1 Spring Temper + Aged)**	 218.0 kN/mm^2 212.4 kN/mm^2 213.7 kN/mm^2	 31619 ksi 30806 ksi 30995 ksi

Heat Treatment of Finished Parts

Condition as supplied by Alloy Wire	Type	Temperature		Time (Hr)	Cooling
		°C	°F		
Spring Temper	Age Harden	650	1200	4	Air
Spring Temper (3 Part)	Anneal Stabalize Age Harden	1150 843 704	2100 1550 1300	2 ★★ 24 20	Air Air Air
No. 1 Temper	Age Harden	730	1350	16	Air

Properties

Condition	Approx. tensile strength		Approx. operating temperature depending on load^^ and environment	
	N/mm^2	ksi	°C	°F
Annealed	800 – 1000	116 – 145	-	-
No. 1 Temper	900 – 1150	130 – 167	-	-
Spring Temper	1100 – 1500	160 – 218	-	-
No. 1 Temper + Aged	1300 – 1450	188 – 210	-200 to +550	-330 to +1020
Spring Temper + Aged	1350 – 1750	196 – 254	-200 to +370	-330 to +700
Spring Temper + 3 part heat treated	1100 – 1250	159 – 181	-200 to +550	-330 to +1020

The above tensile strength ranges are typical. If you require different please ask.

★★for diameters below 1.00mm contact AWI Technical department ^^**Dynamic applications** = *active/lively/changing*

NIMONIC® 75

Chemical Composition		
Element	Min %	Max %
C	0.08	0.15
Si	-	0.30
Mn	-	1.00
S	-	0.15
Co	-	5.00
Cr	19.00	21.00
Cu	-	0.50
Fe	-	5.00
Pb	-	0.005
Ti	0.2	0.50
P	-	0.015
Al	-	0.40
Ni	BAL	

Specifications

BS HR 5
BS HR 504

Designations

W.Nr. 2.4951
W.Nr. 2.4630
UNS N06075
AWS 032

Key Features

Good corrosion resistance
Good heat resistance
**High temperature static applications

Typical Applications

Aerospace fasteners

Density	8.37 g/cm^3	0.302 lb/in^3
Melting Point	1380 °C	2520 °F
Coefficient of Expansion	11.0 µm/m °C (20 – 100 °C)	6.1 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	75.6 kN/mm^2	10965 ksi
Modulus of Elasticity	206 kN/mm^2	29878 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	450 – 470	840 – 880	0.5 – 1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature depending on load** and environment**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	700 – 800	102 – 116	-200 to +1000	-330 to +1830
Spring Temper	1200 – 1500	174 – 218	-200 to +1000	-330 to +1830

The above tensile strength ranges are typical. If you require different please ask.

****Static applications** = *still/fixed/motionless/rigid*

NIMONIC® 80A

Chemical Composition		
Element	Min %	Max %
C	0.04	0.10
Si	-	1.00
Mn	-	1.00
S	-	0.015
Ag	-	0.0005
Al	1.00	1.80
B	-	0.008
Bi	-	0.0001
Co	-	2.00
Cr	18.00	21.00
Cu	-	0.20
Fe	-	1.50
Pb	-	0.002
Ti	1.8	2.70
Ni	BAL	

Specifications

ASTM B637
BS 3076 NA 20
BS HR 1
BS HR 601

Designations

W.Nr. 2.4952
W.Nr. 2.4631
UNS N07080
AWS 031

Key Features

Largely superseded by Nimonic 90 & Inconel X-750

Still specified for nuclear applications due to low cobalt content

Age hardenable

^^High temperature dynamic applications

Typical Applications

Gas turbine components

Nuclear industry Fasteners

Density	8.19 g/cm³	0.296 lb/in³
Melting Point	1365 °C	2490 °F
Coefficient of Expansion	12.7 µm/m °C (20 – 100 °C)	7.1 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	85 kN/mm²	12328 ksi
Modulus of Elasticity	222 kN/mm²	32199 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed	Age Harden	700	1290	16	Air
Spring Temper	Age Harden	600	1110	16	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature depending on load^^ and environment**	
	N/mm²	**ksi**	**°C**	**°F**
Annealed	800 – 1000	116 – 145	-	-
Annealed + Aged	1200 – 1400	174 – 203	up to 550	up to 1020
Spring Temper	1300 – 1500	189 – 218	-	-
Spring Temper + Aged	1500 – 1800	218 – 261	up to 350	up to 660

The above tensile strength ranges are typical. If you require different please ask.

^^Dynamic applications = *active/lively/changing*

NIMONIC® 90

Chemical Composition		
Element	Min %	Max %
Ni	BAL	
Cr	18.00	21.00
Fe	-	1.50
Ti	2.00	3.00
Mn	-	1.00
Si	-	1.00
C	-	0.13
Al	1.00	2.00
Co	15.00	21.00
S	-	0.015
Cu	-	0.20
B	-	0.02
Pb	-	0.002
Zr	-	0.15
Ag	-	0.0005
Bi	-	0.0001

Specifications

AMS 5829
BS HR 501
BS HR 502
BS HR 503
BS 3075 NA 19
ISO 15156-3
(NACE MR 0175)
NCK 20TA

Designations

W.Nr. 2.4632
W.Nr. 2.4969
UNS N07090
AWS 030

Key Features

High stress rupture strength and high creep resistance at high temperatures

Good resistance to high-temperature corrosion and oxidation

Age hardenable

^^High temperature dynamic applications

Typical Applications

Aerospace fasteners

Density	8.18 g/cm^3	0.296 lb/in^3
Melting Point	1370 °C	2500 °F
Coefficient of Expansion	12.7 µm/m °C (20 – 100 °C)	7.1 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	82.5 kN/mm^2	11966 ksi
Modulus of Elasticity *(Annealed + Aged)* *(Spring Temper + Aged)*	213 kN/mm^2 227 / 240 kN/mm^2	30894 ksi 32924 / 34810 ksi

Heat Treatment of Finished Parts

Condition as supplied by Alloy Wire	Type	Temperature		Time (Hr)	Cooling
		°C	°F		
Annealed	Age Harden	750	1380	4	Air
Spring Temper	Age Harden	650	1200	4	Air
Spring Temper	Age Harden	600	1100	16	Air

Properties

Condition	Approx. tensile strength		Approx. operating temperature depending on load^^ and environment	
	N/mm^2	ksi	°C	°F
Annealed	800 – 1000	116 – 145	-	-
Annealed + Aged	1200 – 1400	174 – 203	up to 550	up to 1020
Spring Temper	1200 – 1500	175-218	-	-
Spring Temper + Aged	1500 – 1800	218 – 261	up to 350	up to 660

The above tensile strength ranges are typical. If you require different please ask.

^^Dynamic applications = *active/lively/changing*

NIMONIC® C-263

Chemical Composition		
Element	Min %	Max %
C	0.04	0.08
Si	-	0.40
Mn	-	0.60
S	-	0.007
Ag	-	0.0005
Al	0.30	0.60
B	-	0.005
Bi	-	0.0001
Co	19.0	21.0
Cr	19.0	21.0
Cu	-	0.20
Fe	-	0.70
Mo	5.60	6.10
Pb	-	0.002
Ti	1.90	2.40
Ti+Al	2.40	2.80
Ni	Bal	

Specifications

W.Nr. 2.4650
UNS N07263

Designations

AMS 5872
AMS 5886
BS HR 10
BS HR 206

Key Features

Excellent fabrication characteristics in the annealed condition

Age Hardenable

**High temperature static applications

Typical Applications

Parts in gas turbines

Sealing rings

Density	8.36 g/cm^3	0.302 lb/in^3
Melting Point	1325 °C	2415 °F
Coefficient of Expansion	10.6 µm/m• °C (20 – 100 °C)	5.7 x 10^{-6} in/in• °F (70 – 212 °F)
Modulus of Elasticity	222.5 kN/mm^2	32270 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed	Age Harden	800	1475	8 hours	Air
Spring Temper	Anneal Age Harden	1040 - 1165 800	1900 - 2125 1475	Suited to diameter 8 Hours	Water or Air Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature depending on load** and environment**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	800 – 1000	116 – 145	up to 800	up to 1500
Annealed + Aged	1000 – 1200	145 – 174	up to 800	up to 1500
Spring Temper	1200 – 1500	174 – 217	up to 800	up to 1500
Spring Temper + Annealed + Aged	1000 – 1200	145 – 174	up to 800	up to 1500

The above tensile strength ranges are typical. If you require different please ask.

****Static applications** = *still/fixed/motionless/rigid*

INCOLOY® 800

Chemical Composition		
Element	Min %	Max %
Ni	30.00	35.00
Co	-	2.00
Cu	-	0.75
Cr	19.00	23.00
Al	0.15	0.60
C	-	0.10
Si	-	1.00
Mn	-	1.50
Ti	0.15	0.60
Fe	BAL	
S	-	0.015

Specifications

BS 3075 NA15
BS 3076 NA15

Designations

W.Nr. 1.4876
UNS N08800
AWS 020

Key Features

Excellent resistance to oxidation and carburisation at high temperatures

Corrosion resistant in many aqueous environments

**High temperature static applications

Typical Applications

Process Piping

Heat Exchangers

Carburising Equipment

Heating Element Sheathing

Density	7.94 g/cm^3	0.287 lb/in^3
Melting Point	1385 °C	2525 °F
Coefficient of Expansion	14.4 µm/m °C (20 – 100 °C)	7.9 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	78.9 kN/mm^2	11444 ksi
Modulus of Elasticity	196.5 kN/mm^2	28500 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	450 – 470	840 – 880	0.5 - 1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature depending on load** and environment**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	600 – 800	87 – 116	-200 to +815	-330 to +1500
Spring Temper	800 – 1100	116 – 159	-200 to +815	-330 to +1500

The above tensile strength ranges are typical. If you require different please ask.

****Static applications** = *still/fixed/motionless/rigid*

INCOLOY® 800 HT

Chemical Composition		
Element	Min %	Max %
Ni	30.00	35.00
Co	-	2.00
Cu	-	0.75
Cr	19.00	23.00
Al	0.15	0.60
C	0.05	0.10
Si	-	1.00
Mn	-	1.50
Ti	0.15	0.60
Fe	BAL	
S	-	0.015

Specifications

BS 3076 NA 15H

Designations

W.Nr. 1.4958
W.Nr. 1.4959
UNS N08811
AWS 021

Key Features

Higher creep rupture strength than Incoloy 800 due to close control of C, Al, Ti

Excellent resistance to oxidation and carburisation at high temperatures

Corrosion resistant in many aqueous environments

**High temperature static applications

Typical Applications

Chemical Processing
Petrochemical Processing
Industrial Furnaces
Heat Treating Equipment

Density	7.94 g/cm^3	0.287 lb/in^3
Melting Point	1385 °C	2525 °F
Coefficient of Expansion	14.4 µm/m °C (20 – 100 °C)	7.9 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	78.9 kN/mm^2	11444 ksi
Modulus of Elasticity	196.5 kN/mm^2	28500 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	450 – 470	840 – 880	0.5 - 1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature depending on load** and environment**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	600 – 800	87 – 116	-200 to +1000	-330 to +1830
Spring Temper	800 – 1100	116 – 159	-200 to +1000	-330 to +1830

The above tensile strength ranges are typical. If you require different please ask.

****Static applications** = *still/fixed/motionless/rigid*

INCOLOY® 825

Chemical Composition		
Element	Min %	Max %
Ni	38.00	46.00
Co	-	2.00
Cu	1.50	3.00
Cr	19.50	23.50
Mo	2.50	3.50
Al	-	0.20
C	-	0.05
Si	-	0.50
Mn	-	1.00
S	-	0.03
Ti	0.60	1.20
Fe	BAL	

Specifications

ASTM B425
BS 3075 NA 16
BS 3076 NA 16
ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 2.4858
UNS N08825
AWS 022

Key Features

Resistant to reducing environments such as those containing sulphuric and phosphoric acids

Resistant to a variety of oxidising substances such as nitric acid and nitrates

Resistant to chloride-ion stress corrosion cracking, pitting and crevice corrosion

Good for chemical processing

Typical Applications

Chemical Processing
Nuclear Fuel
Reprocessing
Acid Production
Pickling Equipment

Density	8.14 g/cm^3	0.294 lb/in^3
Melting Point	1400 °C	2550 °F
Coefficient of Expansion	14.0 µm/m °C (20 – 100 °C)	7.8 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	75.9 kN/mm^2	11009 ksi
Modulus of Elasticity	196 kN/mm^2	28428 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	450 – 470	840 – 880	0.5 – 1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	600 – 800	87 – 116	-100 to +250	-145 to +480
Spring Temper	800 – 1100	116 – 159	-100 to +250	-145 to +480

The above tensile strength ranges are typical. If you require different please ask.

