Helping manufacturers across the globe achieve sustainable leaner manufacturing processes

Copper Alloys

CUT TO LENGTH WIRE & COIL

Commercially Pure
High Conductivity Coppers
Brasses
Phosphor Bronzes
Nickel Silvers
Cupronickels
Beryllium Copper
Pfinodal® Alloys

Fast Turnaround Processing

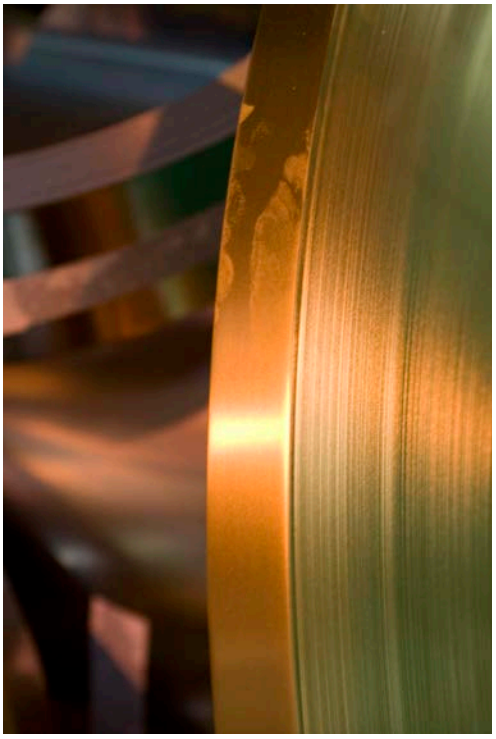
Low Width Thickness Ratio 3:1 unique to the industry (normal minimum is 8:1)

WIDE STOCK RANGE

Over 75 years Experience

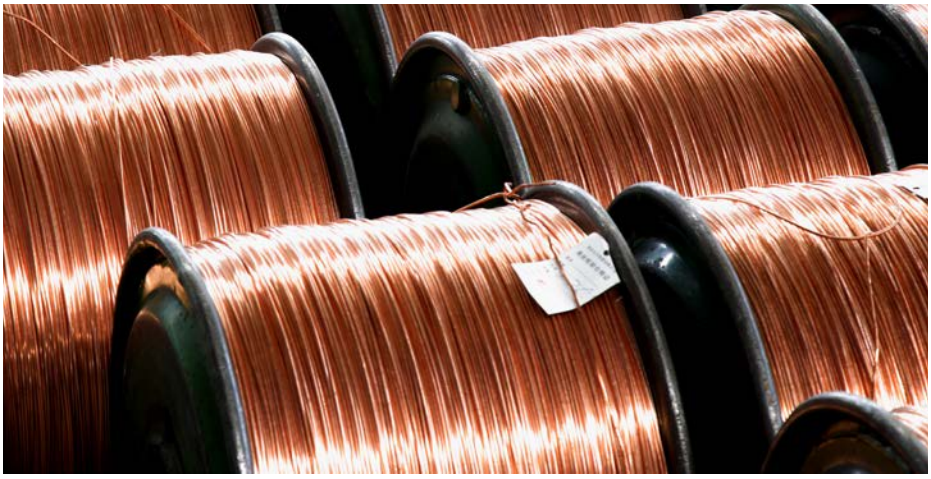
bsi. ISO 9001 Quality Management
FM 02114

Copper, Brasses & Bronzes



Copper and Copper alloys form an important group of metals with many excellent properties. They have very good electrical and thermal conductivities, are easy to fabricate and include some alloys of exceptional strength (notably Copper Beryllium Alloys) and corrosion resistance. The characteristics of Copper and Copper alloys have resulted in extensive use of those alloys in a very wide range of applications. They can be formed, pressed, deep drawn or photochemically etched into the most complex of shapes.

