Helping manufacturers across the globe achieve sustainable leaner manufacturing processes

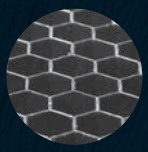
Knight Group

Exclusive Supplier Agreements


STAINLESS STEELS


NICKEL ALLOYS


KNUFOIL


TITANIUM ALLOYS


ALUMINIUM ALLOYS


COPPER ALLOYS


CARBON STEELS


CLAD & PLATED METALS

Fast Turnaround Processing

OVER 2500 STOCK ITEMS

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

Over 75 years Experience

Knight Group

Visit our websites:
Main: **www.knight-group.co.uk**
Offcuts: **www.ksmdirect.co.uk**
www.pmdirect.be

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About Us

The Knight Group is a family owned business that has built a reputation for providing the highest quality products and solutions to global manufacturers since 1940. We are now one of the largest Precision Strip Stockholding and Processing facilities in Europe.

Comprised of Knight Strip Metals Ltd (KSM), with production facilities in the UK and Precision Metals EU (PM) in Belgium, the Knight Group is a multi-metal stockist and processor, providing coil, strip and wire across 6 continents.

Our reputation for quality, innovation and reliability, has led to us being the favoured supplier across a wide range of sectors and our continued growth. Whilst we have an impressive existing operation, our commitment to investing in further processing capabilities, expanding our product ranges and developing the expertise of our team, ensures the continued expansion of the Knight Group.

We offer a comprehensive range of precision strip and wire, stocking one of the biggest ranges in Europe, including: Stainless Steel, Nickel Alloys, Titanium Alloys, Aluminium Alloys, Copper Alloys, Mild Steel and Clad and Plated Metals. We have established exclusive agreements with a number of mills to offer specialist and bespoke materials.

Our Key Benefits

Our People
At the heart of any business is people. At the Knight Group we have developed a dedicated team of people with a valued wealth of knowledge and experience within the metals industry. No matter what your metal needs are, our team will provide you with individual customer support and the best customer experience in the industry.

Products
We offer a comprehensive range of precision strip and wire, stocking one of the biggest ranges in Europe. We maintain a stock 2500 individual items of the most popular materials, adapting to suit our customers production needs. With established exclusive agreements with a number of mills to offer specialist and bespoke material, we can source most materials including those outside of our standard range.

Quality
Being able to supply high quality materials, reliably and ethically sourced is key to our business and one of the reasons we are a favoured supplier of manufacturers across the globe. Our materials are fully traceable and Certificates of Conformity can be supplied on request or downloaded from our website.

Extensive Processing Capabilities
We provide bespoke processing services to help reduce our customers costs and manufacturing times. We can supply you with material cut and finished to your specifications and production ready delivered.

Competitive Pricing
We know two of the key factors in purchasing decisions are quality and cost. We have established partnerships with key mills across the globe, and as one of the largest suppliers in Europe, we can negotiate the best price for material, meaning you don't have to compromise quality for cost.

AVAILABLE AS
FOIL, COIL, SHEET AND WIRE

STAINLESS STEEL ALLOYS

TITANIUM ALLOYS

NICKEL ALLOYS

ALUMINIUM ALLOYS

CLAD ALUMINIUM

COPPER ALLOYS

MILD STEEL

CLAD AND PLATED METALS

Global Sourcing and Distribution
Thanks to our global exports 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. We deliver to over 61 countries around the globe and each year that number grows. We have preferred carriers who can offer short lead times on most products and custom packing solutions to ensure your materials arrive safely and on time, wherever in the world you need them.

“Expertise and Experience Combined”

Our ongoing successful partnerships can be attributed to the specialist knowledge and expertise and the ability to understand customers’ materials problems and apply our resources to find the appropriate solution. We continually invest in our sales and purchasing teams, building upon their experience with ongoing training and product knowledge support.

Our focus on developing partnerships with both our customer and supplier base have led to reducing costs and maximising efficiency in both directions, without compromising on quality or lead times. Through working closely together, and using innovation, experience and expertise, allows us to tailor make solutions for your individual needs.

With a diverse global customer base, the Knight Group supply materials to manufacturers across multiple sectors including: **Aerospace, Automotive, Construction, Cryogenic, Defence, Energy, Oil and Gas, Telecommunications, Photo and Laser Etching, Medical and Pharmaceutical, Chemical and Precision Engineering.**

Our Key Sectors

Aerospace

Automotive

Chemical and Photo Etch

Renewable Energy

Petrochemical, Oil and Gas

Marine

Precision Stamping & Springs

Medical

Our History

1940 — ESTABLISHED
E.A. Knight & Sons, started as family metals business in North London, supplying manufactures across the UK.

1958 — EXPANSION
Adapting to the growing metal needs of an expanding customer base, the business is relocated to a larger, combined office, warehouse and processing facility in Potters Bar, Hertfordshire.

1971 — RELOCATION
With new processing technologies and materials available, we expand our range of precision strip metal stock, and move to a purpose built combined warehouse processing and offices facility in Potters Bar.

1975 — EXPANSION
Precision Metals EU was opened to provide further support and stock holding facilities to our growing European customer base.

1985 — REDEVELOPMENT
The Potters Bar site is redeveloped to accommodate additional machinery and stock.

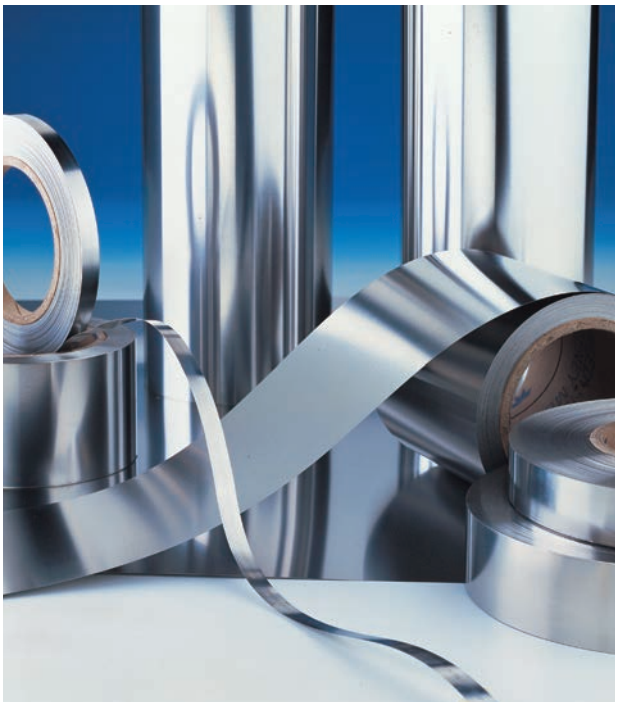
1999 — ACQUISITION
Knight Group acquired slitting machine manufacturer and metals processing company, Charles Harbage. The increase in capability makes the Knight Group one of the largest independent precision strip processors in Europe.

2000 — EXPANSION
Our Processing and warehouse facility is relocated to Saltley, accommodating additional stock lines and machinery and our growing team.

Today — EXPANSION
Today we supply over 61 countries. As one of the largest independent Precision Strip and Wire Stock holding and Processing suppliers in Europe, we continue to invest in the skills and expertise of our team, extending out stock range and our facilities.

Our Mission

"TO BE THE SUPPLIER OF CHOICE FOR LOCAL AND GLOBAL MANUFACTURERS"



Our Aims
As the world around us continually changes, we too must continue to adapt and evolve to ensure a sustainable business for today and for the future that lies ahead. People are our most valued asset, with knowledge, experience, commitment and a united approach, we can continue to achieve our goals and share in the rewards. We have a continual programme of development and as we grow our expertise and knowledge, we continue to expand on our products and service offering to support our customers in growing their businesses.

Our Mission
To continue the growth and development of a sustainable business through being the supplier of choice for local and global manufacturers by providing high quality materials, processing & superior customer service through experience and innovation.

The Knight Group currently supplies 61 countries, across 6 continents and has continued focus on export growth. We offer a range of bespoke packaging and delivery options tailored to the specifications of our customers. No matter where you are, you have your material delivered how, when and where you want.

We pride ourselves on building strong long term relationships with our global partners and know the importance of understanding the individual requirements and expectations of customers and suppliers alike to ensure efficient, effective sustainable solutions. We have a responsive customer service approach and facilitate global trade with a knowledgeable sales team.

10 languages are spoken amongst the team including English, Spanish, French, German, Italian, Dutch, Flemish, Hungarian, Hebrew and Arabic.

"We offer flexible logistical solutions to ensure you can have material how you want, where you want, when you want"

Your Goals

Skills
We have a knowledgeable, multi-lingual sales and customer services team on hand to share their expertise and find the right solution for you. Our production operatives are multi-machined trained with an impressive level of skill and experience. They ensure your material meets your exact production needs

Inventory
You will have no need to store excess materials when you take advantage of our just in time service. With over 815 tonnes of material in stock, established mill connections and extensive in-house processing available, you can rely on us to deliver all your material, how and when you need it.

Over Production
We order large volumes of material, ensuring we can offer you the best price, no matter how much you need. With low minimum order quantities and test samples available, you can order only what you need.

Over Processing
With one of the largest processing facilities in Europe, you can have your material delivered in custom widths and lengths to suit your end products. With ready to use material, you can effectively reduce costs, time and resources through minimising your storage needs, unnecessary downtime and material waste.

Transport
With our transparent pricing, you can easily make the decision that best suits your business. You can choose from your own or our established global network of freight providers You can also collect from our conveniently located sites in the UK and Belgium.

Waiting
We stock over 2500 items as standard and deliver over 3000 tonnes of material every year, to 61 counties around the globe. You can be confident that with our extensive stock range, processing capabilities and flexible transport options, you won't be waiting for your order.

Motion
Our strip products can be supplied in either "pancake" form or in a traverse wound spool. A traverse wound spool can hold up to ten times more material, reducing the need to move and store materials. Our packaging is also tailored to ensure materials are ready to use.

Defects
Our customers rely on us to cut costs, without compromising quality. As a result, we only stock materials from approved sources and supply test certificates as standard. Our robust quality control system includes inspecting all materials on arrival and prior to despatch.

From small fabricators to OEMs, lean manufacturing goals are of increasing significance to ensuring a business's sustainability. We aim to assist all our customers in eliminating waste in their operations through our position as a strategic supplier.

The world around us continually changes. As individuals and businesses, we must adapt and grow with these changes. Resource management is at the forefront of global conversations and whilst as individuals, we are encouraged to "do our bit," so too are businesses. Reducing waste offers manufacturers more than just environmental benefits. With lean strategies in place, there is the potential for cost savings and greater sustainability in an uncertain economic climate.

The most common manufacturing wastes identified are waiting, transport, motion, inventory, defects, over-processing, over production and skills. Regardless of industry sectors served or end product types, these "wastes" have the potential to impact any manufacturing business.

Undeniably, these processes start from within, but we are sure that our knowledgeable and experienced team can help you achieve your manufacturing goals.

"We help manufacturers across the globe achieve sustainable leaner manufacturing processes"

Our Values

We are driven to continue building a better business, by working closely with our customers to grow theirs. Established in 1940, we attribute our decades of successfully supplying global industries to ensuring our actions are guided by our core values.

Quality

Commitment to ensuring our products and services are consistently delivered to the highest standards our customers and colleagues deserve.

Efficiency

Offering services that support our customers in reducing production costs and time without compromising quality. Providing a responsive approach in every situation.

Innovation

Embracing challenges and change with enthusiasm and a solution focused attitude. Learning from our experience to adapt our approach for the better. Striving for better.

Trust

Ethical, Responsible and Fair Business Practices. Committed to honesty, timeliness and clarity in communicating. Delivering what we say we will, when we say we will.

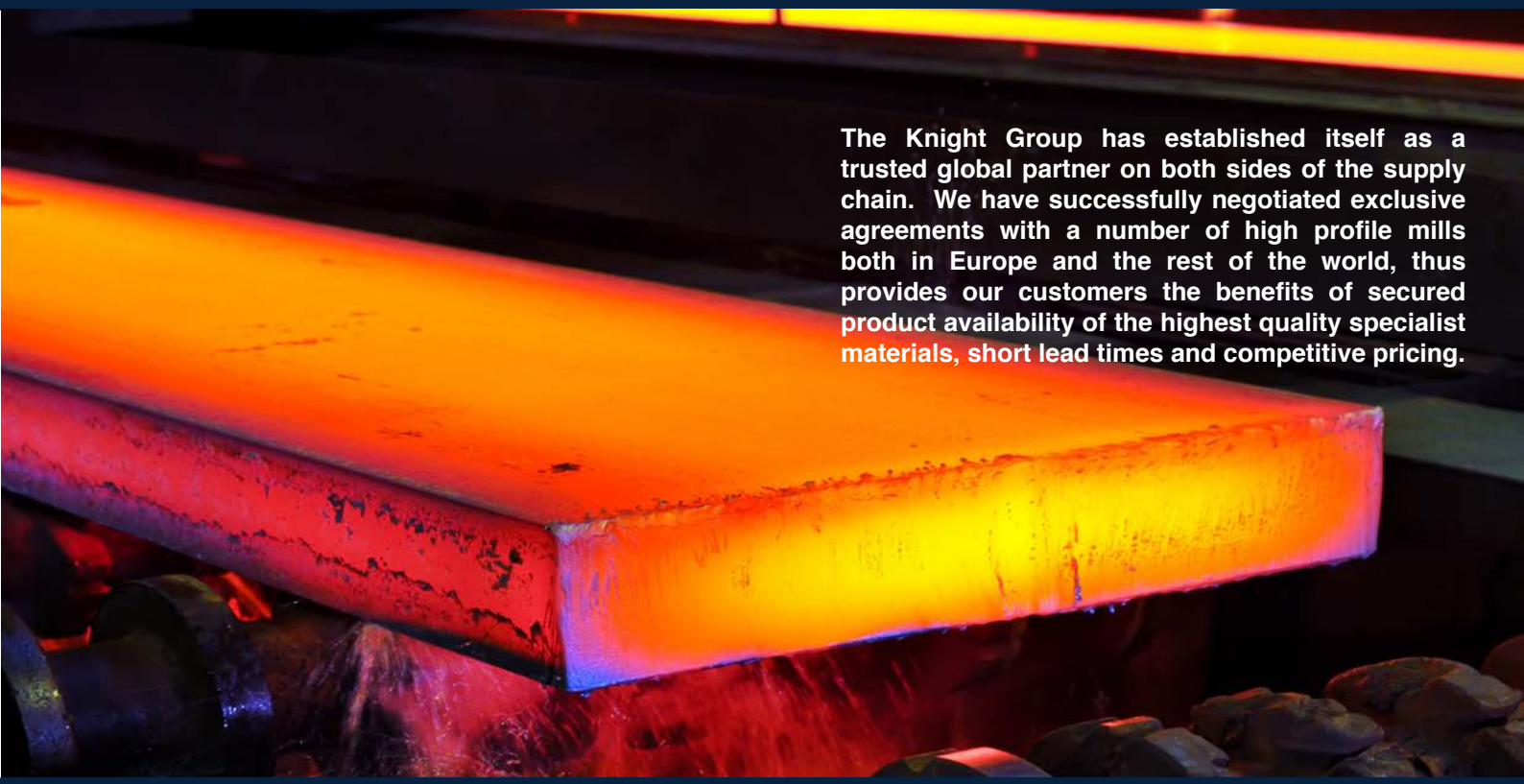
Partnership

Valuing the contributions of customers, colleagues and suppliers as key partners in achieving goals to grow and maintain a sustainable business.

Investment

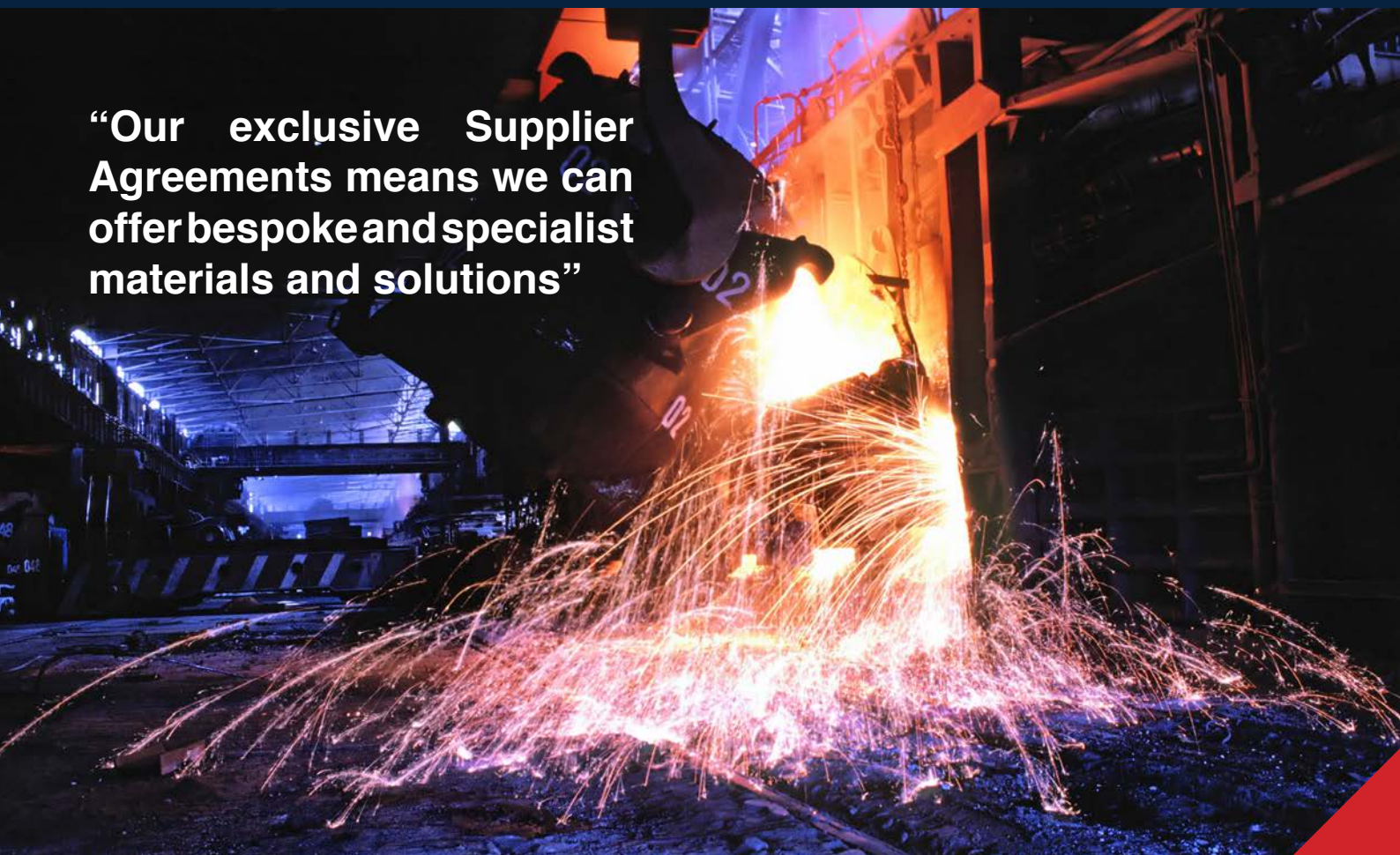
Giving the time, effort, energy and financial investment to support ongoing growth in knowledge, resulting in success for customers and ourselves.