INCOLOY® A-286

Chemical Composition		
Element	Min %	Max %
C	0.03	0.08
Mn	1.00	2.00
Si	-	0.50
P	-	0.02
S	-	0.015
Cr	13.50	16.00
Ni	24.00	27.00
Mo	1.00	1.50
Ti	1.90	2.30
B	0.003	0.01
V	0.10	0.50
Co	-	1.00
Al	-	0.35
Cu	-	0.50
Pb	-	0.005

Specifications

AMS 5731
AMS 5734
AMS 5737
AMS 5853
ASTM A453
BS HR 52
BS HR 650
ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 1.4944
W.Nr. 1.4980
UNS S66286
AWS 023

Key Features

High strength and good corrosion resistance at high temperatures

Age hardenable

Good for high temperature fasteners

**High temperature static applications

Typical Applications

Jet Engines

Super Chargers

Afterburner Parts

Fasteners

Density	7.94 g/cm³	0.287 lb/in³
Melting Point	1430 °C	2600 °F
Coefficient of Expansion	16.4 µm/m °C (20 – 100 °C)	9.1 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	71.5 kN/mm²	10370 ksi
Modulus of Elasticity	205 kN/mm²	29733 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Age Harden	705 – 760	1300 – 1400	16	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature depending on load** and environment**	
	N/mm²	**ksi**	**°C**	**°F**
Annealed	600 – 750	87 – 109	-200 to +400	-330 to +750
Annealed + Aged	1100 – 1300	159 – 188	-200 to +400	-330 to +750
Spring Temper	1050 – 1250	152 – 181	-200 to +400	-330 to +750
Spring Temper + Aged	1300 – 1500	188 – 218	-200 to +400	-330 to +750

The above tensile strength ranges are typical. If you require different please ask.

****Static applications** = *still/fixed/motionless/rigid*

HASTELLOY® B-3

Chemical Composition		
Element	Min %	Max %
Ni	65.00	-
Cr	1.00	3.00
Mo	27.00	32.00
Fe	1.00	3.00
W	-	3.00
C	-	0.01
Si	-	0.10
Co	-	3.00
Mn	-	3.00
V	-	0.20
P	-	0.030
S	-	0.010
Ti	-	0.20
Cu	-	0.20
Al	-	0.50
Zr	-	0.10
Nb/Cb	-	0.20
Ta	-	0.20
Ni+Mo	94.00	98.00

Specifications

ASTM B335
ASTM B619

Designations

W.Nr. 2.4600
UNS N10675
AWS 051

Key Features

Excellent corrosion resistance to hydrochloric acid at all concentrations and temperatures

Withstands sulphuric, acetic, formic and phosphoric acids and other non-oxidising media

Excellent resistance to pitting corrosion and stress corrosion cracking

Typical Applications

Chemical processing

Density	9.22 g/cm^3	0.333 lb/in^3
Melting Point	1418 °C	2585 °F
Coefficient of Expansion	10.6 µm/m °C (20 – 100 °C)	5.7 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	83 kN/mm^2	12038 ksi
Modulus of Elasticity	216 kN/mm^2	31329 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	400 – 450	750 – 840	2	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	1000 – 1200	145 – 174	-200 to +400	-330 to +750
Spring Temper	1600 – 2000	232 – 290	-200 to +400	-330 to +750

The above tensile strength ranges are typical. If you require different please ask.

HASTELLOY˜ C-4

Chemical Composition		
Element	Min %	Max %
Cr	14.00	18.00
Mo	14.00	17.00
Fe	-	3.00
C	-	0.015
Si	-	0.08
Co	-	2.00
Mn	-	1.00
P	-	0.04
S	-	0.03
Ti	-	0.70
Ni	BAL	

Specifications

ASTM B574
ASTM B575
ASTM B619

Designations

W.Nr. 2.4610
UNS N06455
AWS 052

Key Features

Excellent resistance to stress-corrosion cracking and to oxidizing atmospheres at high temperature

Exceptional resistance to a wide variety of chemical process environments including, hot contaminated mineral acids, solvents, chlorine, formic and acetic acids and salt waters

Typical Applications

Chemical processing

Density	8.64 g/cm^3	0.312 lb/in^3
Melting Point	1399 °C	2550 °F
Coefficient of Expansion	10.8 µm/m °C (20 – 100 °C)	6.0 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	81.2 kN/mm^2	11777 ksi
Modulus of Elasticity	212.4 kN/mm^2	30807 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	400 – 450	750 – 840	2	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	800 – 1100	116 – 159	-200 to +400	-330 to +750
Spring Temper	1300 – 1700	189 – 247	-200 to +400	-330 to +750

The above tensile strength ranges are typical. If you require different please ask.

HASTELLOY˜ C-22

Chemical Composition		
Element	Min %	Max %
Cr	20.00	22.50
Mo	12.50	14.50
Fe	2.00	6.00
W	2.50	3.50
C	-	0.015
Si	-	0.08
Co	-	2.50
Mn	-	0.50
V	-	0.35
P	-	0.02
S	-	0.02
Ni	BAL	

Specifications

ASTM B574
ASTM B575
ASTM B619
ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 2.4602
UNS N06022
AWS 053

Key Features

Better overall corrosion resistance than Hastelloy C-4 and C-276 and Inconel 625

Outstanding resistance to pitting, crevice corrosion and stress corrosion cracking

Typical Applications

Chlorination systems
Nuclear fuel reprocessing
Pickling systems

Density	8.69 g/cm^3	0.314 lb/in^3
Melting Point	1399 °C	2550 °F
Coefficient of Expansion	12.4 µm/m °C (20 – 100 °C)	6.9 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	78.6 kN/mm^2	11400 ksi
Modulus of Elasticity	205.5 kN/mm^2	29806 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	400 – 450	750 – 840	2	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	800 – 1100	116 – 159	-200 to +400	-330 to +750
Spring Temper	1400 – 1700	203 – 247	-200 to +400	-330 to +750

The above tensile strength ranges are typical. If you require different please ask.

HASTELLOY˜ C-276

Chemical Composition		
Element	Min %	Max %
Mo	15.00	17.00
Cr	14.50	16.50
Fe	4.00	7.00
W	3.00	4.50
Co	-	2.50
C	-	0.010
Si	-	0.08
Mn	-	1.00
V	-	0.35
P	-	0.04
S	-	0.03
Ni	BAL	

Specifications

ASTM B574
ASTM B575
ASTM B619
ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 2.4819
UNS N10276
AWS 054

Key Features

Excellent corrosion resistance in a wide range of corrosive media including, sulphur compounds and chloride ions

Excellent resistance to pitting, crevice corrosion and stress corrosion cracking

Withstands the corrosive effects of wet chlorine gas, hypochlorite and chlorine dioxide

Good for sea water applications

Typical Applications

Chlorination systems
Nuclear fuel reprocessing
Pickling systems
Chemical processing
Marine industries

Density	8.89 g/cm^3	0.321 lb/in^3
Melting Point	1370 °C	2500 °F
Coefficient of Expansion	11.2 µm/m °C (20 – 100°C)	6.2 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	78.6 kN/mm^2	11400 ksi
Modulus of Elasticity	205.5 kN/mm^2	29806 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	400 – 450	750 – 840	2	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	850 – 1050	123 – 152	-200 to +400	-330 to +750
Spring Temper	1300 – 1700	189 – 247	-200 to +400	-330 to +750

The above tensile strength ranges are typical. If you require different please ask.

HASTELLOY® C-2000

Chemical Composition		
Element	Min %	Max %
Cr	22.00	24.00
Mo	15.00	17.00
Fe	-	3.00
C	-	0.010
Si	-	0.080
Co	-	2.00
Mn	-	0.50
P	-	0.025
S	-	0.010
Cu	1.30	1.90
Al	-	0.50
Ni	BAL	

Specifications

ASTM B574
ASTM B575
ASTM B619

Designations

W.Nr. 2.4675
UNS N06200
AWS 055

Key Features

Developed to resist corrosion in a wider range of media

Resistant to an extensive range of corrosive chemicals including sulphuric, hydrochloric and hydrofluoric acids

Superior pitting resistance and crevice corrosion resistance to Hastelloy C-276

Excellent corrosion resistance to reducing media

Good oxidising resistance

Typical Applications

Chemical processing

Density	8.5 g/cm^3	0.307 lb/in^3
Melting Point	1399 °C	2550 °F
Coefficient of Expansion	12.4 µm/m °C (20 – 100 °C)	6.9 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	79 kN/mm^2	11458 ksi
Modulus of Elasticity	206 kN/mm^2	29878 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	400 – 450	750 – 840	2	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	700 – 1000	102 – 145	-200 to +400	-330 to +750
Spring Temper	1300 – 1600	189 – 232	-200 to +400	-330 to +750

The above tensile strength ranges are typical. If you require different please ask.

HASTELLOY® X

Chemical Composition		
Element	Min %	Max %
Cr	20.50	23.00
Mo	8.00	10.00
Fe	17.00	20.00
W	0.20	1.00
C	0.05	0.15
Si	-	1.00
Co	0.50	2.50
Mn	-	1.00
P	-	0.04
S	-	0.03
B	-	0.01
Ni	BAL	

Specifications

AMS 5754
AMS 5798
ASTM B619
GE B50A463
GE B50A655
ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 2.4665
UNS N06002
AWS 057

Key Features

Exceptional oxidation resistance

Highly resistant to stress corrosion cracking in petrochemical applications

Typical Applications

Gas turbine engines
Industrial furnaces
Chemical processing
Petrochemical processing

Density	8.22 g/cm^3	0.297 lb/in^3
Melting Point	1355 °C	2470 °F
Coefficient of Expansion	13.9 µm/m °C (20 – 100 °C)	7.7 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	77.6 kN/mm^2	11255 ksi
Modulus of Elasticity	205 kN/mm^2	29733 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	400 – 450	750 – 840	2	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	850 – 1050	123 – 152	-200 to +400	-330 to +750
Spring Temper	1350 – 1550	196 – 225	-200 to +400	-330 to +750

The above tensile strength ranges are typical. If you require different please ask.

HAYNES® 25/L605

Chemical Composition		
Element	Min %	Max %
C	0.05	0.15
Mn	1.00	2.00
Si	-	0.40
P	-	0.040
S	-	0.030
Cr	19.00	21.00
Ni	9.00	11.00
W	14.00	16.00
Fe	-	3.00
Co	BAL	

Specifications

AMS 5796
AMS 5759
ASTM F90
BS HR 40
ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 2.4964
UNS R30605
AWS 060

Key Features

Good resistance to oxidising environments at high temperatures for long exposures

Excellent resistance to sulphidation

**High temperature static applications

Typical Applications

Parts for gas turbine engines and bearings

Density	9.13 g/cm^3	0.330 lb/in^3
Melting Point	1410°C	2570 °F
Coefficient of Expansion	12.3 µm/m °C (20 – 100°C)	6.8 x 10^{-6} in/in °F (70 – 212°F)
Modulus of Rigidity	98 kN/mm^2	14214 ksi
Modulus of Elasticity	225 kN/mm^2	32634 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	400 – 450	750 – 840	2	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature depending on load** and environment**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	900 – 1500	131 – 218	-200 to +900	-330 to +1650
Spring Temper	1400 – 1800	203 – 261	-200 to +900	-330 to +1650

The above tensile strength ranges are typical. If you require different please ask.