COPPER, BRASS & BRONZE STOCK RANGE			
COIL STOCK RANGE		WIRE STOCK RANGE	
Thickness (mm)	Width (mm)	Round	Shaped
COMMERCIALLY PURE HIGH CONDUCTIVITY COPPER			
0.01 - 3.0	3 - 1220	0.1 – 10.00 mm dia	upto 45 mm2 area
BRASS			
0.01 - 3.0	3 - 1220	0.1 – 10.00 mm dia	upto 45 mm2 area
PHOSPHOR BRASS			
0.01 - 3.0	3 - 1220	0.1 – 10.00 mm dia	upto 45 mm2 area
NICKEL SILVERS			
0.01 - 3.0	3 - 1220	0.1 – 10.00 mm dia	upto 45 mm2 area
CUPRONICKEL & HIGH COPPER CONTENT ALLOYS			
0.01 - 3.0	3 - 1220	0.1 – 10.00 mm dia	upto 45 mm2 area
COPPER BERYLLIUM ALLOYS			
0.01 - 3.0	3 - 1220	0.1 – 10.00 mm dia	upto 45 mm2 area
Other specifications can be made available upon request, please contact us with your requirements			



Types

Commercially Pure High Conductivity Coppers

The various Coppers within this group have differing degrees of purity and consequently exhibit different characteristics. For high conductivity requirements oxygen-free Coppers are required and this extra purity enhances ductility and gives freedom from hydrogen embrittlement or blistering during brazing operations.

Brasses

Brasses are Copper based Alloys with Zinc as the essential secondary ingredient. The addition of Zinc to Copper creates a lower cost alloy with superior cold working strength to Copper but at the expense of reduced conductivity. The degree of alloying gives a range of colours for decorative applications.

Phosphor Bronzes

Phosphor Bronzes are Copper Tin Alloys containing up to 7% tin and a small quantity of phosphorus, which is a residual from the de-oxidation of the Copper melt before the tin is added.

Phosphor Bronzes can be significantly hardened by cold working to give excellent spring properties.

Nickel Silvers

These alloys of Copper Nickel and Zinc contain no Silver, but take their name from their silvery appearance and ability to be polished to a high lustre. Their mechanical properties are somewhat higher than Brasses, but not matching Phosphor Bronze.

Cupronickels & High Copper Content Alloys

The most important commercial alloys are based on 90/10 Copper Nickel. Cupronickels have good formability and excellent resistance to sea water corrosion.

An important high Copper content alloy is Alloy 194 which has 2.3% iron with small additions of phosphorus and Zinc. Particularly developed for the leadframe application, it has excellent resistance to softening, being able to withstand 300°C plus, for a few minutes.

Copper Beryllium Alloys

Copper Beryllium Alloys are precipitation hardening alloys of remarkable strength, elasticity and fatigue resistance, making them ideal for spring applications. The principal compositions are based around 1.6% to 2.0% beryllium, with a small addition of cobalt added to refine grain size. These alloys can be supplied in the following forms:

i) Solution Treated (Annealed), or
ii) Solution Treated & Temper rolled, i.e. 1/4 Hard, 1/2 Hard, Hard, etc.