Exclusive Supplier Sourcing



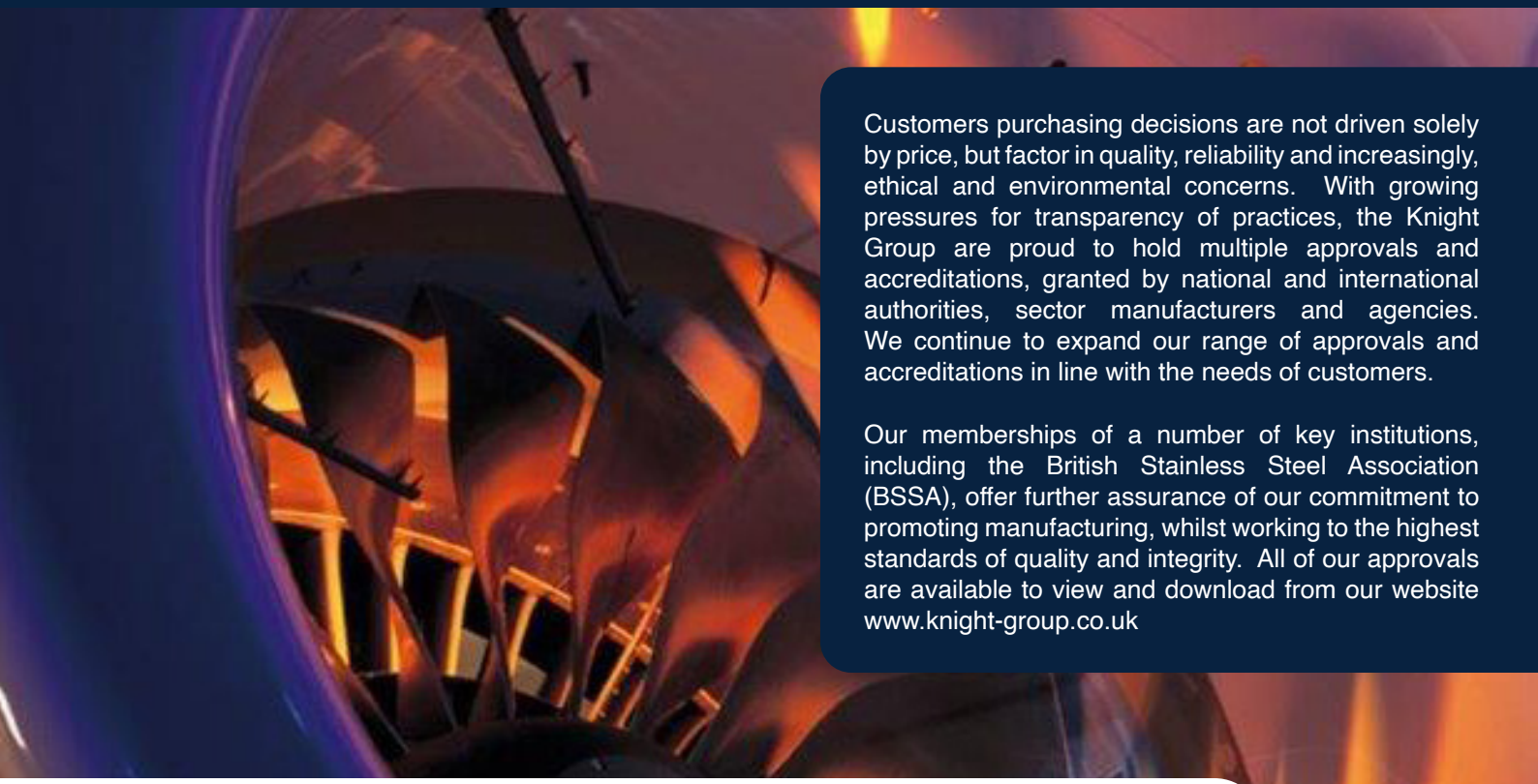
The Knight Group has established itself as a trusted global partner on both sides of the supply chain. We have successfully negotiated exclusive agreements with a number of high profile mills both in Europe and the rest of the world, thus provides our customers the benefits of secured product availability of the highest quality specialist materials, short lead times and competitive pricing.

WE HAVE OVER 600 SUPPLIERS IN OUR NETWORK SO YOU CAN HAVE YOUR MATERIAL HOW, WHEN AND WHERE YOU WANT



"Our exclusive Supplier Agreements means we can offer bespoke and specialist materials and solutions"

Approvals



Customers purchasing decisions are not driven solely by price, but factor in quality, reliability and increasingly, ethical and environmental concerns. With growing pressures for transparency of practices, the Knight Group are proud to hold multiple approvals and accreditations, granted by national and international authorities, sector manufacturers and agencies. We continue to expand our range of approvals and accreditations in line with the needs of customers.

Our memberships of a number of key institutions, including the British Stainless Steel Association (BSSA), offer further assurance of our commitment to promoting manufacturing, whilst working to the highest standards of quality and integrity. All of our approvals are available to view and download from our website www.knight-group.co.uk

We hold a number of Approvals Including:

British Standard Approvals

- **BS EN ISO 9001, 9120 No. FM 02114**
- **BS EN ISO 9001 No. FM 611455**

Customer Approvals

- **Rolls-Royce: Approval No. 01679**
- **Rolls-Royce Deutchland No. 118990 / 02**
- **Airbus UK: Approval No.20099 and 228990**
- **BAE Systems Regional Aircraft: Approval No. RALOA/00254/2**
- **BAE Systems: Approval No. BAE/AG/20384/MAA Airbus UK: Approval No.20099 and 228990**
- **Westland Helicopters: Approval No. SQA / V00246**
- **Safran DK6000**
- **Hawker Beachcraft Approval HBIFSAS/PART2/0595**
- **UTC Aerospace Systems/ HS Marston Aerospace Limited Approval Certificate AS 132**
- **Spirit Aero Approval Certificate No: SPIRIT1298**
- **Meggitt Certificate: MQAG/2012/MCSD/MCSC/D/115**

Specialist Accreditations

- **EcoVadis Silver Award**
- **Forestry Commission: Wood Packaging Certificate - Number FC1051**

For the most up to date list of our approvals and accreditations, please see our website for details.

Quality

Our key objective is to provide our customers complete assurance and satisfaction in the quality of our products and services. We are the favoured supplier of manufacturers across the globe, owing to the reliable quality of the products and services our customers receive and their continued confidence that our competitive cost does not compromise quality.

Our companies work to a Quality Management System, as defined in ISO 9001/9120, and approved by the BSI. We work in partnership with the BSI, who carry out regular audits to ensure compliance with these standards and that we are operating with efficiency and accountability at all times.

Working within the framework of ISO 9001 and ISO 9120, our quality system meets or exceeds the criteria. We review our processes regularly to ensure an efficient and robust process is in place at all times, with necessary support and resources available. All of the Knight Group employees receive regular training to maintain familiarity and adherence to our Quality Management System. The commitment from our employees ensures the supply and processing of all material, meets the standards set. As a result, we are consistently able to comply with customers' demands, delivering quality products and processing.

To facilitate fast turnaround times, we offer in-house tensile, hardness and chemical analysis testing. We can also supply fully traceable records for our materials by request and Certificates of Conformity are issued as standard when materials are supplied. For further assurance of our integrity and longevity, we are long standing members of a number of institutions including the British Stainless Steel Association (BSSA), Institute of Spring Technology (IST), Midlands Aerospace Association (MAA) and the Photo Chemical Machining Institute (PCMI).

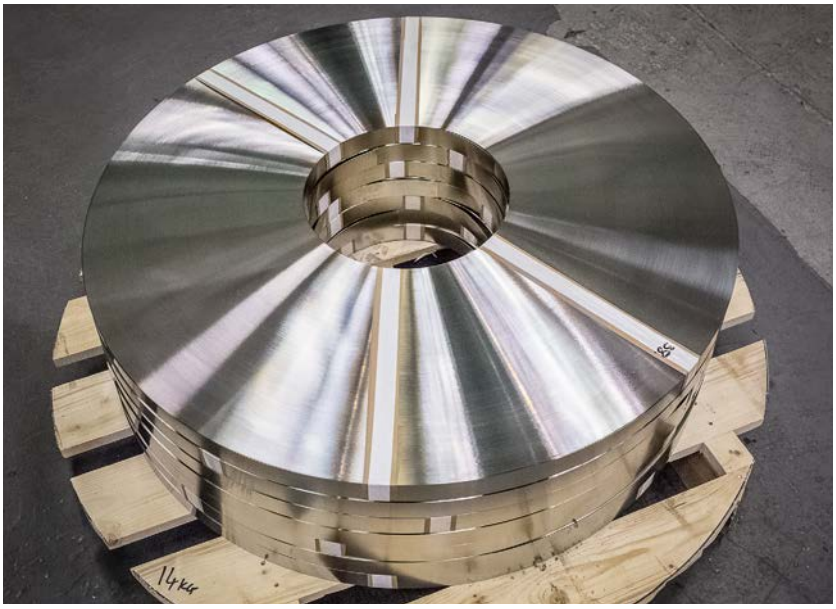
The Knight Group at all times complies with statutory and regulatory requirements. Additionally, we conduct our business in strict compliance with all applicable domestic and international legal standards. We strive to ensure business ethics are practiced with particular emphasis on free competition and rejection of any form of corruption.

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 ISO 9001 and ISO 9120, we are the supplier of choice for global manufacturers where quality, reliability and lean manufacturing are 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 require, saving valuable production time and costs. Our processing is offered at a competitive 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.



Our People

At the heart of any business is people. At the Knight Group we have developed a dedicated team of people with a valued wealth of knowledge and experience within the metals industry. Our staff receive continual, high quality training to ensure they can maximise their personal potential. Our production team are multi machine trained to allow us flexibility in processing, ensuring we can offer efficient processing even with tight turnaround time. With sustainable practices at the forefront of manufacturers' success our team can processes your material with accuracy you need to cut time and costs.

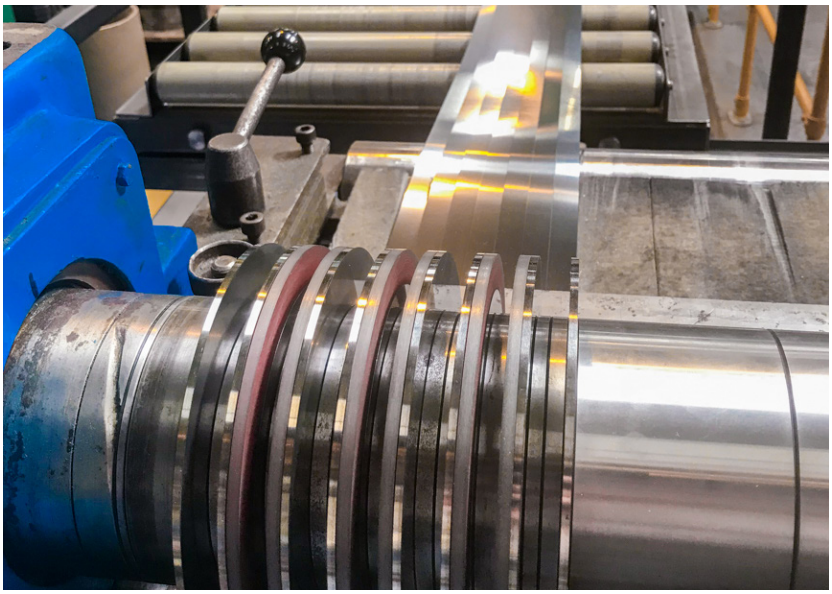
Slitting & Shearing

As one of the largest independent processors in Europe, the Knight Group has 26 slitting machines, providing a large workload capacity to accommodate fast turnaround times to meet even the most demanding deadlines.

Our machines are state of the art, with ultra fine tolerances and a substantially superior width to thickness ratio of 3:1 compared to the industry standard of 8:1, capable of processing all material sizes and specifications.

We have a skilled team of experienced machine operators that ensure the efficient and safe running of our production facilities, with all materials handled with care from arrival to dispatch.

Slit Width Tolerances Dimensions in (mm)					
Specified Thickness		Width			
From	Up To	<40	40 < W <150	150 < W <305	>305
0.025	0.25	± 0.10	± 0.12	± 0.15	± 0.20
0.25	0.50	± 0.12	± 0.15	± 0.20	± 0.25
0.50	1.0	± 0.15	± 0.20	± 0.25	± 0.30
1.0	2.0	± 0.20	± 0.25	± 0.30	± 0.35
2.0	4.0	± 0.25	± 0.30	± 0.35	± 0.40
4.0	6.5	± 0.30	± 0.35	± 0.40	± 0.45



26 Slitting Machines for all Sizes and Material Specifications

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

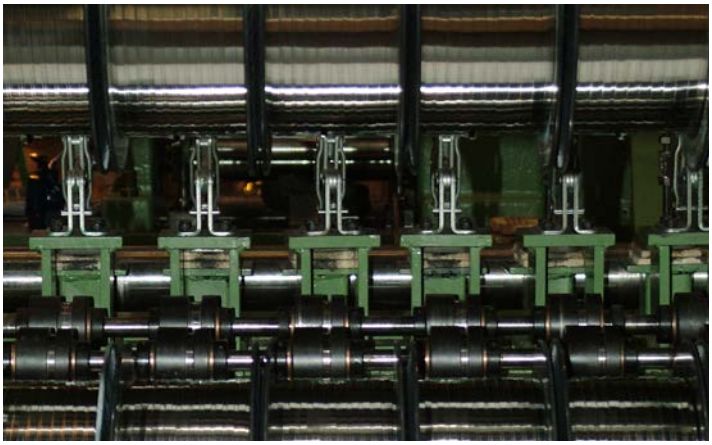
Ability to offer Ultrafine Width Tolerances down to +/- 0.025mm (0.001”)

Thicknesses:
0.013mm to 6.5mm (0.0005” to 0.26”)
Widths:
0.64mm to 1100mm (0.025” to 43”)

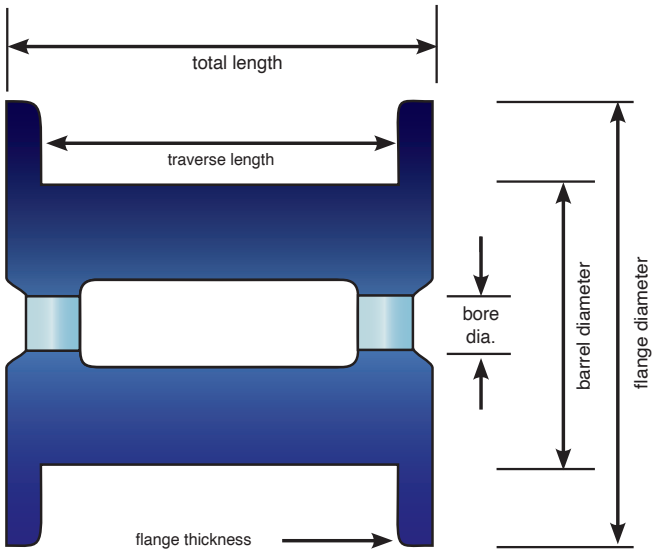
Traverse Winding

With efficiency as one of our key values at the Knight Group, we have successfully developed in-house traverse winding to support our customers in reducing their manufacturing times and costs.

Traverse winding provides an alternative to single coil “pancake” form of feed supply, capable of holding up to ten times more material. Each traverse wound coil increases productivity and enables longer uninterrupted production runs, by reducing the number of coils needing to be re reloaded. Machine downtime and coil handling are minimised and storage and scrap can be dramatically reduced. We can offer traverse wound strip on your choice of spools from 20kg to 100kg max.



Traverse Winding Spool Dimensions			
Spool Type	**Argonaut**	**DIN 355**	**DIN 500**
Maximum Weight (kg)	20	50	100
Total Length (mm)	100	200	250
Traverse Length (mm)	85	160	180
Flange Diameter (mm)	300	355	500
Barrel Diameter (mm)	180	224	315
Bore Diameter (mm)	51.5 +0.5	36 +0.5	36 +0.5



Traverse Winding Tolerances		
Specified Thickness (mm)		
From	**Up To**	**Width <19**
0.10	0.25	± 0.10
0.25	0.50	± 0.12
0.50	1.0	± 0.15

5 Traverse Winding Lines

Spools offer long length coils that are difficult or impossible to handle as flat pancake coils

Spools up to 100kg in Weight

Slitting Width Range is from 3 mm up to 20mm (0.118” to 0.787”)
Slitting Thickness Range from 0.1mm up to 0.5mm (0.004” to 0.020”)

Reduced Machine Downtime
Longer Production Runs
Reduced Storage and Scrap
Safer Material Handling
Reduced Production Time and Costs

Cut to Length

The Knight Group knows that manufacturers are under constant pressure to get their products processed faster and cheaper and stay ahead of their competitors. Space is also at a premium and many manufacturers do not have onsite facilities to store large quantities of material for processing to ensure minimal machine downtime.

By offering our customers material cut and packaged to their exact specifications, we help hundreds of our customers to achieve leaner manufacturing processes to maintain a sustainable and successful business. We have 8 cut to length lines, with multiple encoders used for multi-lane cutting of narrow materials. Operated by our skilled and experienced team, you can rely on very flat, high surface quality blanks from your chosen material, cut quickly and with great accuracy. We offer highly competitive rates to make cut to length an attractive cost and time saving decision. All material is quality checked and then carefully packed in bespoke packaging. Available for both collection or delivery to suit your business needs, your material will arrive machine ready.

8 Cut to Length Lines

High Quality Surface Finish Blanks

Lengths up to 6 Metres (236.22”)

Heavy Gauge Lines for 3mm Metal Stock Up to a 1000mm (39.37”) Wide and Thicker

Gauges up to 6mm (2.36”) at Reduced Widths

Specialist Foil Lines to Cut High Quality Flat

Precision Blanks for the Chemical Etching and Laser Industries

Widths up to 1000mm (39.37”)

and Gauges from 0.05mm (0.002”)

Cut to Length Tolerances For widths up to 1000mm					
Thickness	Thickness	Length (mm)			
From	Up To	25 < L <1000	1000< L <2000	2000 < L <3000	4000 < L <6000
0.1	0.5	± 0.25	± 0.4	± 0.6	± 1.0
0.5	1.5	± 0.4	± 0.6	± 1.0	± 3.0
1.5	3.0	± 0.6	± 1.0	± 3.0	± 5.0
3.0	5.0	± 1.0	± 3.0	± 5.0	± 7.0
Square thin gauge blanks up to 0.6mm in thickness and 650mm wide can have an accuracy across the diagonals of ±0.5mm					

Edge Finishing

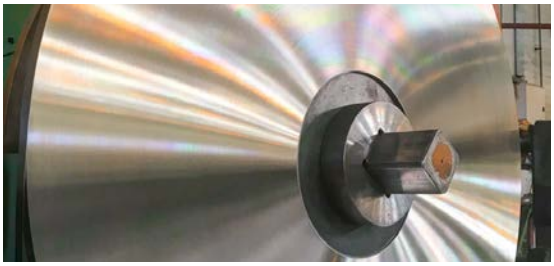
Edge-Dressing: Cutting Risks and Cutting Costs

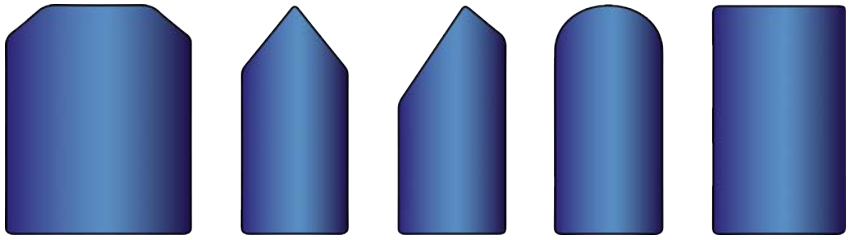
During the production process of strip and coil, the material develops a sharp edge, commonly referred to as a burr. This sharp edge has both safety and manufacturing implications, as it poses a health and safety hazard and the material can be more difficult to work with, increasing manufacturing time and ultimately costs.

The Knight Group offers manufacturers the flexibility to choose the processing that meets your needs and we can supply material edge-dressed to your specifications, whether it is the commonly requested rounded or square edge shapes or you need a contoured edge shape tailored specifically to you. We design and use Bespoke Tungsten Carbide Tooling to meet the most exacting custom edge requirements on precision strip.

With the heavy investment in our bespoke machinery and a wealth of experience in our team, our machines can offer precision processing in high volumes, with fast turnaround times.