****Static applications** = *still/fixed/motionless/rigid*

HAYNES® 214

Chemical Composition		
Element	Min %	Max %
Al	4.10	5.00
B	-	0.004
C	-	0.05
Nb/Cb	-	0.15
Co	-	2.00
Cr	15.00	17.00
Fe	2.00	4.00
Mg	-	0.01
Mn	-	0.50
Mo	-	0.50
Ni	BAL	
P	-	0.015
S	-	0.015
Si	-	0.20
Ti	-	0.50
W	-	0.50
Y	0.003	0.04
Zr	-	0.02

Specifications

-

Designations

W.Nr. 2.4646
UNS N07214
AWS 061

Key Features

Resistance to oxidation that far exceeds most heat resistant alloys at temperatures of 955 °C (1750 °F) and above

**High temperature static applications

Typical Applications

Mesh belts

Trays and fixtures for the firing of pottery and china, and the heat treatment of electronic devices and technical grade ceramics

Density	8.05 g/cm³	0.291 lb/in³
Melting Point	1400 °C	2550 °F
Coefficient of Expansion	13.3 µm/m °C (20 – 100 °C)	7.4 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	84 kN/mm²	12183 ksi
Modulus of Elasticity	217 kN/mm²	31474 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	400 – 450	750 – 840	2	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature depending on load** and environment**	
	N/mm²	**ksi**	**°C**	**°F**
Annealed	900 – 1200	131 – 174	-200 to +1100	-330 to +2010
Spring Temper	1300 – 1700	189 – 247	-200 to +1100	-330 to +2010

The above tensile strength ranges are typical. If you require different please ask.

****Static applications** = *still/fixed/motionless/rigid*

HAYNES® 282

Chemical Composition		
Element	Min %	Max %
Al	1.38	1.65
B	0.003	0.010
C	0.04	0.08
Nb/Cb	-	0.20
Co	9.00	11.00
Cr	18.50	20.50
Cu	-	0.10
Fe	-	1.50
Mn	-	0.30
Mo	8.00	9.00
Ni	BAL	
P	-	0.015
S	-	0.015
Si	-	0.15
Ta	-	0.10
Ti	1.90	2.30
W	-	0.50

Specifications

-

Designations

UNS N07208
AWS 062

Key Features

New alloy developed for high temperature structural applications which has excellent creep strength in the temperature range of 650 – 930 °C (1200 – 1700 °F), supposedly surpassing that of Waspaloy, and approaching that of Rene 41

Excellent creep strength

**High temperature static applications

Typical Applications

Exhaust nozzle components in augmented aircraft gas turbines, hot gas paths in land based gas turbines

A potential choice for high temperature development parts

Density	8.27 g/cm^3	0.300 lb/in^3
Melting Point	1300 – 1375 °C	2370 – 2510 °F
Coefficient of Expansion	12.1 µm/m °C (20 – 100 °C)	6.7 x 10^{-6} in/in °F (70 – 212 °F)

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stablize Age Harden	1010 790	1850 1450	2 8	Air Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature depending on load** and environment**	
	N/mm²	**ksi**	**°C**	**°F**
Annealed	800 – 1200	116 – 174	Contact AWI Technical department	
Spring Temper	1300 – 1600	190 – 232		
Spring Temper + Stabilised and Aged	1000 – 1300	145 – 190		

The above tensile strength ranges are typical. If you require different please ask.

****Static applications** = *still/fixed/motionless/rigid*

PHYNOX†

Chemical Composition		
Element	Min %	Max %
C	-	0.15
Mn	1.50	2.50
Si	-	1.20
P	-	0.015
S	-	0.015
Cr	19.00	21.00
Ni	14.00	16.00
Co	39.00	41.00
Mo	6.00	8.00
Be	-	0.10
Fe	BAL	

Specifications

AMS 5833
AMS 5834
AMS 5876
ASTM F1058
ISO 5832-7
ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 2.4711
UNS R30003
UNS R30008
AWS 100

Key Features

Combination of high strength, ductility and good mechanical properties at ambient temperatures

Excellent fatigue life

Excellent corrosion resistance in numerous environments

Non magnetic

Age hardenable (Spring Temper only)

Good for sea water applications

Typical Applications

Springs
Seal components
Medical devices
Components for watches
Aerospace applications
Petro-chemical applications
Marine engineering

Density	8.3 g/cm^3	0.300 lb/in^3
Melting Point	1427 °C	2600 °F
Coefficient of Expansion	12.5 µm/m °C (20 – 100 °C)	7.0 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	77 kN/mm^2	11168 ksi
Modulus of Elasticity	203.4 kN/mm^2	29501 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed	-	-	-	-	-
Spring Temper	Age Harden	520	970	5	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	< 1100	< 160	-185 to +450	-300 to +840
Spring Temper	1400 – 1900	203 – 276	-185 to +450	-300 to +840
Spring Temper + Aged	1900 – 2200	276 – 319	-185 to +450	-300 to +840

The above tensile strength ranges are typical. If you require different please ask.

MP35N*

Chemical Composition		
Element	Min %	Max %
C	-	0.025
P	-	0.015
Si	-	0.15
Ni	33.00	37.00
Co	BAL	
Mn	-	0.15
S	-	0.01
Cr	19.00	21.00
Mo	9.00	10.50
Ti	-	1.00
Fe	-	1.00

Specifications

AMS 5844
AMS 5845
ASTM F562
ISO 15156-3
(NACE MR 0175)
ISO 5832-6

Designations

W.Nr. 2.4999
UNS R30035
AWS 110

Key Features

Combination of high strength, ductility and good mechanical properties at ambient temperatures

Excellent corrosion resistance in hydrogen sulphide

Excellent resistance to crevice and stress corrosion cracking in sea water

Age hardenable (Spring Temper only)

Typical Applications

Medical Devices

Marine Engineering

Density	8.43 g/cm^3	0.304 lb/in^3
Melting Point	1440 °C	2625 °F
Coefficient of Expansion	12.8 µm/m °C (20 – 100 °C)	7.1 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	80.7 kN/mm^2	11705 ksi
Modulus of Elasticity	234 kN/mm^2	33939 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed	-	-	-	-	-
Spring Temper	Age Harden	650	1200	4	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	< 1100	< 160	-200 to +315	-330 to +600
Spring Temper	1400 – 1900	203 – 276	-200 to +315	-330 to +600
Spring Temper + Aged	1900 – 2200	276 – 319	-200 to +315	-330 to +600

The above tensile strength ranges are typical. If you require different please ask.

RENE® 41

Chemical Composition		
Element	Min %	Max %
C	-	0.12
Mn	-	0.10
Si	-	0.50
S	-	0.015
Cr	18.00	20.00
Co	10.00	12.00
Mo	9.00	10.50
Ti	3.00	3.30
Al	1.40	1.60
B	0.003	0.01
Fe	-	5.00
Ni	BAL	

Specifications

AMS 5545
AMS 5713
AMS 5800
AMS 5712
GE C50T71

Designations

W.Nr. 2.4973
UNS N07041
AWS 120

Key Features

Very high strength at elevated temperatures
Good oxidation resistance
Age hardenable
^^High temperature dynamic applications

Typical Applications

After burner parts
Turbine castings
Bolts
Other fasteners

Density	8.25 g/cm^3	0.298 lb/in^3
Melting Point	1345 °C	2450 °F
Coefficient of Expansion	13.6 µm/m °C (20 – 100 °C)	7.41 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	83.2 kN/mm^2	12067 ksi
Modulus of Elasticity	218.0 kN/mm^2	31619 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed	Age Harden	760	1400	16	Air
Spring Temper	Solution Anneal Age Harden	1065 760	1950 1400	4 16	Air Air
Spring Temper	Age Harden	760	1400	16	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature depending on load^^ and environment**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	800 – 1100	116 – 159	-	-
Annealed + Aged	1350 – 1550	196 – 225	up to +550	up to +1020
Spring Temper	1400 – 1800	203 – 261	-	-
Spring Temper + Annealed + Aged	1350 – 1550	196 – 225	up to +550	up to +1020
Spring Temper + Aged	1600 – 2000	232 – 290	up to +550	up to +1020

The above tensile strength ranges are typical. If you require different please ask.

^^**Dynamic applications** = *active/lively/changing*

WASPALOY

Chemical Composition		
Element	Min %	Max %
C	0.02	0.10
Mn	-	0.10
Si	-	0.10
P	-	0.010
S	-	0.010
Cr	18.00	21.00
Co	12.00	15.00
Mo	3.50	5.00
Ti	2.75	3.50
Al	1.20	1.60
B	0.003	0.010
Zr	-	0.04
Fe	-	2.00
Cu	-	0.10
Ni	BAL	

Specifications

AMS 5544
AMS 5706
AMS 5708
AMS 5828
ASTM B637

Designations

W.Nr. 2.4654
UNS N07001
AWS 170

Key Features

Very high strength at elevated temperatures

Strength is generally comparable to that of Rene 41 and generally superior to Inconel 718

Age hardenable

^^High temperature dynamic applications

Typical Applications

Gas turbine engine parts
Aerospace components
Springs and fasteners

Density	8.16 g/cm^3	0.295 lb/in^3
Melting Point	1330 °C	2425 °F
Coefficient of Expansion	12.2 µm/m °C (20 – 100 °C)	6.8 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	81 kN/mm^2	11750 ksi
Modulus of Elasticity	211.0 kN/mm^2	30600 ksi

Heat Treatment of Finished Parts

Condition as supplied by Alloy Wire	Type	Temperature		Time (Hr)	Cooling
		°C	°F		
Annealed	Stabilize Age Harden	843 760	1550 1400	4 16	Air Air
Spring Temper	Anneal Stabilize Age Harden	1050 843 760	1920 1550 1400	4 4 16	Air Air Air

Properties

Condition	Approx. tensile strength		Approx. operating temperature depending on load^^ and environment	
	N/mm^2	ksi	°C	°F
Solution Annealed	800 – 1100	116 – 159	-	-
Solution Annealed + Aged	1300 – 1500	189 – 218	up to +550	up to +1020
Spring Temper	1300 – 1600	189 – 232	-	-
Spring Temper + Annealed + Aged	1300 – 1500	189 – 218	up to +550	up to +1020

The above tensile strength ranges are typical. If you require different please ask. **^^Dynamic applications** = *active/lively/changing*

NI SPAN ALLOY C-902®

Chemical Composition		
Element	Min %	Max %
C	-	0.06
Mn	-	0.80
Si	-	1.00
P	-	0.04
S	-	0.04
Cr	4.90	5.75
Ni+Co	41.00	43.50
Ti	2.20	2.75
Al	0.30	0.80
Cr+ (Ti-4xC)	7.10	8.10
Co	-	1.00
Fe	BAL	

Specifications

AMS 5225
AMS 5221
HS 261

Designations

W.Nr. N09902
AWS 080

Key Features

Outstanding controllable thermoelastic coefficient characteristics

Can be processed to have constant modulus of elasticity from -45 to +65 °C (-50 to +150 °F)

Good for springs in watches and weighing equipment

Age hardenable

Typical Applications

Springs in precise applications, such as watches and weighing machines

Measuring instruments

Density	8.05 g/cm^3	0.291 lb/in^3
Melting Point	1480 °C	2700 °F
Coefficient of Expansion	7.6 µm/m °C (20 – 100 °C)	4.2 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	62 – 69 kN/mm^2	8993 – 10008 ksi
Modulus of Elasticity	165 – 200 kN/mm^2	23932 – 29008 ksi

Heat Treatment of Finished Parts

Condition as supplied by Alloy Wire	Type	Temperature		Time (Hr)	Cooling
		°C	°F		
Spring Temper - *for good all round properties*	Age Harden	650	1200	2	Air
Spring Temper - *for max stability*	Stress equalise Age Harden	400 650	750 1200	2 2	Air Air
Spring Temper - *for minimum hysteresis & low thermoelastic coefficient*	Stress equalise	400	750	2	Air

Properties

Condition	Approx. tensile strength		Approx. operating temperature	
	N/mm^2	ksi	°C	°F
Annealed	600 – 800	87 – 116	-45 to +65	-50 to +150
			(for constant modulus applications)	
Spring Temper	900 – 1100	131 – 159	-45 to +65	-50 to +150
			(for constant modulus applications)	
Spring Temper + Aged	1300 – 1500	189 – 218	-45 to +65	-50 to +150
			(for constant modulus applications)	

The above tensile strength ranges are typical. If you require different please ask.