Copper, Brasses & Bronzes
Features

COPPER ALLOY FEATURES						
MATERIAL DESIGNATION EN1652 or Alloy		NEAREST FIT		Key Features	Key Markets	Applications
Symbol/ Name	Number	UNS	BS 2870			
HIGH CONDUCTIVITY COPPERS						
Cu-ETP	CW004A	C11000	C101	Cu-ETP has no susceptibility to hydrogen embrittlement as well as a high electrical conductivity of 101% IACS. This is due to a high purity and an absence of deoxidisers.	Architectural, Chemical Engineering, Culinary, Electrical	Electrical Conductors, Chemical Process Equipment, Radiators, Kitchen Appliances
Cu-HCP	CW021A	C10300	C102	A de-oxidised,oxygen-free Copper with a low residual phosphorus content. Offers excellent formability and weldability, as well as good soldering and brazability.	Electrical, Manufacturing	Electrical Contacts & cable Industry, Pressure Vessels
Cu-OF	CW008A	C10200	C103	Oxygen Free (maximum of 10ppm). High purity Copper alloy, offering 100% IACS. It is also immune from hydrogen embrittlement.	Electronics, Telecommunications	Printed Circuits, Electronic Components, Telecommunication Cables
Cu-DHP	CW024A	C12200	C106	A de-oxidised, non-arsenical, oxygen-free 99.9% pure Copper, with limited residual phosphorus content. Offers excellent formability and weldability, as well as good corrosion resistance. This makes it ideal for applications where electrical conductivity is only of secondary importance.	Architectural, Electrical, Plumbing	Piping & Fittings, Heat Exchangers, Transistors, Air/Hydraulic/Oil Lines
BRASSES						
CuZn30	CW505L	C26000	CZ106	Solid Solution Strengthened Brass. The added 30% Zinc increases mechanical strength, but decreases conductivity.	Electronics, Decorative	Connectors, Electronic Components, Jewellery
CuZn33	CW506L	C26800	CZ107	Solid Solution Strengthened Brass with 33% Zinc.	Automotive, Electrical Engineering	Electrical Components, Connectors, Clips, Springs
CuZn37	CW508L	C27200	CZ108	Zinc additions of 37%. Higher Zinc additions increase the inclination for Stress Cracking Corrosion.	Electronics, Plumbing, Decorative	Electric Brackets, Springs, Hose Couplings, Clips, Contacts, Radiator Cores
PHOSPHOR BRONZES						
CuSn5	CW451K	C51000	PB102	Solid Solution Strengthened Brass with 5% tin. Good combination of conductivity and strength.	Automotive, Electrical Engineering	Connectors, Springs, Stamped Parts
CuSn6	CW452K	C51900	PB103	Higher tin content than CuSn5 gives higher strength and spring characteristics. Wear resistant and has good corrosion resistance.	Automotive, Electrical Engineering, Paper and Pulp Industry, Chemical Industry	Flexible Hoses, Springs, Conductive Springs
NICKEL SILVERS, CUPRONICKELS & HIGH COPPER CONTENT ALLOYS						
CuNi10Zn27	CW401J	C74500	NS103	Good corrosion resistance in rural and marine atmospheres. Excellent cold working properties and is suitable for various forming processes. Poor hot working characteristics however.	Decorative, Industrial	Nameplates, Light & Optical Fittings, Door Kicking Plates, Trophies.
CuNi12Zn24	CW403J	C75700	NS104	Good resistance to atmospheric corrosion. Also offers resistance to neutral and alkaline solutions, however resistance o oxidising acids is poor. Good cold forming properties but poor machinability.	Industrial, Telecommunications, Decorative	Relay Springs, Contact Springs, Connectors, Pressure Membranes, Engraved Name Plates
CuNi18Zn20	CW409J	C76400	NS106	Good resistance to atmospheric corrosion. Good cold formability and spring properties. Suitable for many decorative applications. Much lower sensitivity to SCC than Brasses.	Electronics, Telecommunications, Decorative	Shielding, Connectors, Relay Springs, Engraved Name Plates, Decorative Purposes
CuNi18Zn27	CW410J	C77000	NS107	Good corrosion resistance , good formability, good tarnish-resistance and colour make it ideal for decorative purposes.		
CuNi9Sn2 (Alloy 725)	CW351H	C72500	-	A good combination of fatigue strength, formability and resistance to corrosion.	Telecommunications, Electronics	Circuit Breaker Components, Relay & Switch Springs, Bellows, Clamps

COOPER BERYLLIUM ALLOYS						
(Alloy 174)		C17410	-	Mill hardened alloy.	Automotive, Telecommunications	Automotive Terminals, Spring Contacts
(1.8% Be/Cu)		C17200	CB101	Highest Strength of any Copper alloy. Excellent ductility and formability. Greater Electrical conductivity than other high strength alloys.	Electronics	Electrical Contacts, Pressure Sensor Bellows, EM Shielding Gaskets
(Alloy 25)						
CuBe2	CW101C					
OTHER ALLOYS						
Alloy 194		C19400	_	Excellent formability, high strength and good conductivity. Also offers good resistance to softening.	Telecommunications, Electronics	Circuit Breaker Components, Relay & Switch Springs, Bellows, Clamps