Edge Dressing				
Edge Type	Width Range		Thickness Range	
	mm	inches	mm	inches
De-burred Safe	4.5 - 110	0.18 - 4.33	0.15 - 3.0	0.006 - 0.118
Fully Rounded	4.5 - 110	0.18 - 4.33	0.15 - 2.0	0.006 - 0.080
Dressed Square	7.0 - 80	0.28 - 3.15	0.15 - 2.0	0.006 - 0.080
Chamfered	10.0 - 80	0.39 - 3.15	0.30 - 2.0	0.012 - 0.080
Rolled Round	8.0 - 75	0.32 - 2.95	0.80 - 3.50	0.032 - 0.138





Typical Edge Profiles

5 Edge Finishing Lines

Bespoke Tungsten Carbide Tooling

Simple de-burring
Rounded Edges
Chamfered Edges
Square Edges

Available in:
Pancake Coils or Spools

Edge Profiling Size Range						
Size Range	Profiling (Metal Removal)		Edge Rolling		Roll Deburring	
	mm	inches	mm	inches	mm	inches
Thickness	0.1 - 3.0	0.004 - 0.12	1.2 - 4.0	0.05 - 0.16	0.2 - 2.0	0.008 - 0.08
Width	3.0 - 80.0	0.12 - 3.15	8.0 - 80.0	0.32 - 3.15	3.0 - 600	0.12 - 23.62
Coil Types	Pancake, Open Traverse, Spool Wound		Pancake		Pancake	

Warehouse

With one of the widest ranges of precision strip in Europe, the Knight Group are able to supply most strip metal requirements from an extensive range of stock at our major facilities in the UK and Belgium. The warehouse racking at our expansive facility in Birmingham can accommodate a range of coil sizes up to 5 tonnes in weight and up to 73" (1855mm) in diameter. With the use of turret trucks, we can use the full height of the building and ensure a maximum level of stock can be stored. We use a computerized stock management system to ensure all incoming materials are accurately net weighed and given allocated positions, allowing our team real-time information on stock levels to ensure we can provide accurate responsive customer service.

Over 40,000 sq.ft Warehouse

Widest Range throughout Europe of Alloys and Thicknesses of Precision Strip Metals Held in Stock

Fully Barcoded and Computerised Stock Management System

Short Lead Times

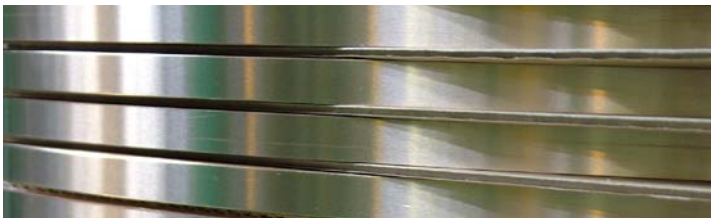
Bespoke Packing

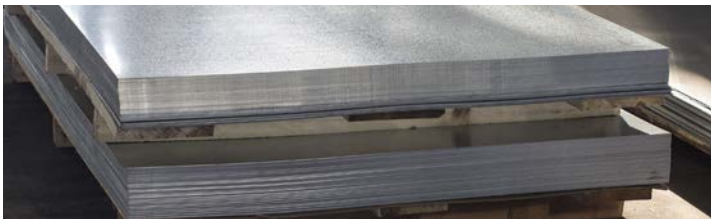
Worldwide Distribution

Products

We offer a comprehensive range of precision strip and wire, stocking one of the biggest ranges in Europe, including: Stainless Steel Alloys, Mild Steel, Nickel Alloys, Titanium Alloys, Aluminium Alloys, Bronze and Copper Alloys, as well as Clad Metals and Plated Strip. We tailor our business to your needs, so whether you are looking for large volumes or test materials for prototypes and trials, we can provide the material with the specifications you need, with a cost that does not compromise on quality. We have established exclusive agreements with a number of mills to offer specialist and bespoke materials in addition to an impressive standard stock range of over 2500 items of precision strip in coil, sheet and wire form. You can rely on us to consistently provide you with the best products and lead times with competitive pricing. Materials can be tested on request and thanks to our established supply network, we can source materials you want that are outside of our standard stock range. If you are looking to cut your costs further, we offer bespoke processing services to ensure your material arrives exactly how, when and where you want it.

"COMPETITIVE PRICING WITHOUT COMPROMISING QUALITY"





Coil

As one of the largest multi-metal stockholders in Europe, we supply an comprehensive range of Stainless Steels, High Performance Nickel Alloys, Mild and Carbon Steels, Aluminium Alloys, Titanium Alloys, Copper Alloys and Plated Strip. With strip thickness from 0.010 mm up to 3 mm and widths from 1.0 mm up to 1250 mm, you can have material to the exact specifications you need. If you want to reduce your manufacturing costs and time, you can also choose from a wide range of processing options designed to support lean manufacturing goals.

Surface Finishes

Selecting the best surface finish on material is not based solely on aesthetic properties desired for the end application, but also for their corrosion resistance. We offer a full range of surface finishes to suit your desired applications and our experienced sales team are available to provide you with excellent technical support when selecting material that meets your needs.

Large stock of precision strip

Strip width from 1.0 mm up to 1250 mm
Strip thickness from 0.010 mm up to 3 mm
Thicknesses above 3mm available by request

Process and Supply – Metal Strip
We process in house and supply strip as:
Pancake coils, Traverse wound coil,
Flat blanks, Sheets
Cut to length Stainless Steel strip

Special Areas – Stainless Steel Strip
Temper rolled strip
Hard rolled strip
Soft steel strip
Thickness less than 0.4mm
Edge conditioning

Foil, Coil, Sheet & Wire

Wire

The Knight Group offer a comprehensive range of high quality wire products, including flat wire, round wire, profile wire and wire rope, in over fifty different alloys, meeting the needs of manufactures across the globe. Whatever your product or application, whether you need a simple commercial shape or something more complex or bespoke, we can supply all your wire needs. You can choose the exact size and shape profile needed, supplied in cut lengths, coils or spools to suit your needs, reducing your waste material and minimising costs and time. We are able to supply ultra fine wire from 0.025 mm dia., suitable for medical and textile applications, up to 10.00 mm dia in lengths from 0.1mm to 4m lengths (longer lengths are available by request).

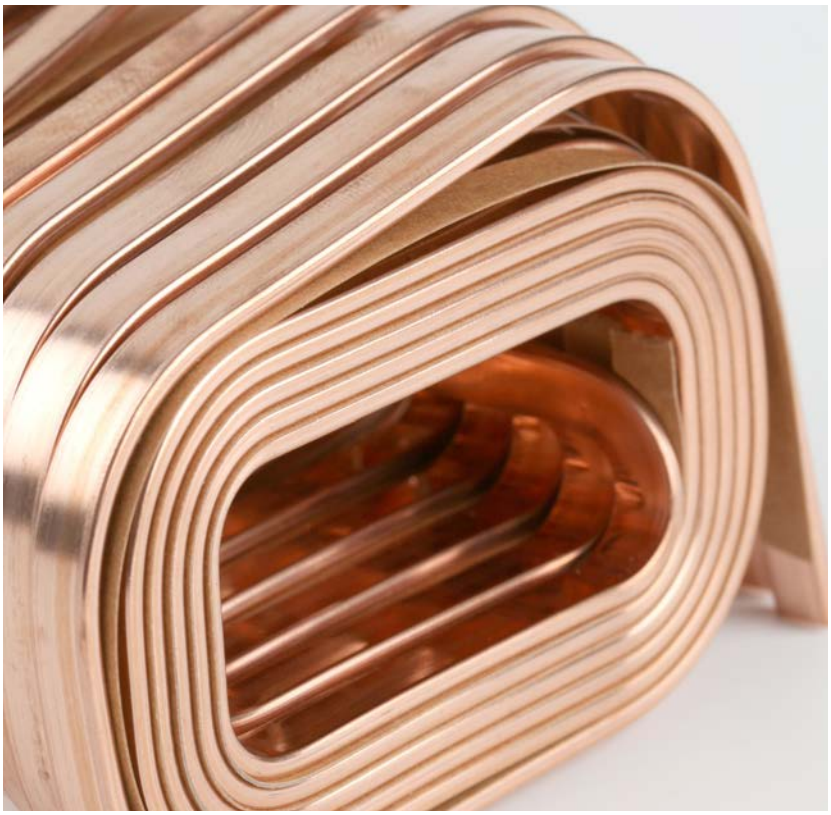
Round and Profile Wire

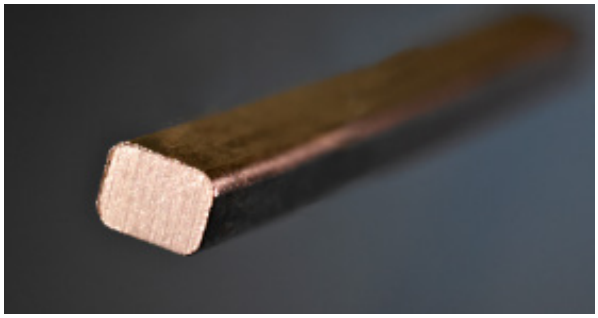
Round Wire from:
0.1 mm up to 10.00 mm dia
Profile Wire: up to 45 mm^2

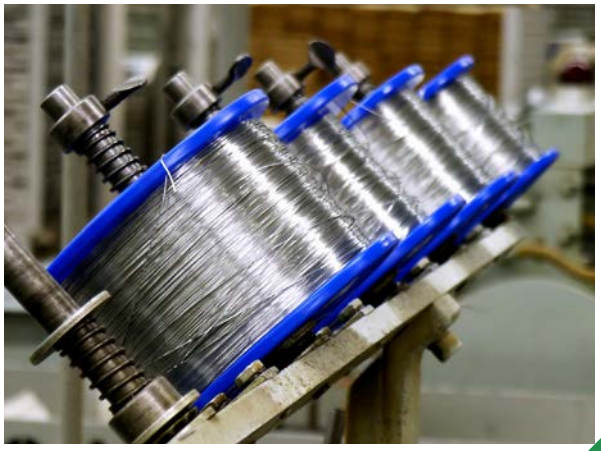
Supplied as
Cut Lengths/ Straightened, Coils, Formers or Spools

Profile Wire Cut lengths from 10 mm to 10 m
Round Wire Cut Lengths from 10 mm to 10 m

Coils from 1 kg to 1000 kgs
Formers from 500 kgs to 1000 kgs
Spools - Wide Range Available







Stainless Steel

The main justification for selecting Stainless Steel for a given application is its outstanding corrosion and oxidation resistance which, along with other exceptional properties, such as the ability to develop very high strength through cold working or heat treatment, excellent formability and capability to withstand cryogenic temperatures, makes it a very versatile material.

Stainless Steels have a wide range of microstructures which are controlled by composition and, although all Stainless Steels must contain chromium to form the complex oxide surface which gives Stainless Steel its protection, other alloying elements have significant effects. In discussing the generic group “Stainless Steels” it is convenient to categorise them in terms of microstructure.

STAINLESS STEEL STOCK RANGE				
TYPE	COIL STOCK RANGE		WIRE STOCK RANGE	
	Thickness (mm)	Width (mm)	Round	Shaped
AUSTENITIC				
Annealed	0.01 - 3.0	3 - 1250	0.1 – 10.00 mm dia	Upto 45 mm2 area
All other Tempers	0.01 - 2.0	3 - 1250		
FERRITIC				
Annealed	0.05 - 3.0	3 - 650	0.1 – 10.00 mm dia	Upto 45 mm2 area
All other Tempers	0.05 - 1.6	3 - 450		
MARTENSITIC				
Annealed	0.127 - 3.0	3 - 450	0.1 – 10.00 mm dia	Upto 45 mm2 area
PRECIPITATION HARDENING (17/7 PH)				
Annealed	0.02 - 1.5	3 - 620	0.1 – 10.00 mm dia	Upto 45 mm2 area
Condition ‘C’	0.025 - 1.0	3 - 620		
HEAT RESISTING STEELS				
Annealed	0.025 - 3.0	3 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
Other widths can be made available upon request				

SURFACE FINISHES AVAILABLE OF SHEET, PLATE AND STRIP		
Abbreviation	Type Of Process Route	Surface Finish / Notes
2D	Cold rolled,heat treated, pickled.	Smooth and dull, a finish for good ductility, not as smooth as 2B or 2R.
2B	Cold rolled, heat treated, pickled	Smoother than 2D, a common finish for further processing, not bright.
2R	Cold rolled, bright annealed.	Smooth, bright, reflective, a common finish for further processing.
2H	Cold rolled, work hardened.	Bright, temper rolled to obtain a higher strength.
2Q	Hardened and tempered, scale free.	Free of scale, either bright hardened and tempered or descaled afterwards.

Types

Austenitic Stainless Steel

The high temperature form of iron with carbon in solid solution is known as Austenite which is non-magnetic. With a range of alloying additions possible, the most common being Nickel, Austenitic Stainless Steel remains non magnetic at room temperature. Traditional Austenitic Stainless Steels are based on an 18% chromium, 8% Nickel alloy, commonly known as 18/8 stainless. The chromium and Nickel contents can be increased to further improve corrosion resistance and other elements, such as molybdenum, can be added, again to improve corrosion resistance. Similarly the Nickel content can be varied to give a range of mechanical properties, due to differing work hardening rates.

This has led to the familiar group of 300 Series Alloys, which were developed to exploit the full range of possibilities available when altering alloying levels. In the fully annealed condition they are essentially non-magnetic but cold working of the less alloyed grades will induce structural changes leading to increased levels of magnetism.

Ferritic Stainless Steel

This group is so named because the alloys have the same structure as iron at room temperature. These alloys are based on a minimum chromium level of 11% and contain no Nickel but provide fair corrosion resistance and good formability at low cost. Chromium levels can be increased to improve corrosion resistance but these alloys have low work hardening rates, do not develop high strength from cold working and remain magnetic in all tempers. Ferritic Stainless Steels are the ideal solution for high volume applications, particularly in domestic environment where moderate corrosion resistance is acceptable. Good examples include hinges and stays in the UPVC window hardware industry.

Martensitic Stainless Steel

Martensitic Stainless Steels are similar to plain Carbon Steels that are austenitised, hardened by quenching and tempered to give improved toughness and ductility. These alloys are magnetic and are generally formed in the annealed condition, then heat treated. The strength generated by heat treatment is dependent on the carbon content of the alloy; increasing carbon increases strength but at the expense of toughness and ductility. Martensitic Stainless Steel is a low cost stainless metal strip and was the first to be commercially developed and is used as cutlery steel. It is also used for the manufacture of complex spring shapes needing a soft steel for forming.

AVAILABLE GRADES

Austenitic
201, 301, 304L, 304, 305, 320, 321, 347, 316, 316L, 316Ti, 904L

Ferritic
410S, 430, 430L, 430Ti (439), 441, 444

Martensitic
410, 420, 431

Precipitation Hardening Stainless Steel
17/4PH, 17/7PH

Duplex & Super Duplex
309, 310

Other grades available by request

Precipitation Hardening Stainless Steel

Precipitation Hardened Alloys are part of the Stainless Steel family, possessing a higher carbon content compared to Ferritic alloys, enabling them to harden through air, oil or water cooling, improving their strength. This alloy grade offers manufacturers many superior properties, combining high work hardening rates and very high strengths, superior fatigue properties, good corrosion resistance, and minimum distortion when heat treated. These properties, in addition to good formability, make 17-7PH ideal for aerospace applications, spring manufacturing and surgical instruments.

Duplex & Super Duplex Stainless Steel

Duplex Stainless Steel strip has a combined Austenitic-Ferritic structure. These magnetic alloys are not hardenable by heat treatment, but offer many added advantages over other Stainless Steels, with higher annealed strengths, stress relaxation and fatigue properties, superior tensile strength, greater corrosion and pitting resistance and lighter weight. Duplex Stainless Steel strip can be strengthened by cold work and has lower thermal expansion and higher heat conductivity than austenitic steel strip. With a lower Nickel content than other Stainless Steels, the material cost is also reduced. Super Duplex has a higher chromium content than standard Duplex, offering further mechanical and corrosion resistance.

Stainless Steel
Features

EURO. NAME	ASTM NAME		FEATURES		
	AISI	UNS	Key Features	Key Markets	Applications
AUSTENITICS					
1.4310	301	S 30100	An Austenitic Nickel-Chrome alloy with high toughness and corrosion resistance. In annealed form it is non magnetic, but develops magnetic properties through cold working. It has good surface brightness, making it useful for decorative applications.	Aerospace, Automotive, Chemical, Transport, Springs & Pressings, Decorative	Aircraft Structural Parts, Automotive Parts Including Trims And Wheel Covers Springs, Pressings, Connectors, Gaskets, Watch Parts, Chemically Etched Components, Building Tools, Decorative Purposes, Tableware, Appliances
1.4301	304	S 30400	The most common grade of Stainless Steel due to its versatility. Excellent corrosion resistance in a wide range of environments, excellent formability and welding, superior deep drawing properties.	Food, Springs & Pressings	Flexible Tube, Pipes, Domestic Appliances, Gaskets, Kitchen Wares, Springs, Thread Fasteners, Sinks, Computer And Monitor Parts, Battery Cases, Window Spacers, Architectural Panels, Heat Exchangers
1.4307	304L	S 30403	Low Carbon version of 304, ideal for more corrosive environments. Greater resistance to intergranular corrosion in welds. Moderate pitting corrosion resistance.	Springs & Pressings	Water Tubes For Electric Heaters, Bellows, Pressings, Deep Drawn Parts, Expanded Mesh
1.4303	305	S 30500	An Austenitic Stainless Steel with good corrosion resistance. It has capability for polishing and electroplating, as well as soldering and welding. It has good Cold Workability.	Electronic, Stationary	Electronic Parts, Deep Drawn Parts, Battery Cases, Pens
1.4833	309S	S 30908	The low Carbon Version of 309, improves weldability and minimises carbide precipitation. Good resistance to oxidation and high-temperature corrosion combined with good mechanical strength at elevated temperatures. Not suited for use in highly carburizing environments.	Automotive, Energy , Chemical, Cement	Gas Burner Radiators, Electrical Heating Element Tubes, Energy Conversion Plants, Furnace Parts, Heat Exchangers, Automotive Exhausts
1.4845	310/ 310S	S 31008	A Refractory Austenitic Stainless Steel, which has high toughness and excellent high-temperature oxidation resistance due to its high Chromium and Nickel content.	Petrochemical Industry, Food Industry	Nuclear Thermal Insulation, Furnaces, Air Heaters, Food Processing Components
1.4401	316	S31600	Molybdenum added to increase corrosion resistance, with higher resistance to pitting and crevice corrosion in chloride environments than other common austenitic grades. Excellent welding and formability characteristics. Good for applications requiring continuous work in a temperature range of 450 and 850C.	Chemical, Petrochemical, Marine, Food	Bursting Discs, Seals, Bellows, Gaskets, Expansion Joints, Explosion Panels, Tubes, Diaphragms, Heat Exchangers, Coastal Architectural Features, Food And Laboratory Benches, Threaded Fasteners, Springs, Boat Fittings, Chemical Containers
1.4436					
1.4404	316L	S 31603	The Low Carbon Version of 316, better for uses at sensitization temperatures, such as welding, as intergranular corrosion resistance is increased. Slightly more corrosion resistant than 1.4401. More heavily alloyed. Excellent corrosion resistance in Food, Beverage and Agricultural sectors.		
1.4432					
1.4571	320/ 316Ti	S 31635	Titanium-stabilised version of 316, prevents intergranular corrosion of welded structures by preventing formation of Chromium Carbide. The addition of Titanium offers improved mechanical strength at temperatures above 600C.		
1.4541	321	S 32100	Titanium added to reduce Chromium Carbide precipitation, giving increased protection against intergranular corrosion. Combines high strength, resistance to scaling and phase stability with resistance to subsequent aqueous corrosion, excellent welding and forming capabilities. Ideal for applications in the temperature range of up to 900°C.	Aerospace, Automotive	Heating Systems, Welded Tubes, Gaskets, Profile Pipes, Expansion Joints, Seals, Bellows Gaskets, Furnace Parts, Honeycomb Seals, Thermal Insulation, Tube, Flexible Tube, Diaphragms, Aerospace Components Including Exhaust Manifolds
1.4550	347	S 34700	Additions of Niobium and Titanium give excellent resistance to intergranular corrosion.		
1.4539	904L	N 08904	A low Carbon Austenitic Stainless Steel, alloyed with Copper to improve resistance in acidic conditions. As it is alloyed with expensive components, Molybdenum and Nickel, it has become largely replace by lower cost Duplex alloys. 904L is non-magnetic, and offers excellent formability, toughness and weldability.	Oil & Gas, Paper & Pulp	Seals, Gaskets And Shims, Thermal Insulation Panels, Distillation, Column Packing