TITANIUM Gr. 1

Chemical Composition		
Element	Min %	Max %
N	-	0.03
C	-	0.08
H	-	0.01
Fe	-	0.20
O	-	0.18
Residuals	-	0.40
Ti	BAL	

Specifications

ASTM B348
ASTM F67

Designations

W.Nr. 3.7025
UNS R50250
AWS 150

Key Features

Properties and chemical composition are very similar to Grade 2, but with tighter controls on O, Fe and H contents

One of the softer and more ductile grades of pure Titanium

Good strength to weight ratio

Corrosion resistant in oxidizing and mildly reducing environments

Good formability

Typical Applications

Aerospace
Automotive
Chemical Processing

Density	4.51 g/cm^3	0.163 lb/in^3
Melting Point	1670 °C	3040 °F
Coefficient of Expansion	8.6 µm/m °C (20 – 100 °C)	4.8 x 10-6 in/in °F (70 – 212 °F)
Modulus of Rigidity	40 – 45 kN/mm^2	5800 – 6530 ksi
Modulus of Elasticity	105 – 120 kN/mm^2	15230 – 17400 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed	Stress Relieve	480	900	0.5 – 2	Air
Spring Temper	Stress Relieve	250	480	0.5	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	300 – 400	44 – 58	-200 to +400	-330 to +750
Spring Temper	550 – 850	180 – 123	-200 to +400	-330 to +750

The above tensile strength ranges are typical. If you require different please ask.

TITANIUM Gr. 2

Chemical Composition		
Element	Min %	Max %
N	-	0.03
C	-	0.08
H	-	0.015
Fe	-	0.25
O	-	0.25
Residuals	-	0.40
Ti	BAL	

Specifications

ASTM B348
ASTM F67

Designations

W.Nr. 3.7035
UNS R50400
AWS 152

Key Features

Good strength to weight ratio, maintained at high temperatures

One of the softer and more ductile grades of pure Titanium

Corrosion resistant in oxidizing and in mildly reducing environments

Good formability

Typical Applications

Aerospace

Automotive

Chemical Processing

Density	4.51 g/cm^3	0.163 lb/in^3
Melting Point	1670°C	3040°F
Coefficient of Expansion	8.6 µm/m °C (20 – 100 °C)	4.8 x 10-6 in/in °F (70 – 212 °F)
Modulus of Rigidity	40 – 45 kN/mm^2	5800 – 6530 ksi
Modulus of Elasticity	105 – 120 kN/mm^2	15230 – 17400 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed	Stress Relieve	540	1000	0.5 – 2	Air
Spring Temper	Stress Relieve	250	480	0.5	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	450 – 650	65 – 94	-200 to +400	-330 to +750
Spring Temper	550 – 950	94 – 138	-200 to +400	-330 to +750

The above tensile strength ranges are typical. If you require different please ask.

TITANIUM Gr. 5/6Al4V

Chemical Composition		
Element	Min %	Max %
N	-	0.05
C	-	0.10
H	-	0.01
Fe	-	0.40
O	-	0.20
Al	5.50	6.75
V	3.50	4.50
Ti	BAL	

Specifications

AMS 4928
ASTM B348
ASTM F136

Designations

W.Nr. 3.7165
W.Nr. 3.7164
UNS R56400
AWS 151

Key Features

Good tensile properties at ambient temperatures compared with other titaniums
Good creep resistance up to approx. 300 °C (570 °F)

Outstanding resistance to corrosion in most natural and many industrial process environments

Approx. half the density of nickel alloys

Typical Applications

Aerospace
Jewellery
Chemical
Springs
Bolts and various fasteners

Density	4.42 g/cm^3	0.16 lb/in^3
Melting Point	1650 °C	3000 °F
Coefficient of Expansion	9.0 µm/m °C (20 – 100 °C)	5.0 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	40 – 44 kN/mm^2	5800 – 6380 ksi
Modulus of Elasticity	105 – 120 kN/mm^2	15230 – 17405 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed	Stress Relieve	480	900	2	Air
Spring Temper	Stress Relieve	250	480	0.5	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	950 – 1100	138 – 159	-200 to +400	-330 to +750
Spring Temper	1000 – 1400	145 – 203	-200 to +400	-330 to +750

The above tensile strength ranges are typical. If you require different please ask.

Beryllium Copper CB 101

Chemical Composition		
Element	Min %	Max %
Be	1.70	2.10
Fe	-	0.20
Ni	-	0.30
Co	-	0.30
Cu	BAL	

Specifications

ASTM B196
ASTM B197
BS 2873
BS EN 12166

Designations

W.Nr. 2.1247
UNS C17200
AWS 140

Key Features

Good conductor of electricity
Age hardenable
Good mechanical properties

Typical Applications

Springs
Electrical connectors and switches
Electronic components

Density	8.25 g/cm^3	0.298 lb/in^3
Melting Point	980 °C	1800 °F
Coefficient of Expansion	17.8 µm/m °C (20 – 100 °C)	9.9 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	47 kN/mm^2	6817 ksi
Modulus of Elasticity	123 kN/mm^2	17840 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed	Age Harden	315 – 320	600 – 610	3	Air
Spring Temper	Age Harden	315 – 320	600 – 610	2	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	400 – 600	58 – 87	up to +200	up to +390
Annealed + Aged	800 – 1200	116 – 174	up to +200	up to +390
Spring Temper	800 – 1200	116 – 174	up to +200	up to +390
Spring Temper + Aged	1200 – 1600	174 – 232	up to +200	up to +390

The above tensile strength ranges are typical. If you require different please ask.

MONEL® 400

Chemical Composition		
Element	Min %	Max %
C	-	0.30
Si	-	0.50
Mn	-	2.00
S	-	0.024
Cu	28.00	34.00
Fe	-	2.50
Ni+Co	63.00	70.00
Co	-	2.0

Specifications

AMS 4730
ASTM B164
BS 3075 NA 13
BS 3076 NA 13
DTD 204B
ISO 15156-3
(NACE MR 0175)
QQ-N-281

Designations

W.Nr. 2.4361
W.Nr. 2.4360
UNS N04400
AWS 040

Key Features

Excellent corrosion resistance in a wide range of acidic & alkaline environments
Especially suitable for reducing conditions
Good ductility & thermal conductivity
Good for sea water applications

Typical Applications

Marine Engineering
Chemical Processing
Hydrocarbon Processing
Heat Exchangers
Valves
Pumps

Density	8.8 g/cm^3	0.318 lb/in^3
Melting Point	1350 °C	2460 °F
Coefficient of Expansion	13.9 µm/m °C (20 – 100 °C)	7.7 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	65.3 kN/mm^2	9471 ksi
Modulus of Elasticity	173 kN/mm^2	25092 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	300 – 320	570 – 610	0.5 – 1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	400 – 600	58 – 87	-200 to +230	-330 to +445
Spring Temper	800 – 1100	116 –160	-200 to +230	-330 to +445

The above tensile strength ranges are typical. If you require different please ask.

MONEL® K-500

Chemical Composition		
Element	Min %	Max %
Ni	63.00	70.00
Co	-	2.00
Cu	27.00	33.00
Fe	-	2.00
Al	2.30	3.20
C	-	0.25
Si	-	1.00
Mn	-	1.50
Ti	0.35	0.85
S	-	0.01

Specifications

ASTM B865
BS 3075 NA 18
BS 3076 NA 18
ISO 15156-3
(NACE MR 0175)
QQ-N-286

Designations

W.Nr. 2.4375
UNS N05500
AWS 041

Key Features

Corrosion resistance similar to Monel 400 but with higher strength and hardness

Low permeability and is non-magnetic to temperatures as low as -101 °C (-150 °F)

Age hardenable

Good for sea water applications

Typical Applications

Pump Shafts
Fasteners
Marine Propeller Shafts
Oil Well Tools
Instruments
Springs

Density	8.44 g/cm^3	0.305 lb/in^3
Melting Point	1350 °C	2460 °F
Coefficient of Expansion	13.7 µm/m °C (20 – 100 °C)	7.6 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	66 kN/mm^2	9573 ksi
Modulus of Elasticity	179 kN/mm^2	25962 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed	Age Harden $^\Delta$	580 – 590	1075 – 1095	8 – 10	Air
Spring Temper	Age Harden $^\Delta$	530 – 540	985 – 1005	4 – 6	Air

$^\Delta$ *Heat treating Monel K-500 in free air can have a detrimental effect on its corrosion resistant properties.*

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	650 – 850	94 – 123	-100 to +260	-150 to +500
Annealed + Aged	950 – 1050	138 – 167	-100 to +260	-150 to +500
Spring Temper	1000 – 1300	145 – 189	-100 to +260	-150 to +500
Spring Temper + Aged	1200 – 1500	174 – 218	-100 to +260	-150 to +500

The above tensile strength ranges are typical. If you require different please ask.

NILO® 36

Chemical Composition		
Element	Min %	Max %
Ni	35.00	38.00
Fe	BAL	
C	-	0.10
Mn	-	0.60
P	-	0.025
S	-	0.03
Si	-	0.35
Cr	-	0.50
Mo	-	0.50
Co	-	1.00

Specifications

-

Designations

W.Nr. 1.3912
UNS K93600
UNS K93601
AWS 090

Key Features

Low expansion alloy. Maintains near constant dimensions over the range of normal atmospheric temperatures

Low coefficient of expansion from cryogenic temperatures to about 500 °C (930 °F)

Retains strength and toughness at cryogenic temperatures

Typical Applications

Standards of length (measurement reference)

Thermostat rods

Laser components

Tanks and piping for the storage and transportation of liquefied gasses

Density	8.11 g/cm^3	0.293 lb/in^3
Melting Point	1430 °C	2610 °F
Inflection Point	220 °C	430 °F
Thermal conductivity	10.0 W/m• °C	69.3 btu•in/ft^2•h °F
Coefficient of Expansion	1.5 µm/m °C (20 – 100 °C) 2.6 µm/m °C (20 – 200 °C)	0.83 x 10^{-6} in/in °F (70 – 212 °F) 1.4 x 10^{-6} in/in °F (70 – 392 °F)

Heat Treatment of Finished Parts

The Nilo alloys are usually supplied and used in the annealed condition (residual cold work distorts the coefficients of thermal expansion). Annealing times may vary due to section thickness.

	Type	Temperature		Time (Hr)	Cooling
		°C	°F		
For highest dimensional stability	Anneal	850 – 1000	1560 – 1830	0.5	Air or water
		830 300 100	1525 570 212	0.5 1 48	Water Water Air

Properties				
Condition	Approx. tensile strength		Approx. operating temperature	
	N/mm^2	ksi	°C	°F
Annealed	450 – 550	65 – 80	up to +500	up to +930
Hard Drawn	700 – 900	102 – 131	up to +500	up to +930

The above tensile strength ranges are typical. If you require different please ask.

NILO® 42

Chemical Composition			Specifications	Key Features	Typical Applications
Element	Min %	Max %	ASTM F30	Low and nominally constant coefficient of thermal expansion from room temperature to about 300 °C (570 °F)	Semiconductor lead frames Thermostat rods Various glass to metal seals
Ni	41.00 nominal				
Fe	BAL		**Designations**		
Mn	-	0.80	W.Nr. 1.3917 UNS K94100 AWS 091		
Si	-	0.30			
C	-	0.05			
Cr	-	0.25			
P	-	0.03			
S	-	0.03			
Al	-	0.10			

Density	8.11 g/cm^3	0.293 lb/in^3
Melting Point	1435 °C	2615 °F
Inflection Point	370 °C	700 °F
Thermal Conductivity	10.5 W/m• °C	72.8 btu•in/ft^2•h °F
Coefficient of Expansion	5.3 µm/m °C (20 – 100 °C) 4.5 – 6.5 µm/m °C (20 – 300 °C)	2.9 x 10^{-6} in/in °F (70 – 212 °F) 2.5 – 3.6 x 10^{-6} in/in °F (70 – 572 °F)

Heat Treatment of Finished Parts

The Nilo alloys are usually supplied and used in the annealed condition (residual cold work distorts the coefficients of thermal expansion). Annealing times may vary due to section thickness.