Copper, Brasses & Bronzes

Chemical Properties

Copper & Alloys Grade Designations & Chemical Compositions (% by weight)

MATERIAL DESIGNATION EN1652 or Alloy		NEAREST FIT		TYPICAL CHEMICAL COMPOSITION %											
Symbol/ Name	Number	UNS	BS 2870	Cu	Be	Co	Fe max	Mn max	Ni	P	Pb max	Sn	Zn	OTHERS	Impurities max
HIGH CONDUCTIVITY COPPERS															
Cu-ETP	CW004A	C11000	C101	99.90 min	-	-	-	-	-	-	0.005			Bi 0.0005 max O 0.040 max	0.3
Cu-HCP	CW021A	C10300	C102	99.95 min				-		0.002 - 0.007					
Cu-OF	CW008A	C10200	C103	99.95 min	-	-	-	-	-	-	0.005			Bi 0.0005 max	0.3
Cu-DHP	CW024A	C12200	C106	99.90 min	-			-		0.015 - 0.040	-			-	
BRASSES															
CuZn30	CW505L	C26000	CZ106	69 - 71	-	-	0.05	-	0.30 max	-	0.05	0.10 max	Balance	Al 0.02 max	0.10
CuZn33	CW506L	C26800	CZ107	66 - 68	-	-	0.05	-	0.30 max	-	0.05	0.10 max	Balance	Al 0.02 max	0.10
CuZn37	CW508L	C27200	CZ108	62 - 64	-	-	0.10	-	0.30 max	-	0.10	0.10 max	Balance	Al 0.05 max	0.10
PHOSPHOR BRONZES															
CuSn5	CW451K	C51000	PB102	Balance	-	-	0.10	-	0.20 max	0.01 - 0.40	0.02	4.6 - 5.5	0.2 max	-	0.20
CuSn6	CW452K	C51900	PB103	Balance	-	-	0.10	-	0.20 max	0.01 - 0.40	0.02	5.5 - 7.0	0.2 max	-	0.20
NICKEL SILVERS, CUPRONICKELS & HIGH COPPER CONTENT ALLOYS															
CuNi10Zn27	CW401J	C74500	NS103	61 - 64	-	-	0.3	0.5	9.00 - 11.00		0.05		Balance		0.20
CuNi12Zn24	CW403J	C75700	NS104	63 - 66	-	-	0.3	0.5	11.00 - 13.00		0.03	0.03 max	Balance		0.20
CuNi18Zn20	CW409J	C75200	NS106	60 - 63	-	-	0.3	0.5	17.00 - 19.00		0.03	0.03 max	Balance		0.20
CuNi18Zn27	CW410J	C77000	NS107	53 - 56	-	-	0.3	0.5	17.00 - 19.00		0.03	0.03 max	Balance		0.20
CuNi9Sn2 (Alloy 725)	CW351H	C72500		Balance	-	-	0.3	0.3	8.50 - 10.50		0.03	1.8 - 2.8	0.10 max		0.10
COOPER BERYLLIUM ALLOYS															
(Alloy 174)		C17410	-	Balance	0.15 - 0.5	0.35 - 0.6		-		-	-	-	-	-	0.50
(1.8% Be/Cu)		C17200	CB101	Balance	1.7 - 1.9	*		-	*	-		-	-	* (Ni + Co) 0.05 - 0.40	0.50
(Alloy 25)				Balance	1.8 - 2.0	*	*	-	*	-	-	-	-	* (Ni + Co) 0.2 min *(Co + Ni + Fe) 0.6 max	0.50
CuBe2	CW101C			Balance	1.8 - 2.1	0.30 max	0.20 max	-	0.30 max	-	-	-	-	-	0.50
OTHER ALLOYS															
(Alloy 194)		C19400	-	Balance	-	-	2.10 - 2.60	-		0.015 - 0.15	0.03	0.03 max	0.05 - 0.20	-	0.15