Features

EURO. NAME	ASTM NAME		FEATURES		
	AISI	UNS	Key Features	Key Markets	Applications
FERRITICS					
1.4016	430	S 43000	Good Formability. Good corrosion resistance in moderately aggressive media and good oxidation resistance at elevated temperatures. It is not susceptible to stress cracking corrosion.	Automotive, Chemical Etching	Automotive Trim, Domestic Appliance Panels, Chemically Etched Components, Paint Brushes, Gaskets, Lights Bulbs, Hose Clamps, Oil Refinery Components In Acidic Environments
1.4113	434	S 43400	A low Carbon Ferritic Stainless Steel with additions of Molybdenum. Corrosion resistance is better than 430. Excellent polishing characteristics.	Automotive, Architectural	Automotive Trim, Dishwashers, Restaurant Equipment, Nitric Acid Plant Equipment
MARTENSITICS					
1.4006	410	S 41000	A low hardness Martensitic Stainless Steel which is corrosion resistant in water and steam. Not considered to be weldable, although it is possible with thin gauge material.	Medical, Mechanical	Stainless Steel Springs, Valves, Axles, Surgical Instruments, Wear Resistant Surfaces
1.4028	420	S 42000	Higher hardness than 410. Useful for applications in which wear and abrasion resistance is important.	Springs & Pressings, Printing Industry, Mechanical	Cutlery, Machine Knives, Scissors, Measuring Tools, Springs, Mechanical Parts
1.4122	-	-	The most corrosion resistant of the common Martensitic grades. Medium-High hardness. Very good wear resistance and mechanical properties.	Medical, Food, Mechanical	Surgical Instruments, Pumps, Mechanical Parts, Food Processing
PRECIPITATION HARDENING					
1.4542	-	17-4PH	Good combination of corrosion resistance and excellent mechanical properties. The corrosion resistance is very similar to 1.4301, but significantly more resistant to Stress Corrosion Cracking. It is susceptible to Crevice Corrosion in stagnant sea water.	Aerospace, Marine, Sport And Leisure, Mechanical, Pulp And Paper Industry	Pump Components, Mechanical Parts, Golf Clubs, Seals
1.4568	-	17-7PH	Good formability and strength. Corrosion resistance is generally higher than the Martensitic Stainless Steels and 17-4PH but lower than 304. The formability is comparable to 301.	Springs & Pressings	Stainless Steel Springs, Diaphragms, Encapsulated Bellows, Strain Gauges
DUPLEX					
1.4062	2202	S 32202	A dual-phase Austenitic-Ferritic Stainless Steel. Offers elevated yield strength, good resistance to stress corrosion cracking and good mechanical strength. Suitable for cold forming.	Pulp And Paper Industry, Water, Food, Construction, Automotive	Crash barriers, Desalination Cladding of paper machines, Oil tanks Juice tanks, Automotive Structures
1.4462	2205	S 32205	A dual-phase Austenitic-Ferritic Stainless Steel. Achieves high yield strength while maintaining sufficient ductility. The corrosion resistance is comparable to grades 304 and 301. Good weldability and formability. High Design Strength, allowing for a reduction in section thickness.	Automotive, Chemical, Transport, Springs & Pressings, Decorative	Pulp and Paper Processing, Desalination, Automotive Trim, Offshore Platforms
1.4362	2304	S 32304	A dual-phase Austenitic-Ferritic Stainless Steel with low carbon content. Good resistance to corrosion and offers much higher proof strength as Austenitic Stainless Steels. Other properties include good weldability and good toughness.		
1.4410	2507	S 32750	A dual-phase Austenitic-Ferritic Stainless Steel. High resistance to all corrosion, high mechanical strength and good weldability. Suitable for service in highly corrosive conditions.	Automotive, Chemical, Marine	Pulp and Paper Processing, Desalination, Automotive Trim, Seawater Systems, Heat exchangers
1.4662	(LDX) 2404	S 82441	A Duplex Stainless Steel with high contents of Chromium and Nitrogen. This combination gives the material high corrosion resistance and a higher mechanical strength than other common Duplex materials. Other properties include good fatigue resistance and good weldability.	Automotive, Chemical, Marine, Energy, Architectural	Structural Components, Piping Systems, Pulp and Paper Processing, Oil ad Gas, Water Treatment.
1.4162	(LDX) 2101	S 32101	A low-alloyed, general purpose, Duplex Stainless Steel. Offers good general corrosion resistance, high sulphide and chloride stress corrosion resistance, good strength and weldability.	Chemical, Water Treatment, Paper & Pulp	Chemical Processing Vessels and Piping. Pulp and Paper Mill Equipment, Water Treatment Tanks.

Stainless Steel
Chemical Properties

AUSTENITICS													
EURO. NAME	ASTM NAME		TYPICAL CHEMICAL COMPOSITION %										
	AISI	UNS	C	Si	Mn	P	S	Cr	Mo	Ni	N	Cu	Other
1.4310	301	S 30100	0.05 - 0.15	1.00 - 2.00	2.00	0.045	0.015 - 0.030	16.00 - 19.00	0.80	6.0 - 9.5	0.10	-	-
1.4301	304	S 30400	0.07	1.00	2.00	0.045	0.030	17.50 - 19.50	-	8.0 - 10.5	0.10	-	-
1.4307	304L	S 30403	0.03	1.00	2.00	0.045	0.030	17.50 - 19.50		8.0 - 12.00	0.10	-	-
1.4303	305	S 30500	0.06 -0.12	1.00	2.00	0.045	0.030	17.00 - 19.00	-	10.50 - 13.00	0.10	-	-
1.4833	309S	S 30908	0.08 - 0.15	1.00	2.00	0.045	0.015 - 0.030	22.00 - 24.00	-	12.00 - 15.00	0.11	-	-
1.4845	310/ 310S	S 31008	0.08 - 0.10	1.50	2.00	0.045	0.015 - 0.030	24.00 - 26.00	-	19.00 - 22.00	0.11	-	-
1.4401	316	S31600	0.07 - 0.08	1.00	2.00	0.045	0.030	16.50- 18.50	2.00 - 3.00	10.00 - 14.00	0.10	-	-
1.4436			0.05 -0.08	1.00	2.00	0.045	0.030	16.00 - 18.50	2.50 - 3.00	10.50 - 14.00	0.10	-	-
1.4404	316L	S 31603	0.03	1.00	2.00	0.045	0.030	16.00 - 18.50	2.00 - 3.00	10.00 - 14.00	0.10	-	-
1.4432													
1.4571	316Ti	S 31635	0.08	1.00	2.00	0.045	0.030	16.00 - 18.50	2.00 - 3.00	10.00 - 14.00	-	-	Ti 5 x C to max 0.7
1.4541	321	S 32100	0.08	1.00	2.00	0.045	0.030	17.00 - 19.00	-	9.00 - 12.00	0.10	-	Ti 5 x C to max 0.7
1.4550	347	S 34700	0.08	1.00	2.00	0.045	0.015	17.00 - 19.00	-	9.00 - 13.00		-	Nb = 10 x C to max 1.0
1.4539	904L	N 08904	0.02	0.70	2.00	0.030 - 0.045	0.010 - 0.035	19.00 - 23.00	4.00 - 5.00	23.00 - 28.00	0.10 - 0.15	1.00 to 2.00	-
FERRITICS													
			C	Si	Mn	P	S	Cr	Mo	Ni	N	Cu	Other
1.4016	430	S 43000	0.08 - 0.12	1.00	1.00	0.040	0.030	16.00 - 18.00	-	0.75	-	-	-
1.4113	434	S 43400	0.08 - 0.12	1.00	1.00	0.040	0.030	16.00 - 18.00	0.75 - 1.40	-	-	-	-
MARTENSITICS													
			C	Si	Mn	P	S	Cr	Mo	Ni	N	Cu	Other
1.4006	410	S 41000	0.08 - 0.15	1.00	1.00 - 1.50	0.040	0.030	11.50 - 13.50	-	0.75	-	-	-
1.4028	420	S 42000	0.26 - 0.35	1.00	1.50	0.040	0.030	12.00 - 14.00	-	-	-	-	-
1.4122	-	-	0.33 - 0.45	1.00	1.50	0.040	0.030	15.50 - 17.50	0.80 - 1.30	1.00	-	-	-
PRECIPITATION HARDENING													
			C	Si	Mn	P	S	Cr	Mo	Ni	N	Cu	Other
1.4542	-	17-4PH	0.07	0.70	1.50	0.040	0.030	15.00 - 17.00	0.60	3.00 - 5.00	-	3.0 - 5.0	Nb: 5x C to 0.45
1.4568	-	17-7PH	0.09	0.70	1.00	0.040	0.015	16.00 - 18.00	-	6.50 - 7.80	-	-	Al: 0.70 - 1.50
DUPLEX													
			C	Si	Mn	P	S	Cr	Mo	Ni	N	Cu	Other
1.4062	2202	S 32202	0.03	1.00	2.00	0.040	0.010	21.5 - 24.0	0.45	1.00 - 2.90	0.16 - 0.28	-	-
1.4462	2205	S 32205	0.03	1.00	2.00	0.035	0.015	21.0 - 23.0	2.50 - 3.50	4.50 - 6.50	0.10 -0.22	-	-
1.4362	2304	S 32304	0.03	1.00	2.00	0.035	0.015	22.0 - 24.0	0.10 - 0.60	3.50 - 5.50	0.05 - 0.20	0.10 - 0.62	-
1.4410	2507	S 32750	0.03	1.00	2.00	0.035	0.015	24.0 - 26.0	3.00 - 4.50	6.0 - 8.0	0.24 - 0.35	-	-
1.4662	(LDX) 2404	S 82441	0.03	0.70	2.50 - 4.00	0.035	0.005	23.0 - 25.0	1.0 - 2.0	3.0 - 4.50	0.20 - 0.30	0.10 - 0.80	-
1.4162	(LDX) 2101	S 32101	0.04	1.00	4.00 - 6.00	0.040	0.015	21.0 - 22.0	0.10 - 0.80	1.35 - 1.90	0.20 - 0.25	0.10 - 0.81	-

Our materials can be supplied to EN 10088-3:2014 and/or ASTM A 240/03C. We can supply other grades not listed and to other standards by request. Please contact the Knight Group Sales Team with your requirements.

Stainless Steel
Mechanical Properties

TYPICAL MECHANICAL PROPERTIES							
EURO. NAME	ASTM NAME		Proof Strength 0.2% Min (N/mm2)	Tensile Strength	Elong. % Min. (50mm Gauge Length)	Hardness Max (VPN)	Surface Finish
	AISI	UNS					
AUSTENITICS							
1.4310	301	S 30100	195	500 - 750	40	242	2B & 2R
1.4301	304	S 30400	190	500 - 700	45	226	2B & 2R
1.4307	304L	S 30403	175	500 - 700	45	226	2B & 2R
1.4303	305	S 30500	190	500 - 700	45	226	2B & 2R
1.4833	309 S24	S 30908	210	500 - 700	33	192	2B & 2R
1.4845	310/ 310S	S 31008	210	500 - 700	33	192	2B & 2R
1.4401 1.4436	316	S31600	200	500 - 700	40	226	2B & 2R
1.4404 1.4432	316L	S 31603	200	500 - 700	40	226	2B & 2R
1.4571	320	S 31635	200	500 - 700	40	226	2B & 2R
1.4541	321	S 32100	190	500 - 700	40	226	2B & 2R
1.4550	347	S 34700	205	510 - 740	40	242	2B & 2R
1.4539	904L	N 08904	230	530 - 730	35	242	2B & 2R
FERRITICS							
1.4016	430	S 43000	240	400 - 630	20	200	2B & 2R
1.4113	434	S 43400	280	440 - 660	18	200	2B & 2R
MARTENSITICS							
1.4006	410	S 41000	450	650 - 850	15	231	2B & 2R
1.4028	420	S 42000	650	850 - 1000	10	258	2B & 2R
1.4122	-	-	550	750 - 950	12	280	2B & 2R
PRECIPITATION HARDENING							
1.4542	-	17-4PH	520 - 1000	800 - 1270	10 - 18	380	2R
1.4568	-	17-7PH		max. 850		268	2R
DUPLEX							
1.4062	2202	S 32202	380	650 - 900	30	305	2B & 2R
1.4462	2205	S 32205	450	650 - 880	25	284	2B & 2R
1.4362	2304	S 32304	400	600 - 830	25	274	2B & 2R
1.4410	2507	S 32750	530	730 - 950	25	305	2B & 2R
1.4662	(LDX) 2404	S 82441	450	650 - 900	25	305	2B & 2R
1.4162	(LDX) 2101	S 32101	400	650 - 900	25	305	2B & 2R

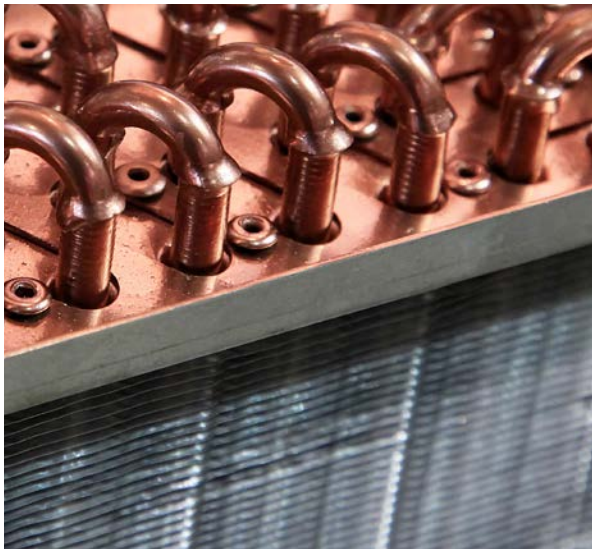
*VPN has been converted from the Brinell Hardness Values and are an approximation only

Titanium

Titanium has been a known element for many years but it is only in the last 50 years or so that it has gained importance. The rapid growth of the Titanium industry has been due to the versatility of the metal and its alloys and their outstanding strength to weight ratios. The mechanical properties of commercially pure Titanium grades vary considerably with small changes in oxygen, nitrogen, hydrogen and carbon. The properties of high strength, light weight and exceptional corrosion resistance have led to traditional applications in chemical process plant, aerospace structures, jet engine components and medical implants and prostheses, nuclear power plants, food processing plants, oil refinery heat exchangers. Commercially Pure Titanium grades have outstanding resistance to seawater and salt-water attack and are used in desalination plant, seawater cooled condensers and other marine related applications.

Titanium exists in two crystallographic forms and its alloys can be classified into three categories:

- alpha
- alpha/beta
- beta alloys



AVAILABLE GRADES

Alpha
Grade 1, Grade 2, Grade 3, Grade 4

Alpha/beta
Grade 5 (Ti 6Al-4V), Grade 9 (Ti 3Al 2.5V)

Beta
21S

TITANIUM STOCK RANGE				
TYPE	COIL STOCK RANGE		WIRE STOCK RANGE	
	Thickness (mm)	Width (mm)	Round	Shaped
ALPHA				
Grade 1	0.025 - 3.00 mm	3 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
Grade 2				
Grade 3				
Grade 4				
ALPHA/BETA				
Ti 6Al-4V (Grade 5)	0.025 - 3.00 mm	3 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
Ti 3Al 2.5V (Grade 9)	0.025 - 3.00 mm	3 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
BETA				
21S	0.025 - 3.00 mm	3 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
Other specifications can be supplied upon request. Please contact us with your requirements.				

Pure Titanium has an alpha structure but transforms to a beta form when heated above 882°C. The addition of alloying elements influences this transformation and many alloys have been developed where beta phase is retained at room temperature, thus giving a material containing alpha and beta phases. The relative amounts of these phases give rise to variations in properties such as ductility, weldability and ease of forming Titanium alloy strip is used for demanding applications such as static and rotating gas turbine engine components. Some of the most critical and highly stressed civilian and military airframe parts are also made of Titanium alloy strip. Commercially pure, or un-alloyed Titanium strip has outstanding corrosion resistance making it the preferred material for many applications in chemical process industries.

Features

TITANIUM FEATURES				
TYPE	**Key Features**		**Key Markets**	**Applications**
ALPHA				
Grade 1	Excellent corrosion resistance, maximum formability, limited strength	Not hardenable by heat treatment. Excellent weldability	Chemical and Marine	Heat Exchangers, Condenser, Tubing, Valves, Pumps, Banding
Grade 2	Very Good formability, improved strength			
Grade 3	Good formability and increased strength over Grades 1 and 2			
Grade 4	Highest strength of commercially pure grades, but sufficient ductility for moderate forming.			
ALPHA/BETA				
Grade 5 (Ti 6Al-4V)	High strength to weight ratio, high corrosion resistance, can be heat treated, but can only be hardened by cold work, good weladability		Medical, Aerospace, Chemical, Marine, Oil and Gas	Aerospace structural components, Turbine blades, discs and rings, medical implants and devices, sports equipment
Grade 9 (Ti 3Al 2.5V)	May be strengthened by cold working. Hardenable by heat treatment. Good weldability.		Aerospace	Honeycomb material for aircraft, seamless tubing, mechanical fasteners
BETA				
21S	Substantial strength to weight ratios. Improved oxidation resistance, elevated temperature strength and creep strength. Good cold formability and weldability. Extremely resistant aircraft hydraulic fluid.		Aerospace	Engine exhaust plug, nozzle assemblies.

TITANIUM CHEMICAL PROPERTIES							
TYPE	**TYPICAL CHEMICAL COMPOSITION %**						
	C	**N**	**O**	**H**	**Fe**	**Ti**	**Others**
ALPHA							
Grade 1	0.1	0.03	0.18	0.015	0.2	Balance	-
Grade 2	0.1	0.03	0.25	0.015	0.3	Balance	-
Grade 3	0.1	0.05	0.35	0.015	0.3	Balance	-
Grade 4	0.1	0.05	0.4	0.015	0.5	Balance	-
ALPHA/BETA							
Grade 5 (Ti 6Al-4V)	0.08 max	0.05 max	0.2 max	0.125 max	0.4 max	Balance	Al 5.5 - 6.75 V 3.5 - 4.5
Grade 9 (Ti 3Al 2.5V)	0.05	0.02	0.12	0.015	0.3	Balance	Al 2.5 - 3.5 V 2.0 - 3.0
BETA							
21S	0.05 max	0.050 max	0.11 - 0.17	0.02 max	0.400 max	Balance	Al 2.5 - 3.5 Si 0.15 - 0.25 Mo: 14.0 - 16.0 Nb: 2.4 - 3.2

TITANIUM MECHANICAL PROPERTIES			
TYPE	Proof Strength 0.2% Min (N/mm2)	Tensile Strength	Elong. % Min. (50mm Gauge Length)
ALPHA			
Grade 1	170 - 240	240 - 330	24
Grade 2	275 - 345	345 - 430	20
Grade 3	380 - 450	450 - 520	18
Grade 4	480 - 580	550 - 660	15
ALPHA/BETA			
Grade 5 (Ti 6Al-4V)	862	931	10
Grade 9 (Ti 3Al 2.5V)	520 - 585	620 - 690	15
BETA			
21S	Available on Request		

Nickel Alloys

Nickel is a very versatile metal, with ability to withstand a wide variety of severe operating conditions, including: corrosive environments, high temperatures, high stresses, and combinations of these factors. This has resulted in the extensive commercial use of both Nickel strip and Nickel-base alloy strip and although very useful in its commercially pure forms, it is its ability to alloy with a range of metals, which has brought it to the forefront of modern metallurgy. A range of highly alloyed materials has developed to provide high strength and excellent corrosion resistance, particularly at elevated temperatures, to meet specific requirements in many different types of environment.