Type	Temperature		Time (Hr)	Cooling
	°C	°F		
Anneal	850 – 1000	1560 – 1830	0.5	Air or water

Properties				
Condition	Approx. tensile strength		Approx. operating temperature	
	N/mm^2	ksi	°C	°F
Annealed	450 – 550	65 – 80	up to +300	up to +570
Hard Drawn	700 – 900	102 – 131	up to +300	up to +570

The above tensile strength ranges are typical. If you require different please ask.

NILO® 48

Chemical Composition		
Element	Min %	Max %
Ni	48.00 nominal	
Fe	BAL	
Mn	-	0.80
Si	-	0.30
C	-	0.05
Cr	-	0.25
P	-	0.025
S	-	0.03
Al	-	0.10

Specifications

ASTM F30

Designations

W.Nr. 1.3922
W.Nr. 1.3926
W.Nr. 1.3927
UNS K94800
AWS 092

Key Features

Coefficient of thermal expansion designed to match that of soft lead and soda-lime glasses

High inflection point

Typical Applications

Industrial thermostats that operate at temperatures up to 450 °C (840 °F)

Glass to metal seals

Density	8.2 g/cm^3	0.296 lb/in^3
Melting Point	1450 °C	2640 °F
Inflection Point	460 °C	860 °F
Thermal Conductivity	16.7 W/m• °C	116 btu•in/ft^2•h °F
Coefficient of Expansion	8.5 µm/m °C (20 – 100 °C) 8.3 – 9.3 µm/m °C (20 – 300 °C)	4.7 x 10^{-6} in/in °F (70 – 212 °F) 4.6 – 5.2 x 10^{-6} in/in °F (70 – 572 °F)

Heat Treatment of Finished Parts

The Nilo alloys are usually supplied and used in the annealed condition (residual cold work distorts the coefficients of thermal expansion). Annealing times may vary due to section thickness.

Type	Temperature		Time (Hr)	Cooling
	°C	°F		
Anneal	850 – 1000	1560 – 1830	0.5	Air or water

Properties				
Condition	Approx. tensile strength		Approx. operating temperature	
	N/mm^2	ksi	°C	°F
Annealed	450 – 550	65 – 80	up to +450	up to +840
Hard Drawn	700 – 900	102 – 131	up to +450	up to +840

The above tensile strength ranges are typical. If you require different please ask.

NILO® 52

Chemical Composition		
Element	Min %	Max %
Ni	50.50 nominal	
Fe	BAL	
Mn	-	0.60
Si	-	0.30
C	-	0.05
Cr	-	0.25
P	-	0.025
S	-	0.03
Al	-	0.10

Specifications

ASTM F30

Designations

W.Nr. 2.4478
UNS N14052
AWS 093

Key Features

Designed for use with a variety of soft glasses

Almost constant coefficient of thermal expansion up to approx. 565 °C (1050 °F)

Typical Applications

Various glass to metal sealing applications with soft glass and ceramics

Density	8.3 g/cm^3	0.300 lb/in^3
Melting Point	1450 °C	2640 °F
Inflection Point	500 °C	930 °F
Thermal Conductivity	17 W/m• °C	118 btu•in/ft^2•h °F
Coefficient of Expansion	10.3 µm/m °C (20 – 100 °C)	5.7 x 10^{-6} in/in °F (70 – 212 °F)

Heat Treatment of Finished Parts

The Nilo alloys are usually supplied and used in the annealed condition (residual cold work distorts the coefficients of thermal expansion). Annealing times may vary due to section thickness.

Type	Temperature		Time (Hr)	Cooling
	°C	°F		
Anneal	850 – 1000	1560 – 1830	0.5	Air or water

Properties

Condition	Approx. tensile strength		Approx. operating temperature	
	N/mm^2	ksi	°C	°F
Annealed	450 – 550	65 – 80	up to +450	up to +840
Hard Drawn	700 – 900	102 – 131	up to +450	up to +840

The above tensile strength ranges are typical. If you require different please ask.

NILO® K

Chemical Composition		
Element	Min %	Max %
Fe	53.00 nominal	
Ni	29.00 nominal	
Co	17.0 nominal	
Mn	-	0.50
Si	-	0.20
C	-	0.04
Al	-	0.10
Mg	-	0.10
Zr	-	0.10
Ti	-	0.10
Cu	-	0.20
Cr	-	0.20
Mo	-	0.20

Specifications

ASTM F15

Designations

W.Nr. 1.3981
UNS K94610
AWS 094

Key Features

Controlled coefficient of expansion (which decreases with rising temperature to the inflection point)

Matches the expansion rate of borosilicate glasses and alumina ceramics

Typical Applications

Glass to metal seals in applications requiring high reliability or resistance to thermal shock, ie. high power transmitting valves

Density	8.16 g/cm^3	0.295 lb/in^3
Melting Point	1450 °C	2640 °F
Inflection Point	450 °C	840 °F
Thermal Conductivity	16.7 W/m• °C	116 btu•in/ft^2•h °F
Coefficient of Expansion	6.0 µm/m °C (20 – 100 °C) 4.6 – 5.2 µm/m °C (20 – 400 °C)	3.3 x 10^{-6} in/in °F (70 – 212 °F) 2.6 – 2.9 x 10^{-6} in/in °F (70 – 752 °F)

Heat Treatment of Finished Parts

The Nilo alloys are usually supplied and used in the annealed condition (residual cold work distorts the coefficients of thermal expansion). Annealing times may vary due to section thickness. Oxidizing time and temperature to be selected depending on required oxide thickness.

	Type	Temperature		Time (Hr)	Cooling
		°C	°F		
	Anneal	850 – 1000	1560 – 1830	0.5	Air or water
To prepare for glass to metal sealing	Decarburization	900 – 1050	1650 – 1920	1	Air or water
If a metal oxide interface is required *(time and temperature depend on required oxide thickness)*	Oxidize	600 – 1000	1110 – 1830	1	Air

Properties

Condition	Approx. tensile strength		Approx. operating temperature	
	N/mm^2	ksi	°C	°F
Annealed	450 – 550	65 – 80	up to +400	up to +750
Hard Drawn	700 – 900	102 – 131	up to +400	up to +750

The above tensile strength ranges are typical. If you require different please ask.

NICKEL® 200

Chemical Composition		
Element	Min %	Max %
Ni	99.0	-
Cu	-	0.25
Fe	-	0.40
C	-	0.15
Si	-	0.35
Mn	-	0.35
Mg	-	0.20
Ti	-	0.10
S	-	0.01
Co	-	2.00

Specifications

ASTM B160
ASTM B162
BS 3075 NA11
BS 3076 NA11

Designations

W.Nr. 2.4060
W.Nr. 2.4066
UNS N02200
AWS 070

Key Features

- Commercially pure nickel
- Resistant to various reducing chemicals and caustic alkalise
- Good magnetostrictive properties
- High electrical and thermal conductivity
- Good ductility and low work hardening rate
- Good weldability and solderability

Typical Applications

- Electronic components
- Electrical components
- Lead in wires for heating elements
- Battery connections/terminals
- Chemical processing
- Aerospace components
- Food processing
- Synthetic fibre processing

Density	8.89 g/cm^3	0.321 lb/in^3
Melting Point	1446 °C	2635 °F
Coefficient of Expansion	13.3 µm/m °C (20 – 100 °C)	7.4 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	81 kN/mm^2	11748 ksi
Modulus of Elasticity	204 kN/mm^2	29588 ksi

Electrical Resistivity	
9.6 µΩ • cm	58 ohm • circ mil/ft

Thermal Conductivity	
70.2 W/m • °C	487 btu • in/ft^2 • h • °F

Properties			
Condition	**Approx. tensile strength**		**Approx. operating temperature**
	N/mm^2	**ksi**	
Annealed	400 – 500	58 – 73	Tensile strength and elongation drop significantly at temperatures above 315 °C (600 °F). Service temperature is dependent on environment, load and size range.
Hard Drawn	700 – 900	102 – 131	

The above tensile strength ranges are typical. If you require different please ask.

NICKEL® 201

Chemical Composition		
Element	Min %	Max %
Ni	99.0	-
Cu	-	0.25
Fe	-	0.40
C	-	0.02
Si	-	0.35
Mn	-	0.35
Mg	-	0.20
Ti	-	0.10
S	-	0.01
Co	-	2.00

Specifications

ASTM B160
ASTM B162
BS 3076 NA12

Designations

W.Nr. 2.4061
W.Nr. 2.4068
UNS N02201
AWS 071

Key Features

- Low-carbon version of Nickel 200
- Preferred to Nickel 200 for applications involving exposure to temperatures above 315 °C (600 °F)
- Resistant to various reducing chemicals and caustic alkalise
- Good magnetostrictive properties
- High electrical and thermal conductivity
- Good ductility and low work hardening rate
- Good weldability and solderability

Typical Applications

- Electronic components
- Electrical components
- Lead in wires for heating elements
- Battery connections/terminals
- Chemical processing
- Aerospace components
- Food processing
- Synthetic fibre processing

Density	8.89 g/cm^3	0.321 lb/in^3
Melting Point	1446 °C	2635 °F
Coefficient of Expansion	13.1 µm/m °C (20 – 100 °C)	7.3 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	82 kN/mm^2	11893 ksi
Modulus of Elasticity	207 kN/mm^2	30000 ksi

Electrical Resistivity	
8.5 µΩ • cm	51 ohm • circ mil/ft

Thermal Conductivity	
79.3 W/m • °C	550 btu • in/ft^2 • h • °F

Properties			
Condition	**Approx. tensile strength**		**Approx. operating temperature**
	N/mm^2	**ksi**	
Annealed	400 – 500	58 – 73	Tensile strength and elongation drop significantly at temperatures above 315 °C (600 °F). Service temperature is dependent on environment, load and size range.
Hard Drawn	700 – 900	102 – 131	

The above tensile strength ranges are typical. If you require different please ask.

NICKEL® 205

Chemical Composition			Specifications	Key Features	Typical Applications
Element	Min %	Max %	-	Similar to Nickel 200 but has compositional adjustments to enhance its performance in electrical and electronic applications	Anodes and grids of electronic valves Lead wires Transistor Housings Magneto-strictive Transducers
Ni	99.0	-			
Mg	0.01	0.08			
Ti	0.01	0.05	**Designations**		
Cu	-	0.15	W.Nr. 2.4061 UNS N02205 AWS 072		
Fe	-	0.20			
C	-	0.15			
Si	-	0.15			
S	-	0.008			
Mn	-	0.35			

Density	8.89 g/cm^3	0.321 lb/in^3
Melting Point	1446 °C	2635 °F
Coefficient of Expansion	13.3 µm/m °C (20 – 100 °C)	7.4 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	82 kN/mm^2	11893 ksi
Modulus of Elasticity	207 kN/mm^2	30000 ksi

Electrical Resistivity	
9.5 µΩ • cm	57 ohm • circ mil/ft

Thermal Conductivity	
75 W/m • °C	520 btu • in/ft^2 • h • °F

Properties			
Condition	**Approx. tensile strength**		**Approx. operating temperature**
	N/mm^2	**ksi**	
Annealed	400 – 500	58 – 73	Tensile strength and elongation drop significantly at temperatures above 315 °C (600 °F). Service temperature is dependent on environment, load and size range.
Hard Drawn	700 – 900	102 – 131	

The above tensile strength ranges are typical. If you require different please ask.