Copper, Brasses & Bronzes

Mechanical Properties

COPPER, BRASSES & BRONZES MECHANICAL PROPERTIES								
MATERIAL DESIGNATION EN1652 or Alloy		NEAREST FIT		Material Condition (R Value)	Proof Strength 0.2% Min (N/mm2)	Tensile Strength (N/mm2)	Elong. % Min. (50mm Gauge Length)	Hardness Max (VPN)
Symbol/ Name	Number	UNS	BS 2870					
HIGH CONDUCTIVITY COPPERS								
Cu-ETP	CW004A	C11000	C101	R220	140 Max	220-260	33	40-65
				R240	180 Min	240-360	8	65-95
				R290	250 Max	290-360	4	90-110
				R360	320 Min	360 Min	2	110 Min
Cu-HCP	CW021A	C10300	C102	R220	140 Max	220-260	33	40-65
				R240	180 Min	240-360	8	65-95
				R290	250 Max	290-360	4	90-110
				R360	320 Min	360 Min	2	110 Min
Cu-OF	CW008A	C26000	C103	R220	140 Max	220-260	33	40-65
				R240	180 Min	240-360	8	65-95
				R290	250 Max	290-360	4	90-110
				R360	320 Min	360 Min	2	110 Min
Cu-DHP	CW024A	C12200	C106	R220	140 Max	220-260	33	40-65
				R240	180 Min	240-360	8	65-95
				R290	250 Max	290-360	4	90-110
				R360	320 Min	360 Min	2	110 Min
BRASSES								
CuZn30	CW505L	C26000	CZ106	R270	160 Max	270-320	40	55-95
				R350	170 Min	350-430	21	95-125
				R410	260 Min	410-490	9	120-155
				R480	430 Min	480 Min	-	150 Min
CuZn33	CW506L	C26800	CZ107	R280	170 Max	280-380	40	55-90
				R350	170 Min	350-430	23	90-125
				R420	300 min	420-500	6	125-155
				R500	450 Min	500 Min	-	155 Min
CuZn37	CW508L	C27200	CZ108	R300	180 Max	300-370	38	55-95
				R350	170 Min	350-440	19	95-125
				R410	300 Min	410-490	8	120-155
				R480	430 Min	480-560	3	150-180
				R550	500 Min	550 Min	-	170 Min
PHOSPHOR BRONZES								
CuSn5	CW451K	C51000	PB102	R310	250 Max	310-390	45	75-105
				R400	240 Min	400-500	14	120-160
				R490	450 Min	490-580	8	160-190
				R550	520 Min	550-640	4	180-210
				R630	600 Min	630-720	3	200-230
				R690	670 Min	690 Min	-	220 Min
CuSn6	CW452K	C51900	PB103	R350	300 Max	350-420	45	80-110
				R420	260 Min	420-520	17	125-165
				R500	450 Min	500-590	8	160-190
				R560	500 Min	560-650	5	180-210
				R640	600 Min	640-730	3	200-230
				R720	690 Min	720 Min	-	220 Min