Commercially Pure Nickels

These materials are characterised by high density, offering low electrical resistivity, high thermal conductivity and high magnetic properties. In addition, commercially pure Nickel strip offers excellent corrosion resistance in many chemical media, especially some strong alkalis. Commercially pure Nickel strip cannot be hardened by heat treatment. However, metal strip can be produced by cold rolling to a range of strengths.

Nickel-Copper Alloys

Nickel-Copper alloys have been found to possess excellent corrosion resistance in reducing chemical environments and also in seawater, i.e. marine environments, where they are commonly used. They have good ductility and can be readily fabricated.

Nickel-Chromium & Nickel-Chromium-Iron Alloys

This group of alloys led the way to higher strength and resistance to elevated temperatures. Initially developed for use in the chemical processing industry where carburising environments and elevated temperatures were too severe for Stainless Steels.

Iron-Nickel-Chromium Alloys (800 Series)

Offering good oxidation resistance, these alloys have found extensive use in the petrochemical processing industry. The 800 series offer excellent strength at high temperature.

Controlled Expansion Alloys

A range of alloys developed for use in conjunction with the lighting industry where glass to metal seals are very important, they exhibit good thermal conductivity.

AVAILABLE GRADES

Commercially Pure Nickels
200, 201

Nickel-Copper Alloys
400

Nickel-Chromium & Nickel-Chromium-Iron Alloys
alloy K500, alloy X, C22, alloy C2000, alloy 600, alloy 601, alloy 625, alloy C 276, alloy 718, alloy X750

Iron-Nickel-Chromium Alloys (800 Series)
alloy 800, alloy 825

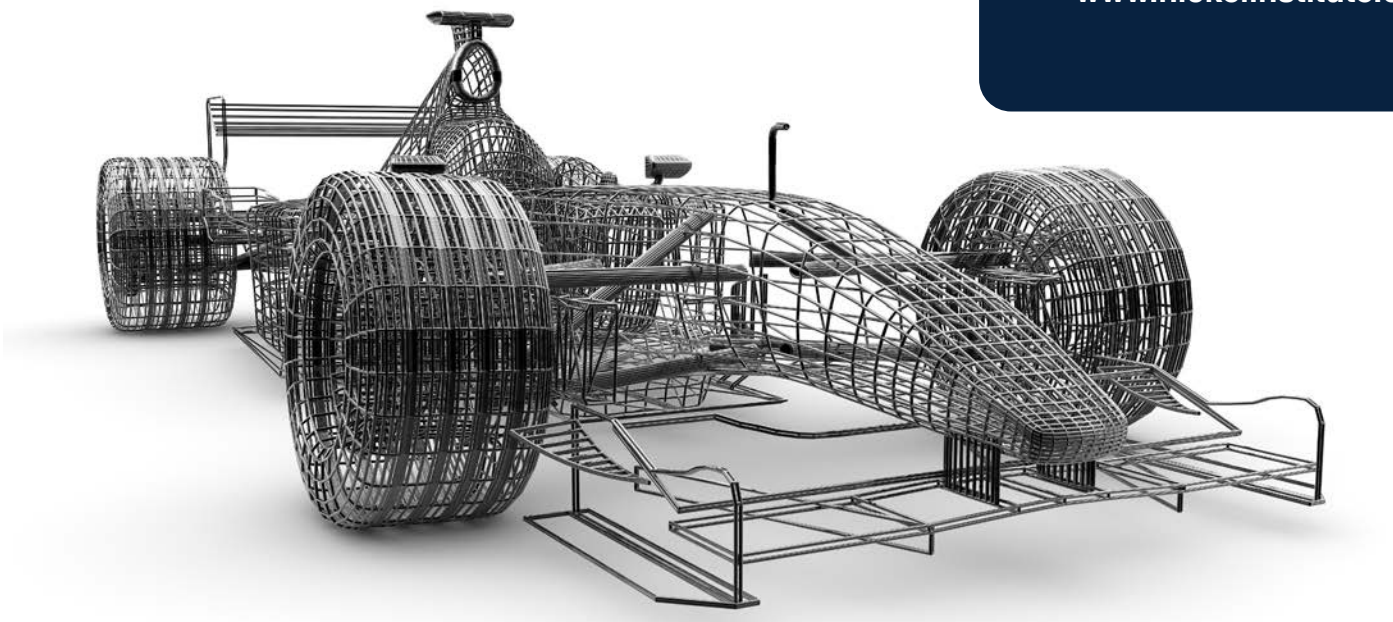
Controlled Expansion Alloys
29/18

Types

NICKEL ALLOYS STOCK RANGE			
COIL STOCK RANGE		WIRE STOCK RANGE	
Thickness (mm)	Width (mm)	Round	Shaped
COMMERCIALLY PURE NICKELS			
0.025 - 2.5	2 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
NICKEL-COPPER ALLOYS			
0.025 - 2.5	2 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
NICKEL-CHROMIUM & NICKEL-CHROMIUM-IRON ALLOYS			
0.025 - 2.5	2 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
IRON-NICKEL-CHROMIUM ALLOYS (800 SERIES)			
0.025 - 2.5	2 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
CONTROLLED EXPANSION ALLOYS			
0.025 - 2.5	3 - 610	0.1 – 10.00 mm dia	Upto 45 mm2 area
Other specifications can be supplied upon request. Please contact us with your requirements.			

“Nickel is widely used in over 300,000 products for consumer, industrial, military, transport, aerospace, marine and architectural applications”

www.nickelinstitute.org



Nickel Alloys
Features

NICKEL ALLOYS FEATURES								
COMMON NAME	TRADE MARKED METALS	EURO. NAME	ASTM NAME		AMS	Key Features	Key Markets	Applications
			AISI	UNS				
COMMERCIALLY PURE NICKEL								
alloy 200	-	NA 11	B 162	N02200		Commercially pure Nickel with excellent mechanical properties and excellent corrosion resistance, particularly to caustic alkalis and de-aerated acid. High thermal and electrical conductivity. Can be shaped through all hot and cold working practices.	Aerospace, Defence, Food and Beverage, Automotive, Chemical	Bursting Discs, Explosion Panels, Battery Contacts, Food Processing, Chemical Containers, Aerospace and Defence Components
alloy 201	-	NA12	B 162	N02201	5553	Low carbon version of commercially pure alloy 200. Generally specified for temperature above 315°C. It does not suffer embrittlement due to the low carbon content. It is particularly suited for spinning and cold forming.	Automotive, Chemical, Aerospace, Electronics	Electronic Components, Aerospace Components, Bursting Discs
NICKEL-COPPER ALLOY								
alloy 400	MONEL® alloy 400*	NA13	B 127	N04400	4544	A solid-solution alloy only hardenable through cold-working. High strength and toughness over a large temperature range. Excellent corrosion resistance, particularly in sea water.	Aerospace, Oil & Gas, Marine, Chemical	Bellows, Heat Exchangers, Propellers, Shafts, Fasteners, Pumps, Valves
NICKEL-CHROMIUM & NICKEL-CHROMIUM-IRON ALLOYS								
alloy K-500	MONEL® alloy K500*	NA18	-	N05500	4676	Precipitation hardened non-magnetic alloy. Greater strength and hardness than Monel 400, whilst maintaining excellent corrosion resistance. High fatigue strength in seawater.	Oil & Gas, Chemical, Power Generation, Marine, Medical, Electronics	Propellers, Fasteners, Gyroscopes, Medical blades, Pump Shafts, Drill Collars
alloy X	-	-	B 435	N06002	5536	Additional amounts of chromium and iron provide strength and resistance to corrosion and oxidisation up to 1170°C	Aerospace, Automotive, Chemical,	Aerospace components, Honeycomb Seals, Combustion Liners, Turbine Engine Components
C22	HASTELLOY® C22®**	-	B 575	N06022	-	A versatile Nickel Alloy with superior corrosion resistance and weldability	Chemical, Nuclear, Environment & Energy Engineering, Oil & Gas, Waste Management	Expansion Bellows, Industrial equipment, Chemical Processing.
-	NIMONIC® alloy 75*	-	-	N06075	-	Medium strength at high operating temperatures. Good Weldability. Due to good ductility and malleability in the annealed condition it can be used in cold deformation, large reductions can be made without rupture.	Aerospace, Thermal Engineering	Turbine blades, Furnace Components, Heat treatment equipment
alloy C2000	HASTELLOY® alloy C 2000**	-	B 575	N06200	-	The addition of Copper enables resistance to an extensive range of corrosive chemicals, including many acids. Easy to form and weld. Excellent resistance to stress corrosion cracking.	Chemical	Heat Exchangers, Reactors
alloy 600	INCONEL® alloy 600*	NA14	B 168	N06600	5540	Resists oxidation up to 1200°C, good corrosion resistance. High Nickel content makes it highly resistant to chloride-ion stress corrosion cracking. It is not Precipitation Hardenable. Can be hardened and strengthened through cold work. Can operate from cryogenic temperatures to above 1095°C. Readily weldable by conventional processes.	Chemical, Nuclear, Aerospace, Heat Treating, Automotive, Oil & Gas, Environment & Energy Engineering	Flexible Tubing, Furnace equipment, Insulation blankets, Chemical and Food Processing, Seals

NICKEL-CHROMIUM & NICKEL-CHROMIUM-IRON ALLOYS CONTINUED

alloy 601	INCONEL® alloy 601*	-	B 168	N06601	5870	Lower Nickel content than alloy 600, with Aluminium and silicon additions for exceptional resistance to oxidation at high temperatures. Good mechanical strength, easily formed, machined and welded. It has high tensile strength at room temperature, and retains much of it at elevated temperatures. Alloy 601 is not embrittled by long exposures to elevated temperatures, retaining good impact strength. Good creep-rupture strength.	Chemical, Thermal Engineering, Aerospace, Power Generation, Petrochemical, Automotive	Petrochemical Processing Equipment, Furnace Equipment, Gas Turbine Components, Gaskets, Condenser Tubes, Insulating Cans
alloy 625	INCONEL® alloy 625*	NA21	B 443	N06625	5599	High temperature, high strength alloy, tougher than alloy 600 due to increased Molybdenum and Niobium content. Good Creep and Rupture strength. Higher oxidisation resistance and excellent resistance to aqueous corrosion, chloride pitting and crevice corrosion cracking. It is resistant to caustics and seawater as well as being immune to chloride ion stress corrosion cracking. Excellent weldability.	Automotive, Chemical, Marine, Aerospace, Power Generation, Nuclear	Honeycomb, Seals, Bellows, Diaphragms, Springs, Heat Exchangers, Aircraft Exhausts, Marine Components, Compressor Vanes
-	HAYNES® 214®**	-	-	N07214	-	Excellent corrosion and oxidisation resistance at high temperatures. Ideally suited to high temperature, low stress oxidizing environments.	Aerospace, Automotive, Industrial Heating	Honeycomb, Seals, Catalytic Converters, Flame Hoods, Rotary Calciners
alloy C 276	HASTELLOY® C 276®**	-	-	N10276	-	Outstanding universal corrosion resistance. High Chromium and Molybdenum contents protect against oxidising and non-oxidising acids.	Chemical, Marine, Aerospace, Oil & Gas, Environment & Energy Engineering, Pharmaceutical	Diaphragms, Marine Engineering, Chemical Processing, Pulp and Paper Production, Ducts, Heat Exchangers
alloy 718	INCONEL® alloy 718*	-	B 670	N07718	5596	Precipitation hardened, age hardenable, high strength alloy. Good corrosion resistance and highly resistant to chloride and sulfur stress corrosion cracking. Titanium and niobium additions overcome strain age cracking problems in welding to provide good weldability.	Oil & Gas, Nuclear, Aerospace, Defense, Automotive	High Temperature Springs, Bellows, Seals, Valves, Fasteners, Mandrels, Gaskets, Clamps
alloy X750	INCONEL® alloy X750*	-	B 637	N07750	5598	Precipitation hardenable, excellent strength and corrosion resistance up to 704°C and useful strength up to 982°C and excellent relaxation resistance. Ideal for springs operating at high temperatures.	Oil & Gas, Nuclear, Aerospace, Power Generation, Automotive	High Temperature Springs, Diaphragms, Gas Turbines, Jet Engines

IRON-NICKEL-CHROMIUM ALLOYS

-	INCOLOY® alloy 800*	NA15	B 409	N08800	5871	Excellent corrosion resistance, heat resistance, strength and stability at high temperatures. Resists stress corrosion cracking and oxidisation at high temperatures. Used in applications in which resistance to Stress Corrosion Cracking is required. 800H and 800HT alloys are available with a greater resistance to stress rupture and creep.	Chemical, Thermal Engineering, Food and Beverage, Nuclear, Petrochemical	Electrical heating elements, Heat Exchangers, Furnace Equipment, Petrochemical Process Tubing, domestic appliances
-	INCOLOY® alloy 825*	NA16	-	N08825	-	Additional molybdenum for increased corrosion resistance over alloy 800. Resistant to oxidisation and reducing acids, particularly sulphuric, stress corrosion cracking and pitting.	Chemical, Petrochemical, Oil & Gas, Nuclear, Pollution Control	Tubing, Pipework in Petrochemical, Industry, Seals, Gaskets, Heat Exchangers

GLASS SEALING ALLOY (CONTROLLED EXPANSION)

29/18	-	-	-	K94610	-	Controlled expansion alloy whose co-efficient of expansion decreases with rising temperature and matches the expansion rate of glass	Aerospace, Automotive, Electronics	Microwave Tubes, Transistors, Diodes, Hermetic Seals

Other specifications supplied upon request, please contact us with your requirements.
* Trademark of Special Metals
** Trademark of Haynes International, Inc

Nickel Alloys
Chemical Properties

NICKEL ALLOYS CHEMICAL COMPOSITION																		
COMMON NAME	EURO. NAME	ASTM NAME		AMS	TYPICAL CHEMICAL COMPOSITION %													
		AISI	UNS		Al	C	Co	Cr	Cu	Fe	Mn	Mo	Ni	P	Si	S	Ti	Others
COMMERCIALLY PURE NICKEL																		
alloy 200	NA 11	B 162	N02200		-	0.15	-	-	0.25	0.4	0.35	-	99.0 min	-	0.35	0.01	-	Mg 0.2 max
alloy 201	NA12	B 162	N02201	5553	-	0.02	-	-	0.25	0.4	0.35	-	99.0 min	-	0.35	0.01	-	-
NICKEL-COPPER ALLOY																		
alloy 400	NA13	B 127	N04400	4544	-	0.3	-	-	28.0 - 34.0	2.5	2.0	-	63.0 min	-	0.50	0.024	-	Pb 0.005 max
NICKEL-CHROMIUM & NICKEL-CHROMIUM-IRON ALLOYS																		
alloy K500	NA18		N05500	4676	2.30 - 3.15	0.18	-	-	27.0 - 33.0	2.0	1.50	-	63.0 min	-	0.50	0.01	0.35 - 0.85	-
alloy X		B 435	N06002	5536	-	0.05 - 0.15	0.5 - 2.5	20.5 - 23.0	0.5	17.0 - 20.0	1.00	8.0 - 10.0	Balance	0.04	1.00	0.03	0.15	W 0.2 - 1.0
C22		B 575	N06022		-	0.015	2.5	20.0 - 22.5	-	2.0 - 6.0	0.50	12.5 - 14.5	Balance	0.02	0.08	0.02	-	W 2.5-3.5 V 0.35 max
alloy C2000		B 575	N06200		0.50	0.01	2.0	22.0 - 24.0	1.30 - 1.90	3.0	0.50	15.0 - 17.0	Balance	0.025	0.08	0.01	-	
alloy 600	NA14	B 168	N06600	5540	-	0.15	-	14.0 - 17.0	0.50	6.0 - 10.0	1.00	-	72.0 min	-	0.50	0.015	-	-
alloy 601	-	B 168	N06601	5870	1.0 - 1.70	0.10	-	21.0 - 25.0	1.00 max	Balance	1.00	-	58.0 - 63.0		0.50	0.015	-	-
alloy 625	NA21	B 443	N06625	5599	0.40	0.10	1.00 max	20.0 - 23.0	-	5.0	0.50	8.0 - 10.0	58.0 min	0.015	0.50	0.015	0.40	Nb + Ta 3.15 - 4.15
alloy C 276			N10276		-	0.01	2.5	14.5 - 16.5	-	4.0 - 7.0	1.00	15.0 - 17.0	Balance	0.04	0.08	0.03	-	V 0.35 max W 3.0 - 4.5
alloy 718		B 670	N07718	5596	0.20 - 0.80	0.08	1.0	17.0 - 21.0	0.30 max	Balance	0.35	2.80 - 3.30	50.0 - 55.0	0.015	0.35	0.015	0.65 - 1.15	Nb + Ta 4.75 - 5.50; B 0.006
alloy X750	-	B 637	N07750	5598	0.40 - 1.00	0.08	1.00 max	14.0 - 17.0	0.50	5.0 - 9.0	1.00 max	-	70.0 min	-	0.50 max	0.01	2.25 - 2.75	Nb + Ta 0.70 - 1.20
IRON-NICKEL-CHROMIUM ALLOYS																		
alloy 800	NA15	B 409	N08800	5871	0.15 - 0.60	0.10	-	19.0 - 23.0	0.75	Balance	1.50	-	30.0 - 35.0	0.035	1.00	0.015	0.1 - 0.60	Al + Ti 0.30-1.20
alloy 825	NA16		N08825		0.20	0.05	-	19.5 - 23.5	1.50 - 3.00	Balance	1.00	2.5 - 3.5	38.0 - 46.0	-	0.50	0.03	0.60 - 1.20	-
GLASS SEALING ALLOY (CONTROLLED EXPANSION)																		
29/18			K94610		0.1	0.02	17.0	0.2	0.2	Balance	0.5	0.2	29.0	-	0.2	-	0.10	Zr 0.10 max

Other specifications supplied upon request, please contact us with your requirements.
* Trademark of Special Metals
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Nickel Alloys
Mechanical Properties

NICKEL ALLOYS FEATURES TYPICAL MECHANICAL PROPERTIES								
COMMON NAME	EURO. NAME	ASTM NAME		AMS	Proof Strength 0.2% Min (N/mm2)	Tensile Strength	Elong. % Min. (50mm Gauge Length)	Hardness Max (VPN)
		AISI	UNS					
COMMERCIALLY PURE NICKEL								
alloy 200	NA 11	B 162	N02200	-	105	380	40	125
alloy 201	NA12	B 162	N02201	5553	85	350	30	125
NICKEL-COPPER ALLOY								
alloy 400	NA13	B 127	N04400	4544	195	480	35	125
NICKEL-CHROMIUM & NICKEL-CHROMIUM-IRON ALLOYS								
alloy K500	NA18	-	N05500	Mechanical Properties available on request				
alloy X	-	B 435	N06002	5536	310	723	35	230
alloy C22	-	B 575	N06022	Mechanical Properties available on request				
NIMONIC® alloy 75*	-	-	N06075	Mechanical Properties available on request				
alloy C2000	-	B 575	N06200	Mechanical Properties available on request				
alloy 600	NA14	B 168	N06600	5540	241	552	30	230
alloy 601	-	B 168	N06601	5870	230	790	40	230
alloy 625	NA21	B 443	N06625	5599	414	827	30	250
HAYNES® 214®**	-	-	N07214	Mechanical Properties available on request				
C 276	-	-	N10276	5750	280	690	40	230
alloy 718	-	B 670	N07718	5596	552	965	30	270
alloy X750	-	B 637	N07750	5598	280	700	40	250
IRON-NICKEL-CHROMIUM ALLOYS								
alloy 800	NA15	B 409	N08800	5871	210	520	30	200
alloy 825	NA16	-	N08825	-	240	550	30	200
GLASS SEALING ALLOY (CONTROLLED EXPANSION)								
29/18	-	-	K94610	-	300	500	25	200

Other specifications supplied upon request, please contact us with your requirements.
* Trademark of Special Metals
** Trademark of Haynes International, Inc

Aluminium

Aluminium is the third most abundant resource on the planet and is used widely across many manufacturing sectors due to the ease of machining and forming, requiring low energy input making it highly cost efficient and ideally suited for extrusion work, milling, drilling, cutting, punching and bending in large or small volumes.