NICKEL® 212

Chemical Composition			Specifications	Key Features	Typical Applications
Element	Min %	Max %	-	Stronger than Nickel 200 due to the addition of manganese	Electrical Lead Wires Supporting components in Lamps and electronic valves Electrodes in Glow-discharge Lamps Sparking Contacts
Ni + Co	97.0	-			
Mn	1.50	2.50			
Fe	-	0.25	**Designations**		
C	-	0.10	W.Nr. 2.4110 AWS 073		
Cu	-	0.20			
Si	-	0.20			
Mg	-	0.20			
S	-	0.006			

Density	8.86 g/cm^3	0.320 lb/in^3
Melting Point	1446 °C	2635 °F
Coefficient of Expansion	12.9 µm/m °C (20 –100 °C)	7.2 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	78 kN/mm^2	11313 ksi
Modulus of Elasticity	196 kN/mm^2	28400 ksi

Electrical Resistivity	
10.9 µΩ • cm	66 ohm • circ mil/ft

Thermal Conductivity	
44 W/m • °C	305 btu • in/ft^2 • h • °F

Properties			
Condition	**Approx. tensile strength**		**Approx. operating temperature**
	N/mm^2	**ksi**	
Annealed	450 – 550	65 – 80	Tensile strength and elongation drop significantly at temperatures above 315 °C (600 °F). Service temperature is dependent on environment, load and size range.
Hard Drawn	750 – 950	109 – 138	

The above tensile strength ranges are typical. If you require different please ask.

NICKEL® 270

Chemical Composition		
Element	Min %	Max %
Ni + Co	99.9	-
Cu	-	0.01
Fe	-	0.05
Mn	-	0.003
C	-	0.05
S	-	0.003
Mg	-	0.005
Si	-	0.005
Ti	-	0.005

Specifications

-

Designations

W.Nr. 2.4050
UNS N02270
AWS 074

Key Features

High purity grade of nickel that is made by powder metallurgy

Typical Applications

Electrical Resistance Thermometers

Components for hydrogen thyratrons

Electrical and electronic components

Density	8.89 g/cm^3	0.321 lb/in^3
Melting Point	1454 °C	2650 °F
Coefficient of Expansion	13.3 µm/m °C (20 – 100 °C)	7.4 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	82 kN/mm^2	11893 ksi
Modulus of Elasticity	207 kN/mm^2	30000 ksi

Electrical Resistivity	
7.5 µΩ • cm	45 ohm • circ mil/ft

Thermal Conductivity	
86 W/m • °C	595 btu • in/ft^2 • h • °F

Properties			
Condition	**Approx. tensile strength**		**Approx. operating temperature**
	N/mm^2	**ksi**	
Annealed	300 – 450	44 – 65	Tensile strength and elongation drop significantly at temperatures above 315 °C (600 °F). Service temperature is dependent on environment, load and size range.
Hard Drawn	600 – 800	87 – 116	

The above tensile strength ranges are typical. If you require different please ask.

DUPLEX 2205

Chemical Composition		
Element	Min %	Max %
C	-	0.03
Si	-	1.00
Mn	-	2.00
P	-	0.035
S	-	0.015
Cr	21.00	23.00
Ni	4.50	6.50
Mo	2.50	3.50
N	0.10	0.22
Fe	BAL	

Specifications

ASTM A479
ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 1.4462
UNS S31803
2205
AWS 167

Key Features

Greater corrosion resistance than stainless steel 300 series

Greater pitting resistance and uniform corrosion resistance to stress corrosion cracking than Stainless Steel 300 series

Good weldability

Typical Applications

Chemical processing
Oil and gas refining
Marine environments
Pollution control equipment

Density	7.8 g/cm^3	0.282 lb/in^3
Melting Point	1470 °C	2680 °F
Coefficient of Expansion	13.7 µm/m °C (21 – 100 °C)	7.61 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	76.9 kN/mm^2	11154 ksi
Modulus of Elasticity	200 kN/mm^2	29008 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	250	480	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Solution Annealed	< 1000	< 145	-200 to +300	-330 to +570
Spring Temper	1300 – 1900	189 – 276	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

SUPER DUPLEX

Chemical Composition		
Element	Min %	Max %
C	-	0.03
Mn	-	1.2
Si	-	0.80
S	-	0.015
P	-	0.035
Cr	24.00	26.0
Ni	6.0	8.0
Mo	3.0	4.5
N	0.24	0.35
Cu	-	0.5
Fe	BAL	

Specifications

ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 1.4410
UNS S32750
2507
AWS 169

Key Features

Excellent resistance to stress corrosion cracking in chloride-bearing environments

Excellent resistance to pitting and crevice corrosion

High resistance to general corrosion

Typical Applications

Oil and gas exploration

Marine application

Density	7.8 g/cm^3	0.28 lb/in^3
Melting Point	1350 °C	2460 °F
Coefficient of Expansion	13.5 µm/m °C (25 – 100 °C)	7.5 x 10^{-6} in/in °F (70 – 200 °F)
Modulus of Rigidity	77 kN/mm^2	11000 ksi
Modulus of Elasticity	200 kN/mm^2	29000 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	250	480	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Solution Annealed	< 1000	< 145	-200 to +300	-330 to +570
Spring Temper	1300 – 1900	189 – 276	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

NITRONIC^{xx} 50

Chemical Composition		
Element	Min %	Max %
C	-	0.06
Si	-	1.00
Mn	4.0	6.0
Ni	11.5	13.5
Cr	20.5	23.5
S	-	0.03
P	-	0.04
Mo	1.5	3.0
N	0.20	0.40
V	0.10	0.30
Nb/Cb	0.10	0.30
Fe	BAL	

Specifications

ISO 15156-3
(NACE MR0175)

Designations

W.Nr. 1.3964
UNS S20910
AWS 165

Key Features

Superior corrosion resistance to type 316 stainless steel

Good mechanical properties at ambient and sub-zero temperatures

Does not become magnetic when cold worked or cooled to sub-zero temperatures

Typical Applications

Components in processing environments like:
- Marine
- Petroleum
- Petrochemical
- Fertilizer
- Pulp and Paper

Density	7.88 g/cm^3	0.285 lb/in^3
Melting Point	1415 – 1450 °C	2579 – 2642 °F
Coefficient of Expansion	16.2 µm/m °C (20 – 100 °C)	9.0 x 10^{-6} in/in °F (70 – 200 °F)
Modulus of Rigidity	78.9 kN/mm^2	11444 ksi
Modulus of Elasticity	196.5 kN/mm^2	28500 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	250	480	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Solution Annealed	700 – 1000	102 – 145	-200 to +300	-330 to +570
Spring Temper	1300 – 2200	189 – 319	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

NITRONIC™ 60

Chemical Composition		
Element	Min %	Max %
C	-	0.10
Si	3.50	4.50
Mn	7.00	9.00
Ni	8.00	9.00
Cr	16.00	18.00
S	-	0.03
P	-	0.04
Mo	-	0.75
N	0.08	0.18
Cu	-	0.75
Fe	BAL	

Specifications

AMS 5848
ASTM A580

Designations

UNS S21800
AWS 166

Key Features

Anti galling
Wear resistant

Typical Applications

Valve Stems
Pins
Brushes
Roller bearings
Pump shafts and rings
Thread inserts
Fasteners

Density	7.6 g/cm^3	0.28 lb/in^3
Melting Point	1375 °C	2500 °F
Coefficient of Expansion	15.8 µm/m °C (21 – 200 °C)	8.810 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	69 kN/mm^2	10008 ksi
Modulus of Elasticity	181 kN/mm^2	26200 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	250	480	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Solution Annealed	700 – 1000	102 – 145	-200 to +300	-330 to +570
Spring Temper	1300 – 1900	189 – 276	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

ALLOY 20 CB 3

Chemical Composition		
Element	Min %	Max %
C	-	0.07
Si	-	1.00
Mn	-	2.00
P	-	0.045
S	-	0.035
Cr	19.00	21.00
Mo	2.00	3.00
Ni	32.00	38.00
Cu	3.00	4.00
Nb/Cb	8xC	1.00
Fe	BAL	

Specifications

ISO 15156-3
(NACE MR 0175)

Designations

W.Nr. 2.4660
UNS N08020
AWS 130

Key Features

Excellent resistance to hot sulphuric acid and many other aggressive environments that would attack ST/ST 316

Superior resistance to stress corrosion cracking in boiling 20 – 40% sulphuric acid

Typical Applications

Chemical and allied industries
Processing of synthetic rubber
High-octane gasoline
Solvents
Pharmaceuticals
Agrichemicals

Density	8.08 g/cm^3	0.292 lb/in^3
Melting Point	1425 °C	2600 °F
Coefficient of Expansion	14.69 µm/m °C (20 – 100 °C)	8.16 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	73.6 kN/mm^2	10675 ksi
Modulus of Elasticity	193 kN/mm^2	27993 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	250 – 530	480 – 990	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Solution Annealed	600 – 900	87 – 131	-200 to +300	-330 to +570
Spring Temper	1200 – 1800	174 – 261	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

STAINLESS STEEL 1.4310

Chemical Composition		
Element	Min %	Max %
C	0.05	0.12
Mn	-	2.00
P	-	0.045
S	-	0.015
Si	-	2.00
Cr	16.00	19.00
Ni	6.00	9.50
N	-	0.11
Mo	-	0.80
Fe	BAL	

Specifications

BS EN 10088-3
DIN EN 10270-3

Designations

W.Nr. 1.4310
UNS S30100
AWS 131

Key Features

Good mechanical properties and corrosion resistance

Capable of high tensile strength following cold work

Magnetic following cold work

Typical Applications

Springs and high strength components

Engineered components

Chemical processing

Electronic equipment

Density	7.90 g/cm^3	0.285 lb/in^3
Melting Point	1420 °C	2590 °F
Coefficient of Expansion	17.6 µm/m °C (20 – 100 °C)	9.8 x 10^{-6} in/in °F (70 – 212°F)
Modulus of Rigidity	76 kN/mm^2	11000 ksi
Modulus of Elasticity	190 kN/mm^2	28000 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	250-400	480-750	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	600 – 800	87 – 116	-200 to +300	-330 to +570
Spring Temper	1600 – 2200	189 – 319	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

STAINLESS STEEL 302

Chemical Composition		
Element	Min %	Max %
C	-	0.12
Mn	-	2.00
P	-	0.045
S	-	0.03
Si	-	1.00
Cr	17.00	19.00
Ni	8.00	10.00
Fe	BAL	

Specifications

AMS 5688
ASTM A313
ASTM A580
BS 970
BS 2056

Designations

W.Nr. 1.4310
UNS 30200
AWS 160

Key Features

Good mechanical properties and corrosion resistance

Typical Applications

Springs
Engineered components
Wire mesh
Wire cloth
Hose braiding

Density	8.0 g/cm^3	0.289 lb/in^3
Melting Point	1420 °C	2590 °F
Coefficient of Expansion	17.6 µm/m °C (20 – 100 °C)	9.8 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	70.3 kN/mm^2	10196 ksi
Modulus of Elasticity	187.5 kN/mm^2	27195 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	250	480	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	600 – 800	87 – 116	-200 to +300	-330 to +570
Spring Temper	1300 – 2200	189 – 319	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

STAINLESS STEEL 304

Chemical Composition		
Element	Min %	Max %
C	-	0.07
Mn	-	2.00
P	-	0.045
S	-	0.030
Si	-	1.00
Cr	17.50	19.50
Ni	8.00	10.50

Specifications

ASTM A313
ASTM A580
BS 970
BS 2056

Designations

W.Nr. 1.4301
W.Nr. 1.4307
UNS S30400
AWS 161

Key Features

Good mechanical properties and corrosion resistance

Typical Applications

Springs
Engineered components
Wire mesh
Wire cloth
Hose braiding

Density	8.0 g/cm^3	0.289 lb/in^3
Melting Point	1454 °C	2650 °F
Coefficient of Expansion	18.2 µm/m °C (20 – 100 °C)	10.1 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	70.3 kN/mm^2	10196 ksi
Modulus of Elasticity	187.5 kN/mm^2	27195 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	250	480	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Solution Annealed	600 – 800	87 – 116	-200 to +300	-330 to +570
Spring Temper	1300 – 2200	189 – 319	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

STAINLESS STEEL 316

Chemical Composition		
Element	Min %	Max %
C	-	0.07
Mn	-	2.00
P	-	0.045
S	-	0.03
Si	-	1.00
Cr	16.00	18.50
Ni	9.50	13.00
Mo	2.00	2.50