Copper, Brasses & Bronzes

Mechanical Properties continued

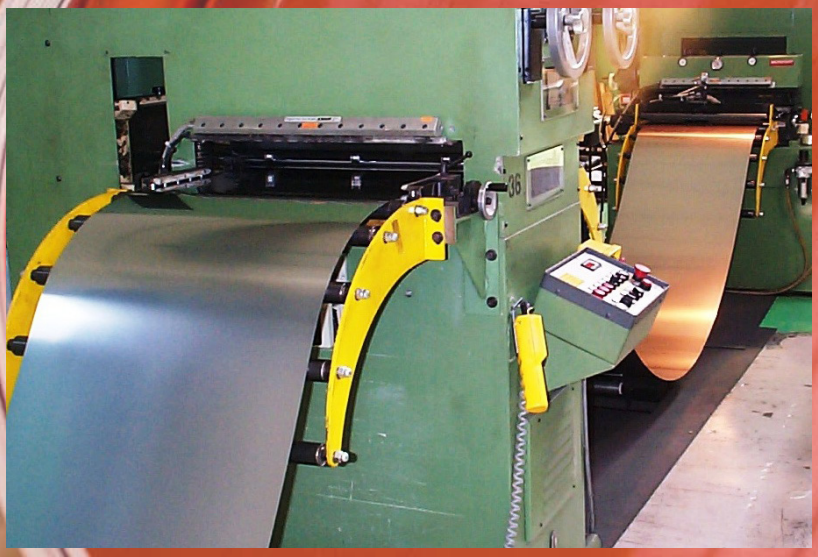
NICKEL SILVERS, CUPRONICKELS & HIGH COPPER CONTENT ALLOYS								
CuNi10Zn27	CW401J	C74500	NS103	R360	230 Max	360-430	35	80-110
				R430	230 Min	430-510	8	110-150
				R490	400 Min	490-580	8	150-180
				R550	480 Min	550-640	-	170-200
				R620	580 Min	620 Min	2	190 Min
CuNi12Zn24	CW403J	C75700	NS104	R360	230 Max	360-430	35	80-110
				R430	230 Min	430-510	8	110-150
				R490	400 Min	490-580	8	150-180
				R550	480 Min	550-640	-	170-200
				R620	580 Min	620 Min	2	190 Min
CuNi18Zn20	CW409J	C76400	NS106	R380	250 Max	380-450	27	85-115
				R450	250 Min	450-520	9	115-160
				R500	410 Min	500-590	3	160-190
				R580	510 Min	580-670	-	180-210
				R640	600 Min	640-730	-	200-230
CuNi18Zn27	CW410J	C77000	NS107	R390	280 Max	390-470	30	90-120
				R470	280 Min	470-540	11	120-170
				R540	450 Min	540-630	3	170-200
				R600	550 Min	600-700	-	190-220
				R700	660 Min	700-800	2	220-250
CuNi9Sn2 (Alloy 725)	CW351H	C72500	-	R340	250 Max	340-410	30	70-100
				R380	200 Min	380-470	8	110-150
				R450	370 Min	450-530	4	140-170
				R500	450 Min	500-580	2	160-190
				R560	520 Min	560-650	-	180-210
COPPER BERYLLIUM ALLOYS								
(Alloy 174)		C17410	-	172 Hard (Solution Heat Treated, Cold Rolled and Precipitation Hardened at the Mill)	410 Min	650 Min	10	180-230
				Hard (Solution Heat Treated, Cold Rolled and Precipitation Hardened at the Mill)	480 Min	760 Min	7	210-280
(1.8% Be/Cu)		C17200	CB101	R410* (Solution Heat Treated & Cold Rolled)	250 Max	410 Min	20	90-150
(Alloy 25)				R580* (Solution Heat Treated & Cold Rolled)	510 Min	580 Min	8	180-250
CuBe2	CW101C			R1130** (Solution Heat Treated, Cold Rolled and Precipitation Hardened at the Mill)	890 Min	1130 Min	3	340-410
				R1200** (Solution Heat Treated, Cold Rolled and Precipitation Hardened at the Mill)	980 Min	1200 Min	2	360-420
OTHER ALLOYS								
(Alloy 194)		C19400	-	R300	240 Max	300-340	16	80-100
				R340	240 Min	340-390	8	100-120
				R370	330 Min	370-430	6	120-140
				R420	380 Min	420-480	6	130-150
				R470	440 Min	470-530	4	140-160
				R520	470 Min	520-580	3	150-165

Processing

Your Material Your Way

The Knight Group are industry leaders in the supply and processing of strip, coil and wire, consistently exceeding expectations of quality, service and performance. With a number of accreditations, including BS EN ISO 9001 and BS EN AS 9120, we are the supplier of choice for global manufacturers where quality, reliability and lean manufacturing at the heart of their priorities. Most manufacturers are facing increasing demands for goods to be delivered with tighter time frames and even tighter margins. By selecting the processing to meet your specific needs, your material can be prepared and delivered to the exact size, length and finish you need, saving valuable production time and costs. Our processing is offered at a comprehensive price and with a flexibility to select only the services you need and want, giving you maximum versatility and minimum cost.