Though commonly found within the Construction industry, the physical properties of Aluminium and its alloys make it an essential material for Aerospace, Automotive and Transport sectors. Aluminium has further environmental advantages with zero toxicity and is easily recyclable, without losing its integral properties in the process. The low cost combined with material availability, physical properties and ease of formability makes it an ideal choice for large volume production of beverage packaging but also has wider use within food and beverage production.

Aluminium is a lightweight, soft, ductile metal with non-magnetic and corrosion resistant properties. Aluminium has approximately a third of the density of steel, but this does not impact its strength. It is more durable at lower temperatures and unlike steels will not become brittle, but actually becomes stronger at low temperatures, however, heat above 100°C can affect strength.

A range of surface finishes ranging from dull to reflective, also make Aluminium ideal for decorative features and metal products.

ALUMINIUM STOCK RANGE			
COIL STOCK RANGE		WIRE STOCK RANGE	
Thickness (mm)	Width (mm)	Round	Shaped
1000 SERIES PURE ALUMINIUM			
0.01 - 3.0	3 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
2000 SERIES ALUMINIUM COPPER ALLOY			
0.01 - 3.0	3 - 1000	0.1 – 10.0 mm dia	Upto 45 mm2 area
3000 SERIES ALUMINIUM MANGANESE ALLOY			
0.01 - 3.0	3 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
5000 SERIES ALUMINIUM MAGNESIUM ALLOY			
0.01 - 3.0	3 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
6000 SERIES ALUMINIUM MAGNESIUM + SILICON ALLOY			
0.01 - 3.0	3 - 1000	0.1 – 10.00 mm dia	Upto 45 mm2 area
7000 SERIES ALUMINIUM ZINC ALLOY			
Please contact us with your exact specifications			
Other specifications supplied upon request. Please contact us with your requirements.			

Types

1000 Series Pure Aluminium

1000 series are essentially pure Aluminium, offering excellent corrosion resistance, high thermal and electrical conductivity and good formability. 1000 series can also be work hardened, but have relatively low strength.

2000 Series Aluminium Copper Alloy

2000 series metals are alloyed with Copper, providing good mechanical properties that can exceed those of Carbon Steel, but are less corrosion resistant than other alloys. 2000 series can be precipitation hardened to increase strength.

3000 Series Aluminium Manganese Alloy

3000 series are alloyed with manganese and are approximately 20% stronger than pure Aluminium (1000 series) and are particularly resistant to pitting corrosion. It can be work hardened to increase strength.

5000 Series Aluminium Magnesium Alloy

5000 series offers moderate to high mechanical strength, anodises well, with good welding characteristics, good corrosion resistance, particularly in marine environments. 5000 series is not work hardenable.

6000 Series Aluminium Magnesium + Silicon Alloy

6000 series is alloyed with both Magnesium and silicon, offering medium mechanical strength, good formability, weldability and machinability in addition to good corrosion resistance. 6000 series can be work hardened.

7000 Series Aluminium Zinc Alloy

7000 series has exceptionally high mechanical strength and is machinable and work hardenable. However it has poor corrosion resistance compared to other Aluminium alloys.

AVAILABLE GRADES

1000 Series Pure Aluminium

2000 Series Aluminium Copper Alloy

3000 Series Aluminium Manganese Alloy

5000 Series Aluminium Magnesium Alloy

6000 Series Aluminium Magnesium + Silicon Alloy

7000 Series Aluminium Zinc Alloy

We can also supply 8000 series and 4000 series on request.

Aluminium
Features

ALUMINIUM FEATURES					
ALLOY NUMBER	EURO. NAME	ASTM NAME / UNS	Key Features	Key Markets	Applications
1000 SERIES (PURE)					
1050	AW-1050	A91050	1050 is a commercially pure Aluminium, which offers high electrical and thermal conductivity alongside excellent corrosion resistance and workability. It is commonly used in the electrical and chemical industries. It has low mechanical strength compared to more significantly alloyed metals. It can be strengthened by cold working, but not by heat treatment. It is the most commonly used Aluminium for general sheet metal work where strength is not essential.	Electrical, Chemical, Universal	Drawn Tube, Chemical Process Plant Equipment, Heat Sinks, General Sheet Metal Work
1050A	AW-1050A	A91050A	1050A provides excellent cold formability, corrosion resistance, very good anodising capability and is easily joined, making it a popular choice for a number of applications. Its reflective aesthetic qualities make it ideally suited for decorative applications. The Chemical composition is similar to Grade 1050, with the addition of Vanadium.	Chemical, Automotive, Food & Beverage, Architectural, Pharmaceutical, Marine, Universal	Chemical Process Plant Equipment, Radiator Tubes, Heat Exchangers, Kitchenware, Packaging, Pyrotechnic Powder, Architecture Fittings, Reflectors, Cable Sheathing, Automotive Trim, Vessels, Piping, General Sheet Metal Work
1060	AW-1060	A91060	Grade 1060 is very similar to 1050 aluminium alloy, with the difference coming down to 0.1% aluminium by weight. Like other grades in the 1000 series, it has a relatively low mechanical strength, but is noted for having high electrical conductivity, corrosion resistance, excellent welding characteristics and formability. It cannot be hardened by heat treatment.	Electrical, Chemical, Transport, Universal	Universal, Chemical Equipment, Railroad Cars
1070	AW-1070	A91070	Like other alloys in the 1000 series, Grade 1070 is highly resistant to chemical corrosion and has good crack resistance, with a low mechanical strength. It is an excellent brazing alloy and is used for joining other alloys in the 1000 series.	Electrical, Chemical, Construction, Food, Transport, Communication, Universal	General Industrial Components, Electrical Boxes, Heat Exchangers, Construction Materials, Communication Cables, Refrigeration Cabinets
1070A	AW-1070A	A91070A	Grade 1070A, is similar to Grade 1070, with a variation in the Copper and Zinc content, and no Vanadium. This grade has very good corrosion resistance and workability, high thermal and electrical conductivity. It also offers an attractive appearance with high reflectivity, making in suitable for decorative anodising. As with other 1000 series alloys, it has low mechanical strength.	Chemical, Food & Beverage, Automotive, Packaging, Architectural	Packaging, Heat Exchangers, Insulation Foils, Kitchenware, Chemical and Food Industry Equipment, Automotive Trim, Reflectors, Architecture Fittings, Piping
1100	AW-1100	A91100	Grade 1100 is a low strength aluminum alloy with excellent corrosion resistance, high electrical conductivity and thermal conductivity. This grade is best used for welding, brazing and soldering but has poor machinability. It is soft and ductile so is ideal for applications that require intricate forming. Its attractive finishing capabilities make it a great choice for decorative purposes. It can be strengthened by cold working, but not by heat treatment.	Universal, Chemical, Automotive, Food & Beverage, Decorative	General Sheet Metal Work, Spinning, Holloware, Food Handling and Storage, Chemical Storage, Processing Equipment, Reflectors, Kitchenware, Heat Exchanger, Dials and Name Plates, Decorative Parts, Giftware, Rivets
1145	AW-1145	A91145	Grade 1145 offers high thermal and electrical conductivity and corrosion resistance. It has good forming and welding capabilities, though is more difficult to machine than most of other aluminum alloys. It is a non-heat treatable alloy but can be strengthened by cold working.	Universal	Sheet, Plate, Foil
1200	AW-1200	A91200	Grade 1200 has very good corrosion resistance and workability, with a high thermal conductivity and reflectivity, although this is lower than the more popular Grade 1050A. Grade 1200 also has very good weldability, and comparatively offers slightly higher strength than 1050A.	Universal	Universal Sheet Metal Work, Spinning, Holloware
1230	AW-1230	A91230	Grade1230 offers good corrosion resistance. It can be manufactured into semi-finished or finished products using methods such as forging, welding, rolling, and casting.	Universal	General Sheet Metal Work
1235	AW-1235	A91235	Grade1235 offers good corrosion resistance and high thermal and electrical conductivity. Like others in the 1000 series, it has good forming abilities, but low mechanical strength. It is a non-heat treatable alloy but can be strengthened by cold working.	Universal	General Sheet Metal Work
1350	AW-1350	A91350	Grade 1350 has excellent formability and corrosion resistance. It is the alloy of choice for electrical conductors and for applications where strength is not as important as economics. Grade1350 has a tighter chemistry specification and is therefore often used in place of Grade1050A.	Electrical, Universal	Electrical Conductors, Pins, Rods, Rivets, Wire Form and Clips
2000 SERIES (ALLOYED WITH COPPER)					
2024	AW-2024	A92024	Grade 2024 is a heat treatable alloy, which provides excellent toughness at moderately high strength levels, good fatigue resistance, and improved fracture toughness. It also offers very good machining characteristics. Its strength is slightly higher than 2014(A) and 2017A.Suitable for welding only by resistance welding.	Universal, Aerospace, Defence, Engineering, Transport	Commercial and Military Aircraft, Aircraft Structures and Components, General Sheet Metal Work, Machinery, Military Equipment, Vehicle Parts, Structural Applications, Rivets

3000 SERIES (ALLOYED WITH MANGANESE)					
3003	AW-3003	A93003	Grade 3003 is a medium strength alloy with very good corrosion resistance and workability. Its excellent mechanical properties have led wide use throughout industry sectors. It has improved mechanical properties when compared with 1000 series alloys and is 20% stronger than 1100.	Universal, Chemical, Food & Beverage, Decorative	Heat Exchangers, Storage Tanks, Chemical Equipment, Kitchenware and Utensils, Decorative Trim, Roofing and Siding Materials
3004	AW-3004	A93004	Grade 3004 is similar to the 3003 alloy, except for the addition of approximately 1% magnesium. It offers moderate strength, good workability, and good corrosion resistance, making it good general-purpose alloy. It is a non-heat treatable alloy but can be strengthened by cold working, to produce tempers with a higher strength but a lower ductility. The additional 1% magnesium in grade 3004, contributes in solid solution strengthening, allowing it to be made thinner. This has made it a popular choice for beverage cans and general can stock, replacing its predecessor Grade 3003.	Universal, Food & Beverage, Transport	General Sheet Metal Work, Beverage Cans, Storage Tanks, Pressure Vessels, Vehicle Parts
3103	AW-3103	A93103	Grade 3103 is medium strength alloy with good corrosion resistance and very good weldability. It is considered a good general-purpose alloy, with properties that are very close to Grade 3003.	Universal	General Sheet Metal Work
3104	AW-3104	A93104	Grade 3104 like others in the 3000 series is a good general purpose alloy, with medium strength and good corrosion resistance.	Universal, Transport	General Sheet Metal Work, Storage Tanks, Pressure Vessels, Vehicle Parts
4000 SERIES (ALLOYED WITH SILICON)					
Available by Request					
5000 SERIES (ALLOYED WITH MAGNESIUM)					
5005	AW-5005	A95005	Grade 5005 has good corrosion resistance and is hardenable to a significant degree by cold working, enabling a series of “H” tempers. However this remains inferior to the high strengths of corresponding tempers in other alloys such as 5052 or 5083. Tempers H116 and H321 can be used in fresh and salt water.	Chemical, Decorative, Architectural, Construction, Marine, Food Domestic, Electrical, Appliances	Roofing and Siding Materials, Chemical and Food Processing, Utensils, Storage Tanks, Domestic Appliances, Cladding, Decorative Items, Electrical Conductors, Signage, HVAC Equipment, Packaging, General Sheet Metal Work
5050	AW-5050	A95050	Grade 5050 has very good corrosion resistance and good workability properties. It is a non-heat treatable alloy but can be strengthened by cold working. In the annealed condition, it offers fair machinability but is improved by cold working. When machining, it is advisable to use proper lubricants.	Domestic Appliances, Construction, Automotive	Refrigerator Trim, Coiled Tubes, Construction Materials
5052	AW-5052	A95052	Grade 5052 is a high strength alloy with very good resistance to corrosion, especially in marine environments. It has a medium to high fatigue strength, making it suitable for applications that are subject to excessive vibrations. With good weldability and formability characteristics, the alloy can be used in a wide range of applications. It is a non-heat treatable alloy but can be strengthened by cold working. In the annealed condition, it is stronger than Grades 1100 and 3003.	Marine, Architectural, Transport, Food & Beverage, Domestic Appliances, Automotive	Marine Components, Pressure Vessels, Treadplate, Transportation Parts, Heavy Duty Utensils, Food Processing, Hydraulic Systems, Fuel Tanks, Containers, Domestic Appliances, Chemical Equipment, Architecture Fittings, Signage
5251	AW-5251	A95251	Grade 5251 is suitable for general sheet metal work where higher mechanical properties are required together with a degree of formability. It has a higher strength and extra hardness over pure aluminium grades, which allows for improved machinability. It is a non-heat treatable alloy, but can be strengthened by cold working.	Chemical, Universal, Marine, Pharmaceutical, Architectural, Packaging, Domestic Appliances	Marine Components, Heat Exchangers, Higher Strength Sheet Metal Work, Packaging, Panelling, Welded Structures, Cabinets, Domestic Appliances, Pressure Vessels
5754	AW-5754	A95754	Grade 5754 has excellent weldability and very good workability, with has higher strength properties compared to Grade 5251. It is a popular choice for corrosive environments as it offers extremely good resistance to both seawater corrosion and chemical corrosion.	Marine, Oil & Gas, Chemical, Nuclear, Food, Automotive	Shipbuilding, Food Processing, Treadplate, Vehicle Bodies, Fishing Industry Equipment, Welded Chemical and Nuclear Structures
6000 SERIES (ALLOYED WITH MAGNESIUM & SILICON)					
6061	AW-6061	A96061	Grade 6061is a medium to high strength with very good corrosion resistance and medium fatigue strength. It is heat-treatable and considered to be the most versatile of the heat-treatable alloys. It is commonly used in heavy duty structures. In the annealed condition, it offers excellent weldability and formability, and is readily disposed to furnace brazing.	Marine, Aerospace, Transport, Construction, Energy	Shipbuilding, Motorboats, Aircraft Structures, Vehicle Bodies, Pylons and Towers, Railroad Cars, Vehicle Bodies, Bridges, Piping, Pylons, Transportation Parts, Boilers, Rivets
6082	AW-6082	A96082	Grade 6082 has the highest strength of all the 6000 series alloys, offering excellent corrosion resistance and good machinability and medium high fatigue strength. 6082 is considered a structural alloy, and is commonly used in high stressed applications, such as trusses, cranes and bridges. It has replaced 6061 in many applications. The extruded finish is not as smooth and therefore not as aesthetically pleasing as other alloys in the 6000 series. It can be heat treated or cold formed.	Marine, Transport, Energy, Defence, Construction, Food & Beverage,	Roofing and Siding Materials, Heavy Duty Structures In Railroad Cars, Vehicle Bodies, Shipbuilding, Offshore, Bridges, Military, Bicycles, Boilers, Flanges, Hydraulic Systems, Mining Equipment, Pylons and Towers, Motorboats, Nuclear Technology, Piping, Rivets
7000 SERIES (ALLOYED WITH ZINC)					
7072	W-7072	A97072	Grade 7072 is used for high-strength structures, primarily in aircraft, as it offers exceptionally high mechanical strength and is machinable and work hardenable. Whilst it is still a versatile alloy, it has poor corrosion resistance compared to other Aluminium alloys. This grade is also use for cladding other Aluminium alloys. This grade is distinct from other 7000 series alloys, which are alloyed with magnesium for strengthening.	Aerospace, Decorative, Marine	Storage, Heat Exchangers, Pressure Vessels, Decorative Items, Golf Heads, Tooling, Jigs, Machinery, High-End Aluminum Bike Frame.
8000 SERIES (ALLOYED WITH OTHER)					
8011	AW-8011	A98011	8000 series alloys have high formability, with deep drawing formability standing out the most. Additional alloying elements include Iron, nickel, which are used to increase strength without significant loss in electrical conductivity. Like other Aluminium alloys, it offers excellent corrosion resistance.	Aerospace, Marine, Food & Beverage, Automotive, Packaging, Decorative	Heat Exchangers, Packaging, Vehicles, Shipbuilding, Insulation Materials, Decorative Items
8111	AW-8111	A9811			

Aluminium
Chemical Properties

ALUMINIUM CHEMICAL PROPERTIES

ALLOY NUMBER	EURO. NAME	ASTM NAME / UNS	TYPICAL CHEMICAL COMPOSITION %										
		UNS	Al	Cr	Cu	Fe	Mg	Mn	Si	Ti	V	Z	Others
1000 SERIES (PURE)													
1050	AW-1050	A91050	Balance	-	0.05	0.04	0.050	0.05	0.25	0.03	0.05	0.05	-
1050A	AW-1050A	A91050A	99.50	-	0.05	0.04	0.050	0.05	0.25	0.05	-	0.07	0.03
1060	AW-1060	A91060	99.60	-	0.05	0.35	0.030	0.03	0.25	0.03	0.05	0.05	0.03
1070	AW-1070	A91070	99.70	-	0.04	0.25	0.030	0.03	0.20	0.03	0.05	0.04	0.03
1070A	AW-1070A	A91070A	99.70	-	0.03	0.25	0.030	0.03	0.20	0.03	-	0.07	0.03
1100	AW-1100	A91100	99.00	-	0.05 - 0.20	Si+Fe	-	0.05	0.95	-	-	0.10	0.05
1145	AW-1145	A91145	99.45	-	0.05	Si+Fe	-	0.05	0.55	-	-	-	0.03
1200	AW-1200	A91200	99.00	-	0.05	Si+Fe	-	0.05	1.00	0.05	-	0.10	0.05
1230	AW-1230	A91230	99.30	-	0.10	Si+Fe	0.05	0.05	0.70	0.05	0.05	0.10	0.03
1235	AW-1235	A91235	99.35	-	0.05	Si+Fe	0.05	0.05	0.65	0,06	0.05	0.10	0.03
1350	AW-1350	A91350	99.50	0.01	0.05	0.4	-	0.01	0.10	-	-	0.05	0.10
2000 SERIES (ALLOYED WITH COPPER)													
2024	AW-2024	A92024	Balance	0.10	3.80 - 4.90	0.5	1.2 - 1.8	0.30 - 0.90	0.50	0.15	-	0.25	0.05
3000 SERIES (ALLOYED WITH MANGANESE)													
3003	AW-3003	A93003	Balance	-	0.20	0.70	-	1.00 - 1.50	0.60	-	-	0.10	0.05
3004	AW-3004	A93004	Balance	-	0.25	0.70	0.80 - 1.30	1.00 - 1.50	0.30	-	-	0.25	0.05
3103	AW-3103	A93103	Balance	0.10	0.10	0.70	0.30	0.90 - 1.50	0.50	-	-	0.20	0.05
3104	AW-3104	A93104	Balance	-	0.05 - 0.25	0.80	0.80 - 1.30	0.8 - 1.40	0.60	0.1	0.05	0.25	Ga: 0.05, 0.05 other
4000 SERIES (ALLOYED WITH SILICON)													
Available on Request													
5000 SERIES (ALLOYED WITH MAGNESIUM)													
5005	AW-5005	A95005	Balance	0.10	0.20	0.70	0.50 - 1.10	0.20	0.30	-	-	0.25	0.05
5050	AW-5050	A95050	Balance	0.10	0.20	0.70	1.10 - 1.80	0.10	0.40	-	-	0.25	0.05
5052	AW-5052	A95052	Balance	0.15 - 0.35	0.10	Si+Fe	2.20 - 2.80	0.10	0.45	-	-	0.10	0.05
5251	AW-5251	A95251	Balance	0.15	0.15	0.50	1.70 - 2.40	0.10 - 0.50	0.40	0.15	-	0.15	0.05
5754	AW-5754	A95754	Balance	0.30	0.10	0.40	2.60 - 3.60	0.50	0.40	0.15	-	0.20	0.05
6000 SERIES (ALLOYED WITH MAGNESIUM & SILICON)													
6061	AW-6061	A96061	Balance	0.04 - 0.35	0.15 - 0.40	0.70	0.80 - 1.20	0.15	0.40 - 0.80	0.15	-	0.25	0.05
6082	AW-6082	A96082	Balance	0.25	0.10	0.50	0.60 - 1.20	0.40 - 1.00	0.70 - 1.30	0.1	-	0.20	0.05
7000 SERIES (ALLOYED WITH ZINC)													
7072	W-7072	A97072	Balance	-	0.10	Si+Fe	0.10	0.10	0.7	-	-	0.8 - 1.3	0.05
8000 SERIES (ALLOYED WITH OTHER)													
8011	AW-8011	A98011	97.3 - 98.9	0.05	0.10	0.60 - 1.00	0.05	0.20	0.50 - 0.90	0.08	-	0.10	0.05
8111	AW-8111	A9811	Balance	0.05	0.10	0.40 - 1.00	0.05	0.05	0.30 - 1.10	0.08	-	0.10	0.05 each Total 0.15