Specifications

ASTM A313
ASTM A580
BS 970
BS 2056

Designations

W.Nr. 1.4401
W.Nr. 1.4404
UNS S31600
AWS 162

Key Features

Better corrosion resistance and non-magnetic properties than 302 & 304 stainless

Better pitting and crevice corrosion resistance than 302 & 304 stainless

Typical Applications

More suited to Marine, Food and Medical applications than 302 and 304 stainless

Food processing

Springs

Engineered components

Wire mesh

Wire cloth

Hose braiding

Density	8.0 g/cm^3	0.289 lb/in^3
Melting Point	1398 °C	2555 °F
Coefficient of Expansion	17.5 µm/m °C (20 – 100 °C)	9.7 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	70.3 kN/mm^2	10196 ksi
Modulus of Elasticity	187.5 kN/mm^2	27195 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	250	480	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	600 – 800	87 – 116	-200 to +300	-330 to +570
Spring Temper	1300 – 2200	189 – 319	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

STAINLESS STEEL 316 LVM

Chemical Composition		
Element	Min %	Max %
C	-	0.03
Si	-	1.00
Mn	-	2.00
P	-	0.025
S	-	0.010
N	-	0.10
Cr	17.00	19.00
Mo	2.25	3.50
Ni	13.00	15.00
Cu	-	0.50
Fe	BAL	

Specifications

ASTM F138
BS 7252 Pt1
COMPOSITION D
ISO 5832 - 1

Designations

W.Nr. 1.4441
UNS S31673
AWS 163

Key Features

Regarded as 'Medical Grade' stainless steel vacuum melted to achieve the extremely high levels of purity and 'cleanliness' required for surgical implants

Good mechanical properties and corrosion resistance

Better pitting and crevice corrosion resistance than 302 and 304 stainless

Typical Applications

Medical implants

Machined parts

Density	8.0 g/cm^3	0.289 lb/in^3
Melting Point	1500 °C	2730 °F
Coefficient of Expansion	16.5 µm/m °C (20 – 100 °C)	9.2 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	70.3 kN/mm^2	10196 ksi
Modulus of Elasticity	187.5 kN/mm^2	27195 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	250	480	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	600 – 800	87 – 116	-200 to +300	-330 to +570
Spring Temper	1300 – 2200	189 – 319	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

STAINLESS STEEL 316 Ti

Chemical Composition		
Element	Min %	Max %
C	-	0.08
Si	-	1.00
Mn	-	2.00
P	-	0.045
S	-	0.03
Cr	16.50	18.50
Mo	2.00	2.50
Ni	10.50	13.50
Ti	5 x C	0.70
Fe	BAL	

Specifications

ASTM A240
ISO 15156-3
(NACE MR0175)
BS EN 10088-3

Designations

W.Nr. 1.4571
UNS S31635
AWS 168

Key Features

Better corrosion resistance at higher temperatures than 316 stainless

Typical Applications

Chemical processing
Springs
Fasteners
Thread inserts
Wire mesh

Density	7.9 g/cm^3	0.285 lb/in^3
Melting Point	1375 °C	2500 °F
Coefficient of Expansion	16.5 µm/m °C (21 – 100 °C)	9.11 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	74 kN/mm^2	10730 ksi
Modulus of Elasticity	193 kN/mm^2	27990 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	250	480	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	600 – 750	87 –109	-200 to +300	-330 to +570
Spring Temper	1300 – 1600	189 – 232	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

STAINLESS STEEL 321

Chemical Composition		
Element	Min %	Max %
C	-	0.08
Mn	-	2.00
P	-	0.04
S	-	0.03
Si	0.40	1.00
Cr	17.00	19.00
Ni	9.50	12.00
N	-	0.10
Mo	-	0.50
Ti	5 x C	0.70
Fe	BAL	

Specifications

ASTM A313
ASTM A240
ASTM A479
BS EN 10088-3:2014

Designations

W.Nr. 1.4541
UNS S32100
AWS 133

Key Features

Similar composition to 304 Stainless Steels but with addition of Titanium

Good creep and oxidation resistance make this a cost effective material for a number of applications

Typical Applications

Refinery Equipment
Heat Exchangers
Engineered components
Food Processing
Waste Treatment

Density	8.03 g/cm^3	0.29 lb/in^3
Melting Point	1370 °C	2500 °F
Coefficient of Expansion	16.6 µm/m °C (20 – 100 °C)	9.2 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	78 kN/mm^2	11300 ksi
Modulus of Elasticity	193 kN/mm^2	28000 ksi

Heat Treatment of Finished Parts					
Condition as supplied by Alloy Wire	**Type**	**Temperature**		**Time (Hr)**	**Cooling**
		°C	**°F**		
Annealed or Spring Temper	Stress Relieve	450	840	1	Air

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	600 – 800	87 –116	-200 to +300	-330 to +570
Spring Temper	1300 – 2200	189 – 319	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

DTD 189A

Chemical Composition		
Element	Min %	Max %
C	-	0.15
Si	0.20	-
Mn	-	2.00
Ni	7.00	10.00
Cr	17.00	20.00
Ni + Cr	25.00	-
Ti or Nb/Cb	4 x C 8 x C	- -
S	-	0.045
P	-	0.045
Fe	BAL	

Specifications

DTD 189A

Designations

AWS 164

Key Features

Corrosion resistant

Typical Applications

Aircraft Locking wire
General Locking wire

Density	8.0 g/cm^3	0.289 lb/in^3
Melting Point	1398 °C	2550 °F
Coefficient of Expansion	17.5 µm/m °C (20 – 100 °C)	9.7 x 10^{-6} in/in °F (70 – 212 °F)
Modulus of Rigidity	70.3 kN/mm^2	10196 ksi
Modulus of Elasticity	187.5 kN/mm^2	27195 ksi

Properties				
Condition	**Approx. tensile strength**		**Approx. operating temperature**	
	N/mm^2	**ksi**	**°C**	**°F**
Annealed	600 – 800	87 – 116	-200 to +300	-330 to +570

The above tensile strength ranges are typical. If you require different please ask.

80/20 NiCr Resistance Wire

Chemical Composition			Designations	Typical Applications
Element	Min %	Max %	W.Nr. 2.4869 UNS N06003 AWS 180	Heating elements in both domestic and industrial appliances and in control resistors
C	-	0.15		
Si	0.50	2.00		
Mn	-	1.00		
P	-	0.02		
S	-	0.015		
Cr	19.00	21.00		
Ni	75.00	-		
Al	-	0.30		
Cu	-	0.50		
Fe	-	1.00		

Density	8.31 g/cm^3	0.300 lb/in^3
Electrical Resistivity at 20 °C	108 microhm • cm	650 ohm • Circ • mil/ft
Maximum Operating Temperature		
For use as a Heating Element	1200 °C	2200 °F
For use in Hot Cutting, Fabrication – Line Bending	300 °C	572 °F
Melting Point	1400 °C	2550 °F
Coefficient of Expansion	12.5 µm/m °C (20 – 100 °C)	7.0 x 10^{-6} in/in °F (70 – 212 °F)

Temperature-Resistance Factor (F) At:												
20 °C	**100 °C**	**200 °C**	**300 °C**	**400 °C**	**500 °C**	**600 °C**	**700 °C**	**800 °C**	**900 °C**	**1000 °C**	**1100 °C**	**1200 °C**
68 °F	**212 °F**	**392 °F**	**572 °F**	**752 °F**	**932 °F**	**1112 °F**	**1292 °F**	**1472 °F**	**1652 °F**	**1832 °F**	**2012 °F**	**2192 °F**
1.00	1.006	1.015	1.028	1.045	1.065	1.068	1.057	1.051	1.052	1.062	1.071	1.080

45/55 NiCu Resistance Wire

Chemical Composition			Designations	Typical Applications
Element	Min %	Max %	W.Nr. 2.0842 AWS 181	Power resistors, shunts, thermocouples and wire-wound precision resistors having operating temperatures up to 400 °C (750 °F)
C	-	0.10		
Si	-	0.50		
Mn	-	1.00		
Fe	-	1.00		
Cu	55.00 nominal			
Ni	BAL			

Density	8.89 g/cm^3	0.321 lb/in^3
Electrical Resistivity at 20 °C	49 microhm • cm	295 ohm • Circ • mil/ft
Maximum Operating Temperature	400 °C	750 °F
Melting Point	1270 °C	2320 °F
Coefficient of Expansion	14.7 µm/m °C (20 – 100 °C)	8.17 x 10^{-6} in/in °F (70 – 212 °F)

45/55 NiCu changes little in electrical resistance as temperature increases. It has a temperature-resistance factor of +0.00003/ °C in the 20 – 100 °C range.

RW 41 Ultra High Strength Hot Cutting Wire

Key Features	Typical Applications
Exceptional strength at elevated temperatures and is the highest performing hot cutting wire we offer.	Production lines cutting foam polystyrene (EPS), thermal laminate materials etc. Excellent track record for working continuously and on oscillating cutting frames.

Density	8.25 g/cm^3	0.298 lb/in^3
Electrical Resistivity at 20 °C	131 microhm • cm	788 ohm • Circ • mil/ft
Maximum Operating Temperature	300 °C	572 °F
Melting Point	1345 °C	2450 °F
Coefficient of Expansion	13.6 µm/m °C (20 – 100 °C)	7.41 x 10^{-6} in/in °F (70 – 212 °F)

RW 118 / RW 122 / RW 70
High Strength Hot Cutting Wires

RW 118 Properties		
Density	8.18 g/cm^3	0.296 lb/in^3
Electrical Resistivity at 20 °C	118 microhm • cm	710 ohm • Circ • mil/ft
Maximum Operating Temperature	300 °C	572 °F
Melting Point	1370 °C	2500 °F
Coefficient of Expansion	12.7 µm/m °C (20 – 100 °C)	7.1 x 10^{-6} in/in °F (70 – 212 °F)

RW 122 Properties		
Density	8.28 g/cm^3	0.299 lb/in^2
Electrical Resistivity at 20 °C	122 microhm • cm	734 ohm • Circ • mil/ft
Maximum Operating Temperature	300 °C	572 °F
Melting Point	1430 °C	2600 °F
Coefficient of Expansion	12.6 µm/m °C (20 – 100 °C)	7 x 10^{-6} in/in °F (70 – 212 °F)

RW 70 Properties		
Density	8.00 g/cm^3	0.289 lb/in^2
Electrical Resistivity at 20 °C	70 microhm • cm	421 ohm • Circ • mil/ft
Maximum Operating Temperature	300 °C	572 °F
Melting Point	1375 °C	2500 °F
Coefficient of Expansion	17.6 µm/m °C (20 – 100 °C)	9.8 x 10^{-6} in/in °F (70 – 212 °F)

Alloy designation/specification summary

It may not be possible to fully release wire to some of the below specifications.
Please contact us for further information.