We have invested heavily in our bespoke machinery and training our established team of operators, so that we can offer a truly comprehensive range of processing to complement our extensive range of stocked material.



8 Cut To Length Lines
5 Edge Finishing Lines
27 Recoiling Lines
26 Slitting Lines
4 Traverse Winding Lines

Low Width Thickness Ratio 3:1 unique to the industry (normal minimum is 8:1)

Ability to offer Ultrafine Width Tolerances down to +/- 0.025mm (0.001”)

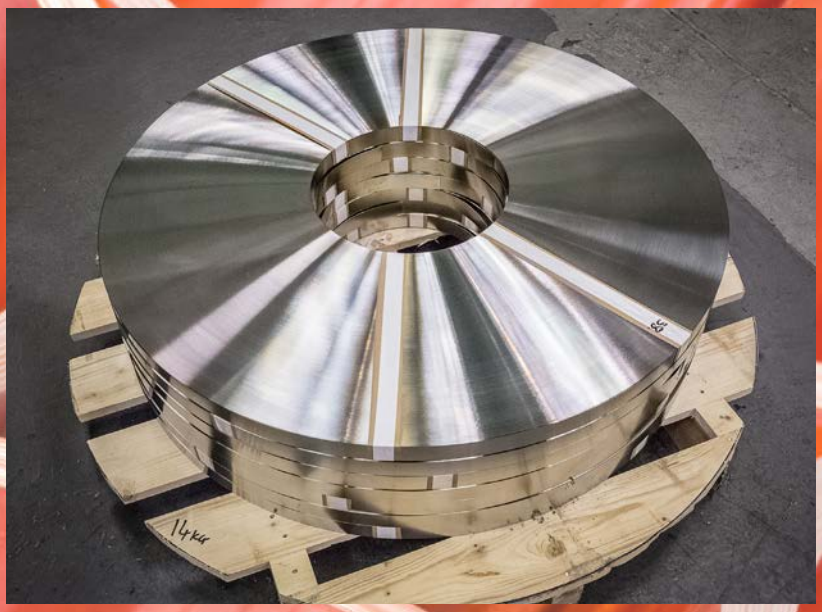
Thicknesses -0.013mm to 6.5mm (0.0005” to 0.26”)

Widths - 0.64mm to 1100mm (0.025” to 43”)

Bespoke Packaging

If you need bespoke material sizes and processing, then you probably want bespoke packaging as well. Thanks to our in house packaging design team, we can offer bespoke packaging solutions to protect your materials in transit. Whatever processing and finishing options you have chosen, your products will packaged to arrive safely and ready to use

You can choose to have strip material as pancake coils, traverse wound coil, flat blanks and sheets. Wire can be supplied as cut lengths, coils, formers or spools to suit your needs.



Choose From Our Trusted Partners Or Your Preferred Carrier

We firmly believe that all of our customers should be able to have your material, your way. Thanks to our global network of freight providers, you can choose from air, land or sea freight so you can have your material where you want, when you want.

There is also the option to arrange your own collection from our site in Birmingham, which can be organised through our sales team.

The information contained herein is given in good faith and is based on our present knowledge and experience. However, no liability will be accepted by The Knight Group and its subsidiaries in respect of any action taken by any third party in reliance thereon. Any advice given by the Company to any third party is given for that party's assistance only and without any liability on the part of the Company.

Any contract between the Company and a customer will be subject to the Company's Conditions of Sale. The extent of the Company's liabilities to any customer is clearly set out in those Conditions; a copy of which is available by request and can also be found at the back of this brochure and on our website.

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KNIGHT GROUP

www.knight-group.co.uk

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