Aluminium
Mechanical Properties

ALUMINIUM MECHANICAL PROPERTIES							
ALLOY NUMBER	EURO. NAME	ASTM NAME / UNS	Proof Strength 0.2% Min (N/mm2)	Tensile Strength	Elong. % Min. (50mm Gauge Length)	Hardness Max (VPN)	Tempers Available
1000 SERIES (PURE)							
1050	AW-1050	A91050	Mechanical Properties available on request				
1050A	AW-1050A	A91050A	20 min	65-95	20 min	20HBW	0, H111, H112, H12, H14, H16, H18, H19, H22, H24, H26, H28
1060	AW-1060	A91060	Mechanical Properties available on request				
1070	AW-1070	A91070	Mechanical Properties available on request				
1070A	AW-1070A	A91070A	15 min	60-90	23 min	18HBW	0, H111, H112, H12, H14, H16, H18, H22, H24, H26
1100	AW-1100	A91100	Mechanical Properties available on request				
1145	AW-1145	A91145	Mechanical Properties available on request				
1200	AW-1200	A91200	25 min	75-105	19 min	23HBW	0, H111, H112, H12, H14, H16, H18, H19, H22, H24, H26
1230	AW-1230	A91230	Mechanical Properties available on request				
1235	AW-1235	A91235	Mechanical Properties available on request				
1350	AW-1350	A91350	20 min	65-95	20 min	20HBW	0, H111, H112, H12, H14, H16, H18, H19, H22, H24, H26, H28
2000 SERIES (ALLOYED WITH COPPER)							
2024	AW-2024	A92024	140 max	220 max	12 min	55HBW	0, T4, T3, T351, T42, T8, T851, T62
3000 SERIES (ALLOYED WITH MANGANESE)							
3003	AW-3003	A93003	35 min	95-135	15 min	28HBW	0, H111, H112, H12, H14, H16, H18, H19, H22, H24, H26, H28
3004	AW-3004	A93004	60 min	155-200	13 min	45HBW	0, H111, H12, H14, H16, H18, H19, H22, H24, H26, H28, H32, H34, H36, H38
3103	AW-3103	A93103	35 min	90-130	17 min	27HBW	0, H111, H112, H12, H14, H16, H18, H19, H22, H24, H26, H28
3104	AW-3104	A93104	Mechanical Properties available on request				
4000 SERIES (ALLOYED WITH SILICON)							
Available on Request							
5000 SERIES (ALLOYED WITH MAGNESIUM)							
5005	AW-5005	A95005	35 min	100-145	15 min	29HBW	0, H111, H112, H12, H14, H16, H18, H19, H22, H24, H26, H28, H32, H34, H36, H38
5050	AW-5050	A95050	45 min	130-170	16 min	36HBW	0, H111, H112, H12, H14, H16, H18, H22, H24, H26, H28, H32, H34, H36, H38
5052	AW-5052	A95052	65 min	170-215	12 min	47HBW	0, H111, H112, H12, H14, H16, H18, H22, H24, H26, H28, H32, H34, H36, H38
5251	AW-5251	A95251	60 min	160-200	13 min	44HBW	0, H111, H12, H14, H16, H18, H22, H24, H26, H28, H32, H34, H36, H38
5754	AW-5754	A95754	80 min	190-240	12 min	52HBW	0, H111, H112, H12, H14, H16, H18, H22, H24, H26, H28, H32, H34, H36, H38
6000 SERIES (ALLOYED WITH MAGNESIUM & SILICON)							
6061	AW-6061	A96061	85 max	150 max	14 min	40HBW	0, T4, T451, T42, T6,T651, T62
6082	AW-6082	A96082	85 max	150 max	14 min	40HBW	0, T4, T451, T42, T6,T651, T62, T61, T6151
7000 SERIES (ALLOYED WITH ZINC)							
7072	W-7072	A97072	Mechanical Properties available on request				
8000 SERIES (ALLOYED WITH OTHER)							
8011	AW-8011	A98011	Mechanical Properties available on request				
8111	AW-8111	A9811	Mechanical Properties available on request				

Clad Products

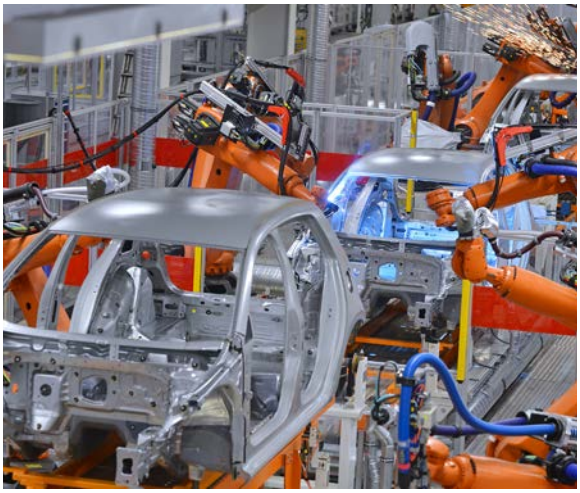
Clad Metals are created when two or more metals are joined together through a laminating process. Clad products are ideal when a product requires material characteristics and properties that cannot be found in a single metal. By combining metals, the superior properties for layer, such as strength, corrosion resistance, thermal and electric conductivity, weight, surface finish, availability, cost, even material availability, clad material can create the exact blend of properties needed. Aluminium is commonly used as a base or inlay layer material, however there is an extensive array of combinations possible using other metals, including Stainless Steel, Copper and Nickel Alloys.

As a result, Clad Metals offer designers, engineers and manufactures the freedom to create new solutions with targeted properties for even the most unique design challenges. This makes Clad Metals an ideal material of choice for a number of sectors including Petrochemical, Oil and Gas, Construction, Aerospace, Telecommunications, Domestic Appliances, Electronics, Medical and Defence.

CLAD ALUMINIUM RANGE

Base Material	Cladding Material	Cladding Thickness	Thickness (mm)	Width (mm)	Temper
3003	4004, 4045, 4343, 7072 (on one or both sides)	2.5% ± 1% 3% ± 1% 4% ± 1% 5% ± 1% 6.5% ± 1.5% 7.5% ± 1.5% 10% ± 2% 12% ± 2% 13% ± 2% 14% ± 2.5% 14% ± 3% 15% ± 2.5% 15% ± 3%	0.30 - 3.00	900 - 1350	F, O, H111, H14, H16, H18, H22, H24, H26, H28
			3.10 - 6.00	900 - 1350	F, O, H111, H12, H22, H24

Other specifications available upon request.



CLAD METALS: PUSHING THE FRONTIERS OF MANUFACTURING & DESIGN THROUGH INNOVATIVE MATERIAL SOLUTIONS

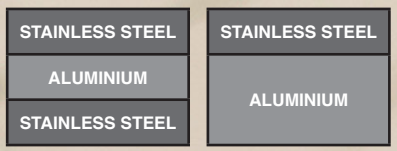
CLAD METAL RANGE

Base Material (Substrate)	Inlay Material	Substrate Thickness	Substrate Width	Inlay Depth
Aluminium Alloys Copper Alloys Bronze Nickel Alloys Stainless Steel Alloys	Aluminium Alloys Copper Alloys Stainless Steel Alloys Nickel Alloys	0.05 mm - 2.54 mm (0.002" - 0.100")	Bis zu 7.00"	2-40% of the total thickness from 2.54 mm (0.100")

Other material combinations are available upon request, including Titanium and Magnesium. Please contact our Sales Team with your requirements.

Popular Configurations

STAINLESS STEEL CLAD ALUMINIUM



Typical Materials include:
Aluminium Alloy: 1100, Alloy 502
Stainless Steel: 301, 304, 430

COPPER CLAD STAINLESS STEEL

Typical Materials include:
Copper: C1100 (C101), C10200, C12200 (C106)
Stainless Steel: 301, 304, 430

COPPER CLAD ALUMINIUM

Typical Materials include:
Copper: C1100 (C101), C10200
Aluminium Alloy: 1100, Alloy 502

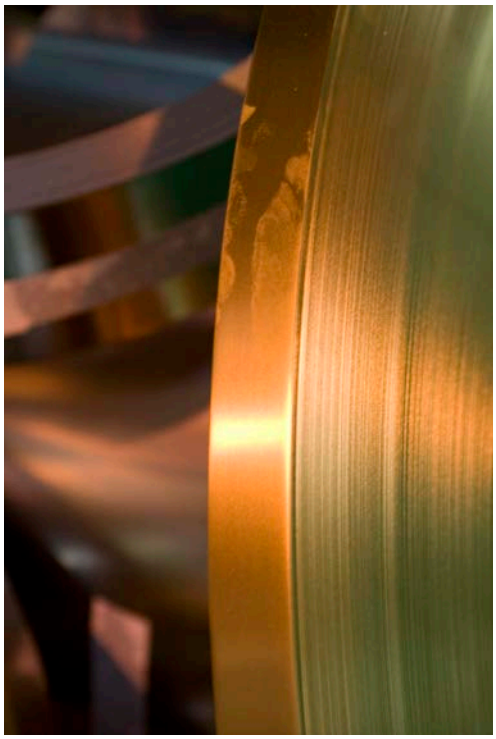
NICKEL CLAD

Typical Materials include:
Nickel Alloy: 201
Copper: C1100 (C101), C10200
Aluminium Alloy: 1100, Alloy 502
Stainless Steel: 301, 304, 430

ALMOST ANY COMBINATION IS POSSIBLE

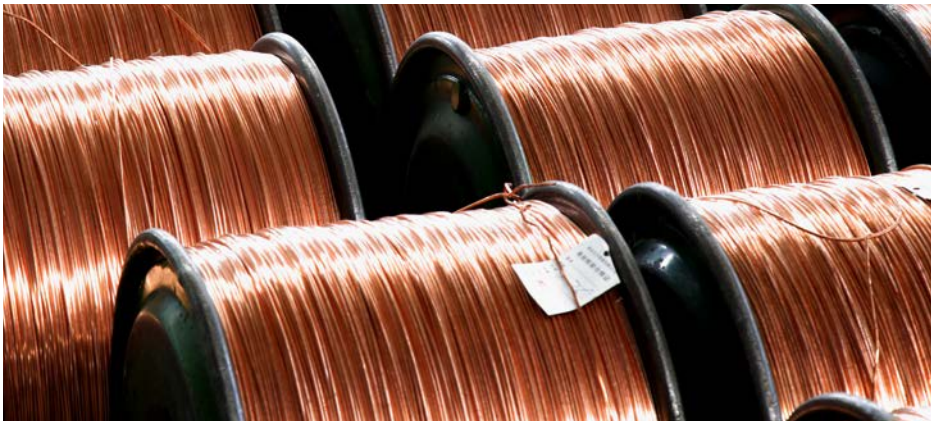
Contact our knowledgeable sales team with your clad metal requirements and let us find the best solution for you

Copper, Brasses & Bronzes

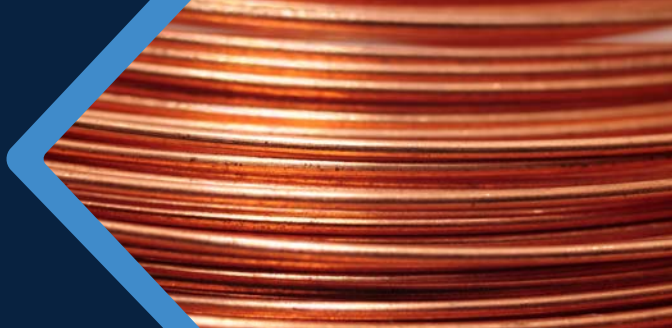


Copper and Copper alloys form an important group of metals with many excellent properties. They have very good electrical and thermal conductivities, are easy to fabricate and include some alloys of exceptional strength (notably Copper Beryllium Alloys) and corrosion resistance. The characteristics of 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 COPPERS			
0.01 - 3.0	3 - 1220	0.1 – 10.00 mm dia	upto 45 mm2 area
BRASSES			
0.01 - 3.0	3 - 1220	0.1 – 10.00 mm dia	upto 45 mm2 area
PHOSPHOR BRONZES			
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.

AVAILABLE GRADES

Commercially Pure High Conductivity Coppers
C101, C102, C103, C106

Brasses
CZ106, CZ107, CZ108

Phosphor Bronzes
C51000, C51900

Nickel Silvers, Cupronickels & High Copper Content Alloys
C74500, C75700, C76400, C77000, C72500

Copper Beryllium Alloys
C17410, C17200

Other Alloys
C19400

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 to 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

Mild & Carbon Steel

Plain Carbon Steel Strip is used in a very wide range of applications because it is particularly adaptable to low cost techniques of metal forming such as presswork. These materials combine ease of fabrication with adequate strength and excellent finishing characteristics to provide good surface finish on the final article.

The Knight Group range of Carbon Steels can be broadly split into two categories: Low Carbon Mild Steels and High Carbon Spring Steels

Spring steels are available in the annealed condition for hardening after forming, or in the hardened and tempered condition.

Low Carbon Steel

The hardness or temper of cold rolled mild steel strip is determined by its analysis, the amount of cold rolling or by a final annealing process. These are selected to achieve the optimum mechanical properties for the forming operation whether it be deep drawing, forming or flat blanking. "Skin passed" is a very light rolling reduction after the annealing process to prevent the formation of deformation bands called stretcher strains, which can ruin surface appearance of the formed article.

Mild steels cannot be hardened except by cold working because their carbon content is too low for significant heat treatment reaction to take place, however they can be case hardened to give a harder surface.

High Carbon Steel

Bright rolled Carbon Steels are often used in the annealed condition for forming of components, which are then batch heat treated to increase their hardness and spring characteristics. To maintain a good surface condition heat treatment should be carried out in a controlled atmosphere furnace at the appropriate temperature for the grade (see table) and oil quenched to achieve maximum hardness.

Tempering must then be carried out to reduce the strength/ hardness of the material but considerably improve its toughness and ductility. Temperatures in the range of 300 - 450°C should be used to achieve the required final hardness. Alternatively, austempering is frequently carried out by quenching into a molten salt bath @ 350 - 450°C.

Hardened & tempered spring steel has been heat treated in strip form at the Mill, prior to being supplied to the customer. Many applications do not require severe bending and forming and it is often beneficial to use hardened & tempered strip in these cases. The main benefits are:, no risk of distortion, uniformity of surface finish, and constant mechanical properties.

These factors often mean reduced processing costs and a higher quality product.

Stress Relieving

After severe deformation hardened & tempered spring steel requires a low temperature (250 - 300°C) stress relieving operation to "set" the components into shape. This will impart a coloured oxide finish ranging from Bronze to Blue which slightly improves corrosion resistance.

AVAILABLE GRADES

Cold Rolled Low Carbon (Mild)

DC01
DC03
DC04
DC05
DC06

Cold Rolled High Carbon Spring Steel

C55S
C60S
C67S
C75S
C85S
C90S
C100S
C125S
48Si7
56Si7
51CrV4
80CrV2
75Ni8
125Cr2
102Cr6

Features

MILD & CARBON STEEL STOCK RANGE				
TYPE	COIL STOCK RANGE		WIRE STOCK RANGE	
	Thickness (mm)	Width (mm)	Round	Shaped
LOW CARBON STEEL				
Annealed	0.01 - 3.0	3 - 1220	0.1 – 10.00 mm dia	Upto 45 mm2 area
All Other Tempers	0.01 - 2.0	3 - 1000		
HIGH CARBON STEEL				
Annealed	0.05 - 3.0	3 - 650	0.1 – 10.00 mm dia	Upto 45 mm2 area
Cold Worked	0.05 - 1.6	3 - 450		
Hardened & Tempered	0.1 - 3.0	3- 450		
Other specifications can be made available upon request. Please contact us with your requirements.				

SURFACE APPEARANCES AND FINISHES			
Symbol	Characteristics	Applications	Surface finish
MA	Bright, metallic clean surface, pitting, small defects and scratches are permitted.	All thicknesses and treatment conditions.	FRR, RM, RL 2)
MB	Bright, metallic clean surface; pitting, grooves and scratches are permitted as long as the uniform smooth appearance is not substantially impaired when viewed with the naked eye.	Thicknesses =< 2.0mm in all conditions except A (annealed)	RM, RL 2)
MC	Bright, metallic clean surface; pitting, grooves and scratches are permitted as long as the uniform appearance of the mirror surface is not impaired.	Thicknesses =<1.0mm in all conditions except A (annealed).	SRN 2)
RR = rough, RM = matt, RL = smooth, RN = mirror 2) These code letters need not be given in the designation.			