W.Nr	UNS No.	Material	AWS	AMS	ASTM	BS	Other	Page No.
1.3912	K93600	Nilo 36	090	-	-	-	-	61
1.3912	K93601	Nilo 36	090	-	-	-	-	61
1.3917	K94100	Nilo 42	091	-	F30	-	-	62
1.3922	K94800	Nilo 48	092	-	F30	-	-	63
1.3926	K94800	Nilo 48	092	-	F30	-	-	63
1.3927	K94800	Nilo 48	092	-	F30	-	-	63
1.3964	S20910	Nitronic 50	165	-	-	-	ISO 15156-3 (NACE MR 0175)	73
1.3981	K94610	Nilo K	094	-	F15	-	-	65
1.4301	S30400	Stainless Steel 304	161	-	A313 / A580	970 / 2056	-	78
1.4307	S30400	Stainless Steel 304	161	-	A313 / A580	970 / 2056	-	78
1.4310	S30200	Stainless Steel 302	160	5688	A313 / A580	970 / 2056	-	77
1.4401	S31600	Stainless Steel 316	162	-	A313 / A580	970 / 2056	-	79
1.4404	S31600	Stainless Steel 316	162	-	A313 / A580	970 / 2056	-	79
1.4410	S32750	Super Duplex	169	-	-	-	ISO 15156-3 (NACE MR 0175)	72
1.4441	S31673	Stainless Steel 316 LVM	163	-	F138	7252 Pt 1 Composition D	ISO 5832-1	80
1.4462	S31803	Duplex 2205	167	-	A479	-	ISO 15156-3 (NACE MR 0175)	71
1.4571	S31635	Stainless Steel 316 Ti	168	-	A240	EN 10088-3	ISO 15156-3 (NACE MR 0175)	81
1.4876	N08800	Incoloy 800	020	-	-	3075 NA 15 / 3076 NA 15	-	37
1.4944	S66286	Incoloy A-286	023	5731 / 5734 / 5737 / 5853	A453	HR 52 / HR 650	ISO 15156-3 (NACE MR 0175)	40
1.4958	N08811	Incoloy 800 HT	021	-	-	3076 NA 15H	-	38
1.4959	N08811	Incoloy 800 HT	021	-	-	3076 NA 15H	-	38
1.4980	S66286	Incoloy A-286	023	5731 / 5734 / 5737 / 5853	A453	HR 52 / HR 650	ISO 15156-3 (NACE MR 0175)	40
2.0842	-	45/55 NiCu Resistance Wire	181	-	-	-	-	85
2.1247	C17200	Beryllium Copper CB 101	140	-	B196 / B197	2873 / EN 12166	-	58
2.4050	N02270	Nickel 270	074	-	-	-	-	70
2.4060	N02200	Nickel 200	070	-	B160 / B162	3075 NA 11 / 3076 NA 11	-	66
2.4061	N02201	Nickel 201	071	-	B160 / B162	3076 NA 12	-	67
2.4061	N02205	Nickel 205	072	-	-	-	-	68
2.4066	N02200	Nickel 200	070	-	B160 / B162	3075 NA 11 / 3076 NA 11	-	66
2.4068	N02201	Nickel 201	071	-	B160 / B162	3076 NA 12	-	67
2.4110	-	Nickel 212	073	-	-	-	-	69
2.4360	N04400	Monel 400	040	4730	B164	3075 NA 13 / 3076 NA 13	ISO 15156-3 (NACE MR 0175) / DTD 204B / QQ-N-281	59
2.4361	N04400	Monel 400	040	4730	B164	3075 NA 13 / 3076 NA 13	ISO 15156-3 (NACE MR 0175) / DTD 204B / QQ-N-281	59
2.4375	N05500	Monel K-500	041	-	B865	3075 NA 18 / 3076 NA 18	ISO 15156-3 (NACE MR 0175) / QQ-N-286	60
2.4478	N14052	Nilo 52	093	-	F30	-	-	64
2.4600	N10675	Hastelloy B-3	051	-	B335 / B619	-	-	41

W.Nr	UNS No.	Material	AWS	AMS	ASTM	BS	Other	Page No.
2.4602	N06022	Hastelloy C-22	053	-	B574 / B575 / B619	-	ISO 15156-3 (NACE MR 0175)	43
2.4610	N06455	Hastelloy C-4	052	-	B574 / B575 / B619	-	-	42
2.4630	N06075	Nimonic 75	032	-	-	HR 5 / HR 504	-	33
2.4631	N07080	Nimonic 80A	031	-	B637	3076 NA 20 / HR 1 / HR 601	-	34
2.4632	N07090	Nimonic 90	030	5829	-	HR 501 / HR 502 / HR 503 / 3075 NA 19	ISO 15156-3 (NACE MR 0175) / NCK 20TA	35
2.4646	N07214	Haynes 214	061	-	-	-	-	48
2.4654	N07001	Waspaloy	170	5544 / 5706 / 5708 / 5828	B637	-	-	53
2.4660	N08020	Alloy 20 CB 3	130	-	-	-	ISO 15156-3 (NACE MR 0175)	75
2.4665	N06002	Hastelloy X	057	5754 / 5798	B619	-	ISO 15156-3 (NACE MR 0175) / GE B50A463 / GE B50A655	46
2.4668	N07718	Inconel 718	013	5662 / 5663 / 5832 / 5962	B637	-	ISO 15156-3 (NACE MR 0175) / GE B50TF14/15 / GE B14H89	31
2.4669	N07750	Inconel X-750	014	5667 / 5671 / 5698 / 5699	B637	HR 505	ISO 15156-3 (NACE MR 0175) / GE B14H41	32
2.4675	N06200	Hastelloy C-2000	055	-	B574 / B575 / B619	-	-	45
2.4711	R30003	Phynox	100	5833 / 5834 / 5876	F1058	-	ISO 5832-7 / ISO 15156-3 (NACE MR 0175)	50
2.4711	R30008	Phynox	100	5833 / 5834 / 5876	F1058	-	ISO 5832-7 / ISO 15156-3 (NACE MR 0175)	50
2.4816	N06600	Inconel 600	010	5665 / 5687	B166	3075 NA 14 / 3076 NA 14	DTD 328A / QQ-W-390	28
2.4819	N10276	Hastelloy C-276	054	-	B574 / B575 / B619	-	ISO 15156-3 (NACE MR 0175)	44
2.4851	N06601	Inconel 601	011	-	B166	-	-	29
2.4856	N06625	Inconel 625	012	5666	B446	3076 NA 21	ISO15156-3 (NACE MR 0175)	30
2.4858	N08825	Incoloy 825	022	-	B425	3075 NA 16 / 3076 NA 16	ISO 15156-3 (NACE MR 0175)	39
2.4869	N06003	80/20 NiCr Resistance Wire	180	-	-	-	-	84
2.4951	N06075	Nimonic 75	032	-	-	HR 5 / HR 504	-	33
2.4952	N07080	Nimonic 80A	031	-	B637	3076 NA 20 / HR 1 / HR 601	-	34
2.4964	R30605	Haynes 25/L605	060	5796 / 5759	F90	HR 40	ISO 15156-3 (NACE MR 0175)	47
2.4969	N07090	Nimonic 90	030	5829	-	HR 501 / HR 502 / HR 503 / 3075 NA 19	ISO 15156-3 (NACE MR 0175) / NCK 20TA	35
2.4973	N07041	Rene 41	120	5545 / 5713 / 5800 / 5712	-	-	GE C50T71	52
2.4999	R30035	MP35N	110	5844 / 5845	F562	-	ISO 15156-3 (NACE MR 0175) / ISO 5832-6	51
3.7164	R56400	Titanium Gr. 5/6Al4V	151	4928	B348 / F136	-	-	57
3.7165	R56400	Titanium Gr. 5/6Al4V	151	4928	B348 / F136	-	-	57
-	N07208	Haynes 282	062	-	-	-	-	49
-	-	DTD 189A	164	-	-	-	DTD 189A	83
-	N09902	Ni-Span C-902	080	5225 / 5221	-	-	HS 261	54
-	S21800	Nitronic 60	166	5848	A580	-	-	74

Glossary of terms

Cold drawn
Reducing the cross-sectional area of a round wire diameter at ambient temperature.

Cold drawn - spring temper
A specific amount of reduction in cross-sectional area to achieve standard spring temper condition. Not a standard condition for all alloys.

Cold drawn - No. 1 temper
A specific amount of reduction in cross-sectional area to achieve standard No. 1 temper condition. Less than that of spring temper and not a standard condition for all alloys.

Cold drawn - special temper
A specific amount of reduction in cross-sectional area to achieve customer required mechanical properties different to spring temper or No.1 temper.

Hard drawn
An amount of reduction in cross-sectional area to increase mechanical properties to no defined standard.

Cold rolled flat wire
Round wire passed through top and bottom rollers at ambient temperature, resulting in an edge with a natural radius.

Cold rolled section
Round wire rolled on four or more surfaces at ambient temperature, to control width and thickness.

Coated
Surface coated with a dry lubricant (soap), generally applied to aid customers during auto coiling.

Clean
No surface coating applied onto the wire.

Annealed
Softened by heat treatment.

Age hardening
Increasing mechanical properties with heat treatment, usually on finished components.

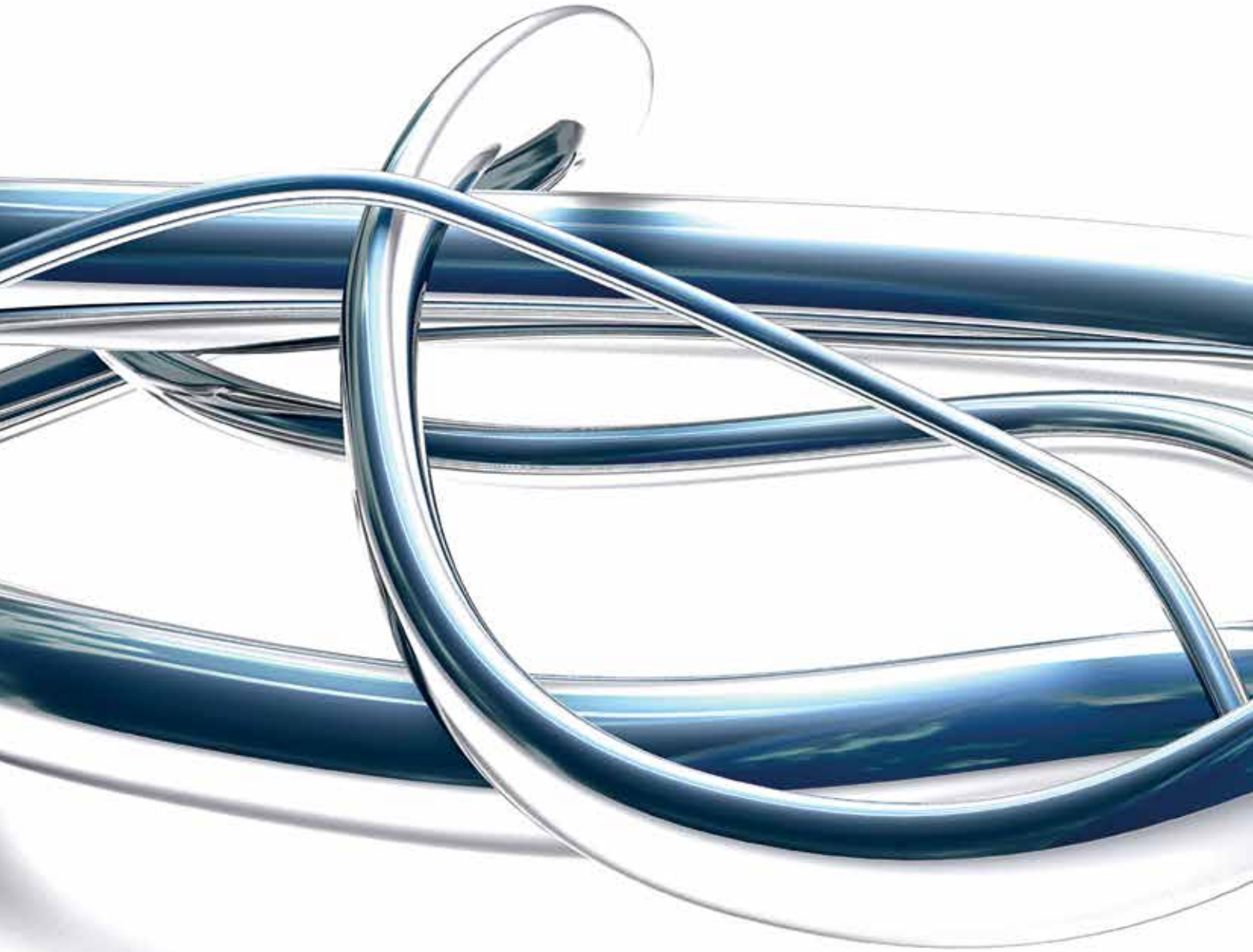
Stress relieve
Heat treatment process carried out on finished components to remove internal stresses induced by forming. Not intended to affect mechanical properties.

Heat treatment – after forming
Standard heat treatments for finished components are stated in our tables as a guide only and resulting mechanical properties are typical values. Various mechanical properties are achievable through a combination of cold working and heat treatment, please contact us to discuss your specific requirements. We can carry out capability tests on samples to demonstrate our products ability to meet your specification after final heat treatment.

Tensile strength
The tensile strength ranges given are typical for each alloy for the specified standard condition of supply. Please be aware that as we manufacture these materials, tensile strength can be altered to suit customer requirements.

Please contact us to discuss if different mechanical properties are required.

Alloys quick search



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