Cold Rolled Low Carbon (Mild) Steel

COLD ROLLED LOW CARBON (MILD) FEATURES

DESIGNATION		FORMER BRITISH STANDARD GRADE	Temper	Key Features	Applications
NAME	NUMBER				
1.0873	DCO6	-	Skin passed	Extra deep drawing quality, non-ageing	Very Deep Drawn Components, Automotive & Electrical Parts
1.0312	DCO5	CS1	Annealed & Skin Passed	Extra deep drawing quality, non-ageing	Springs, clips, pressings and fasteners
1.0338	DCO4	CS2		Deep drawing quality, non-ageing	Deep Drawn and Stretch Formed
1.0347	DCO3	CS3		Drawing quality, non-ageing	Shallow Drawn and Stretch Formed
1.033	DCO1	CS4		Forming and Bending	Press Formed and Bent Components
1.033	DCO1	CS4	Temper Rolled C290/ C340/ C390/ C440	Forming and Bending	Press Formed and Bent Components
			Hard Rolled C490/ C590/ C690	Blanking	Flat Components, Shims, Washers

COLD ROLLED LOW CARBON (MILD) STEEL CHARACTERISTICS

DESIGNATION		FORMER BRITISH STANDARD GRADE	TYPICAL CHEMICAL COMPOSITION %					MECHANICAL PROPERTIES						
NAME	NUMBER		C	P	S	Mn	Ti	Period Guaranteed	Delivery Condition	Symbol	Re N/mm2	Rm N/mm2	Elongation % min A80	Hardness HV
DC01	1.033	CS4	0.12	0.045	0.045	0.6	-	3 months	Annealed	A	-	270-390	28	105 max
									Skin passed	LC	280 max	270-410	28	115 max
									Work hardened	C290	200-380	290-430	18	95-125
									C340	250 min	340-490	-	105-155	-
									C390	310 min	390-540	-	117-172	-
									C440	360 min	440-590	-	135-185	-
									C490	420 min	490-640	-	155-200	-
									C590	520 min	590-740	-	185-225	-
									C690	630 min	690 min	-	215 min	-
DC03	1.0347	CS3, CS2	0.10	0.035	0.035	0.45	-	6 months	Annealed	A	-	270-370	34	100 max
									Skin passed	LC	240 max	270-370	34	110 max
									Work hardened	C290	210-355	290-390	22	95-117
									C340	240 min	340-440	-	105-130	-
									C390	330 min	390-490	-	117-155	-
									C440	380 min	440-540	-	135-172	-
									C490	440 min	490-590	-	155-185	-
									C590	540 min	590 min	-	185 min	-
DC04	1.0338	-	0.08	0.030	0.030	0.4	-	6 months	Annealed	A	-	270-350	38	95 max
									Skin passed	LC	210 max	270-350	38	105 max
									Work hardened	C290	220-325	290-350	24	95-117
										C340	240 min	340-440	-	105-130
										C390	350 min	390-490	-	117-155
										C440	400 min	440-540	-	135-172
										C490	460 min	490-590	-	155-185
										C590	560 min	590 min	-	185-215
DC05	1.0312	-	0.06	0.025	0.025	0.35	-	6 months	Skin passed	LC	180 max	270-330	40	100 max
DC06	1.0873	-	0.02	0.020	0.020	0.25	0.30	6 months	Skin passed	LC	80 max	270-350	38	-

Cold Rolled High Carbon Spring Steel

COLD ROLLED HIGH CARBON SPRING STEEL FEATURES

DESIGNATION		Temper	Key Features	Applications
NAME	NUMBER			
C55S C60S C67S C75S C85S C90S C100S C125S 48Si7 56Si7 51CrV4 80CrV2 75Ni8 125Cr2 102Cr6	1.1204 1.1211 1.1231 1.1248 1.1269 1.1217 1.1274 1.1224 1.5021 1.5026 1.8159 1.2235 1.5634 1.2002 1.2067	Annealed & Skin Passed	Press forming and blanking, hardenable	Springs and Hight Strength Parts. E.g. Circlips & Automotive Clutch Plates Wear Resistant Parts, Knives, Saw Blades
		Hardened & Tempered	Flat or very simply formed shapes High fatigue and wear resistance	Flat Springs, Circlips, Automotive Clutch Plates High Performance Springs, Machine Knife Blades, Doctor Blades

COLD ROLLED HIGH CARBON SPRING STEEL CHARACTERISTICS

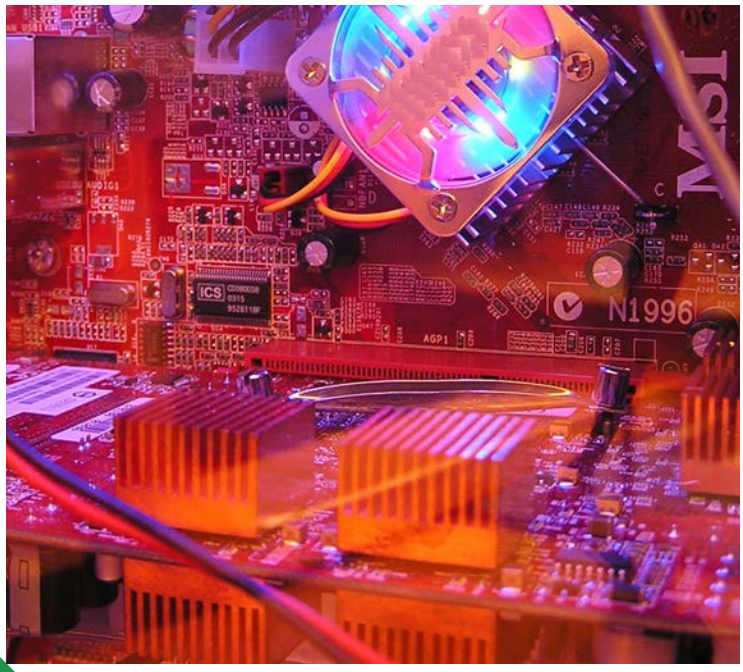
DESIGNATION		TYPICAL CHEMICAL COMPOSITION %									Hardness for Delivery Condition (reference values)	
NAME	NUMBER	C	Si	Mn	P max	S max	Cr	Mo max	V max	Ni	Annealed (+A) or annealed and skin passed (+LC) Rockwell 'B' scale	Quenched and Tempered (+QT) Rockwell 'C' scale
C55S	1.1204	0.52-0.60	0.15-0.35	0.60-0.90	0.025	0.025	0.40 max	0.1	-	0.40 max	90 max	34 - 50.5
C60S	1.1211	0.57-0.65	0.15-0.35	0.60-0.90	0.025	0.025	0.40 max	0.1	-	0.40 max	91 max	35 - 51.5
C67S	1.1231	0.65-0.73	0.15-0.35	0.60-0.90	0.025	0.025	0.40 max	0.1	-	0.40 max	92 max	38.5 - 54
C75S	1.1248	0.70-0.80	0.15-0.35	0.60-0.90	0.025	0.025	0.40 max	0.1	-	0.40 max	93 max	38.5 - 54
C85S	1.1269	0.80-0.90	0.15-0.35	0.40-0.70	0.025	0.025	0.40 max	0.1	-	0.40 max	94 max	38.5 - 55
C90S	1.1217	0.85-0.95	0.15-0.35	0.40-0.70	0.025	0.025	0.40 max	0.1	-	0.40 max	94 max	38.5 - 55
C100S	1.1274	0.95-1.05	0.15-0.35	0.30-0.60	0.025	0.025	0.40 max	0.1	-	0.40 max	95 max	38.5 - 57
C125S	1.1224	1.20-1.30	0.15-0.35	0.30-0.60	0.025	0.025	0.40 max	0.1	-	0.40 max	97 max	38.5 - 57
48Si7	1.5021	0.45-0.52	1.60-2.00	0.50-0.80	0.025	0.025	0.40 max	0.1	-	0.40 max	95 max	38.5 - 50.5
56Si7	1.5026	0.52-0.60	1.60-2.00	0.60-0.90	0.025	0.025	0.40 max	0.1	-	0.40 max	96 max	38.5 - 50.5
51CrV4	1.8159	0.47-0.55	0.40 max	0.70-1.10	0.025	0.025	0.90-1.20	0.1	0.10-0.25	0.40 max	94 max	38.5 - 52.5
80CrV2	1.2235	0.75-0.85	0.15-0.35	0.30-0.50	0.025	0.025	0.40-0.60	0.1	0.15-0.25	0.40 max	95 max	38.5 - 52.5
75Ni8	1.5634	0.72-0.78	0.15-0.35	0.30-0.50	0.025	0.025	< 0.15	0.1	-	1.80-2.10	93 max	38.5 - 52.5
125Cr2	1.2002	1.20-1.30	0.15-0.35	0.25-0.40	0.025	0.025	0.40-0.60	0.1	-	0.40 max	97 max	42 - 57
102Cr6	1.2067	0.95-1.10	0.15-0.35	0.20-0.40	0.025	0.025	1.35-1.60	0.1	-	0.40 max	97 max	42 - 57

Plated Strip

Pre-plated strip is produced by applying a thin layer of material onto the surface of another; less costly metal, commonly Mild and Stainless Steels. This can provide a decorative surface finish whilst reducing the cost of the material, making it ideal for a number of applications, including interior decorative features such as hand rails, light fittings, fireplaces, curtain poles and finials, jewellery design and automotive parts. There are further benefits including improving corrosion resistance, solderability, wearability, paint adhesion, infrared reflectivity, friction reduction and altering the conductivity, depending on the combination of materials chosen. Cost reduction has made plated products an increasingly popular choice.

We supply a range of plated products and finishes to suit your needs. Our most popular products are below, but others are available on request

Plating Material	Substrate Material	Finishes
Brass	Mild Steel	Bright, Satin/ Brushed & Antique
Nickel	Mild Steel	Bright, Satin/ Brushed & Mirror-black
Chrome	Mild Steel	Bright, Satin/ Brushed
Copper	Mild Steel	Bright
Chrome	Stainless Steel	Bright, Satin/ Brushed



Plated Strip Electrical Applications

There is a growing use of plated strip steel in electrical applications – driven by increasing metal prices of the traditional non-ferrous materials used by the electrical industry.

Typical applications include...

- Connectors
- Switchgear
- Circuit Breaker Arc Plates

Some of the benefits plated strip offers are...

- outstanding formability and shape
- best in class corrosion resistance
- excellent braze-ability/weld-ability, and post- plating properties
- cost reduction from a complete material change, or by avoiding post-plating
- lower environmental impact

Knufoil

KNUFOIL TYPICAL CHEMICAL COMPOSITION %							
C	Si	Mn	P	S	Cr	Ni	Ti
0.08	1.00	2.00	0.045	0.030	17.00 - 19.00	9.00 - 12.00	Ti 5 x C to max 0.7

KNUFOIL STOCK RANGE		
Thickness	Width	Roll Length
0.05 mm	610 mm	7.65 m

KNUFOIL is a special Stainless Steel alloy foil, commonly used for tool wrap applications.

KNUFOIL has been developed to provide a simple, low cost method of protecting the surface of tools, dies and other parts during the hardening process by preventing decarburization.

KNUFOIL tool wrap envelopes are simple to make, locking out the air and eliminating the need for expensive protective atmosphere furnaces and only increases hardening time by two or three minutes.

A further major advantage is that a faster quenching medium may be used - for example, water instead of oil. This is due to the insulating effect of KNUFOIL in the quenching medium, which is sufficient to reduce the risk of cracking normally incurred by the use of a faster quench.

It eliminates the need for encapsulating or coating the product in a protective material which might be difficult to remove after hardening, or using expensive protective atmosphere furnaces.

KNUFOIL is available in the standard 610 mm

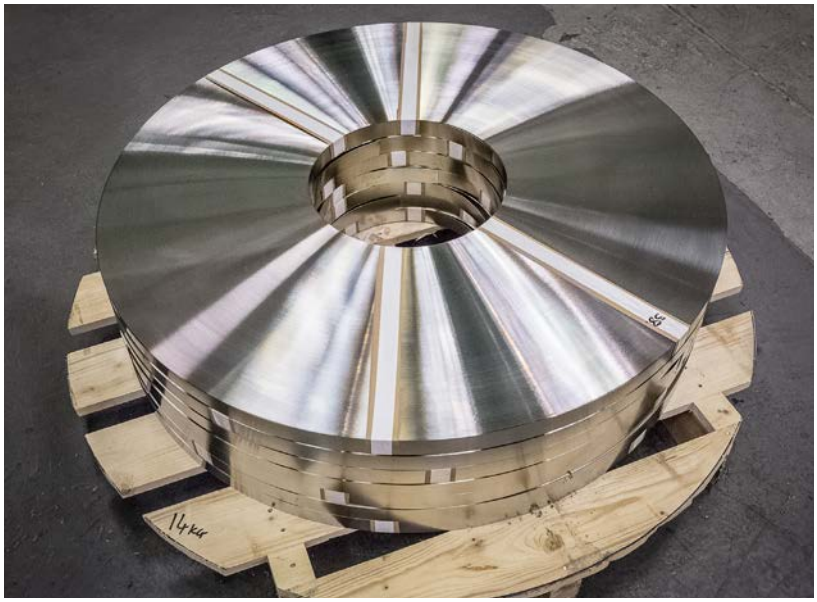
Other widths are available upon request.

Packaging

BESPOKE PACKAGING

If your business needs 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 be 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.

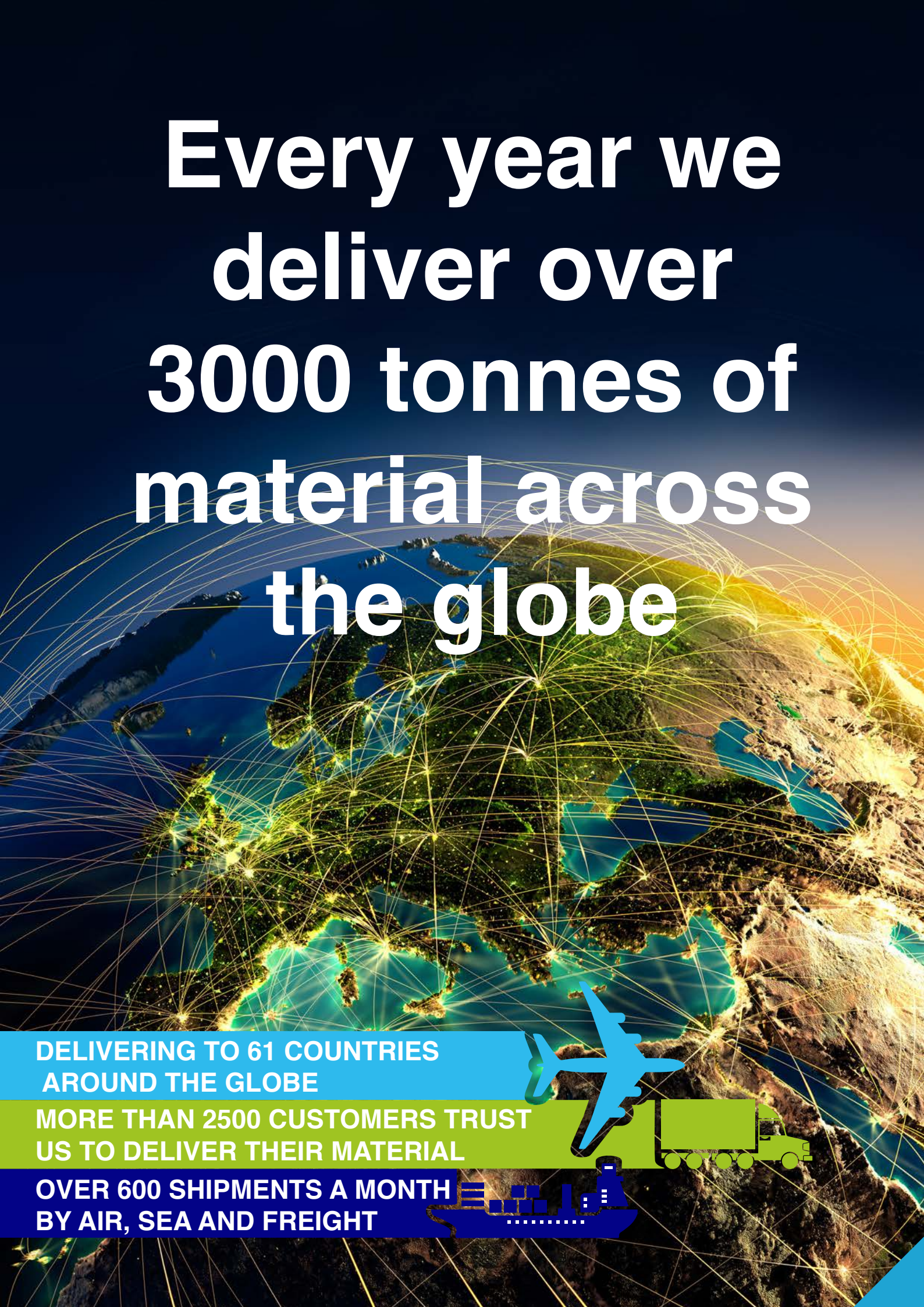


CHOOSE FROM OUR TRUSTED PARTNERS OR YOUR PREFERRED CARRIER

We firmly believe that all you and 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 sites in Birmingham or Mechelen, which can be organised through our sales team.

Every year we deliver over 3000 tonnes of material across the globe



DELIVERING TO 61 COUNTRIES AROUND THE GLOBE

MORE THAN 2500 CUSTOMERS TRUST US TO DELIVER THEIR MATERIAL

OVER 600 SHIPMENTS A MONTH BY AIR, SEA AND FREIGHT

Standard Stock

WE ARE DRIVEN TO CONTINUE BUILDING A BETTER BUSINESS, BY WORKING CLOSELY WITH OUR CUSTOMERS TO GROW THEIRS.

Our materials and processing are carefully chosen to meet the exacting needs of manufacturers around the globe. We work alongside our suppliers to ensure we are at the forefront of material innovation, ensuring the availability of the highest quality material with the most competitive pricing. With over 2500 items in stock and sourcing of an extensive range or alloy grades, you can have your material, your way.

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

Standard Stock Range

WE STOCK IN EXCESS OF 2500 ITEMS, AVAILABLE AS CUT LENGTHS/ STRAIGHTENED, COILS, FORMERS OR SPOOLS

DESCRIPTION										
Material		Stainless Steel								Mild Steel
Temper		ANNEALED				HARD ROLLED				HARD ROLLED
European Norm		EN 10088-2:2005				EN 10151:2002				EN 10139:1998
Thickness Tolerances		EN ISO 9445-1:2010(P) (Thickness X* not within precision range)								EN10140:2006 (precision) C
	European Spec.	1.4541 BS S526		1.4404 1.4401	1.4307 1.4301	1.4310 +C1300		1.4301 +C1300		DC01 C590
	AISI	321		316/316L	304L/304	301		304		-
	AMS	5510		5507	5511/5513	5519		5913		-
	ASTM	A-240		A-240, A-266	A-240, A-266	A-666		A-666		-
THICKNESS (mm)		WIDTH (mm)								
		610	980	305	610	610	305	610	305	610	610
0.025							✓*		✓	✓	
0.05		✓*		✓	✓	✓	✓	✓	✓	✓	✓
0.076		✓	✓		✓	✓	✓		✓	✓	✓
0.08		✓*	✓*	✓							✓
0.1		✓	✓		✓	✓*		✓	✓	✓	✓
0.127		✓	✓		✓	✓			✓	✓	✓
0.15		✓	✓		✓	✓		✓	✓	✓	✓
0.18			✓								✓
0.2		✓			✓	✓		✓	✓	✓	✓
0.25		✓	✓		✓	✓			✓	✓	✓
0.3		✓			✓	✓		✓	✓	✓	✓
0.38		✓						✓			✓
0.39					✓	✓	✓	✓	✓	✓	
0.45		✓				✓					
0.5		✓			✓	✓	✓	✓	✓	✓	✓
0.6								✓	✓	✓	
0.7							✓		✓	✓	
0.8							✓		✓	✓	
0.9									✓	✓	
1							✓	✓	✓	✓	✓
1.2							✓		✓		
1.5							✓	✓	✓		

Product Range

RANGE CAN BE SUPPLIED AS CUT LENGTHS/ STRAIGHTENED, COILS, FORMERS OR SPOOLS

OTHER GRADES AND SPECIFICATIONS AVAILABLE, PLEASE CONTACT OUR SALES TEAM WITH YOUR REQUEST

TYPE		GRADES AVAILABLE	COIL STANDARD RANGE			ROUND AND PROFILE WIRE STANDARD RANGE	
			Tempers Available	Thickness (mm)	Width (mm)	Tempers Available	Specifications and Forms
STAINLESS STEEL	AUSTENITIC	201, 301, 304L, 304, 305, 320, 321, 347, 316, 316L, 316Ti, 904L	Annealed	0.01 - 2.5	3 - 1250	Annealed Light Drawn Hard Drawn Specified Tensile	Round Wire 0.1 to 10.00mm dia* Profile Wire Upto 45mm2 area For cold worked condition, please contact us with your requirements. Coils from 1kg to 1000kgs Formers from 500kgs to 1000kgs Spools - Wide Range Available Cut Lengths/ Straightened from 10mm to 4m * *Duplex Round Wire 0.8 – 8.00mm dia* Cut Lengths/ Straightened from 10mm to 10m
			All Other Tempers	0.01 - 2.0	3 - 1250		
	FERRITIC	410S, 430, 430L, 430Ti (439), 441, 444	Annealed	0.05 - 2.0	3 - 650		
			All Other Tempers	0.05 - 1.6	3 - 450		
	MARTENSITIC	410, 420, 431	Annealed	0.127 - 2.50	3 - 450		
	PRECIPITATION HARDENING	17/4PH, 17/7PH	Annealed	0.02 - 1.5	3 - 620		
			Condition 'C'	0.025 - 1.0	3 - 620		
	HEAT RESISTING STEELS	309, 310	All Tempers Available	0.025 - 3.0	3 - 1000		
TITANIUM	ALPHA	Grade 1, Grade 2, Grade 3, Grade 4	All Tempers Available	0.025 - 3.00	3 - 1000	Annealed (soft) 1/8 Hard 1/4 Hard 1/2 Hard Hard Spring Hard	Round Wire 0.1 to 10.00mm dia Profile Wire Upto 45mm2 area Coils from 1kg to 1000kgs Formers from 500kgs to 1000kgs Spools - Wide Range Available Cut Lengths from 10mm to 10m
	ALPHA/BETA	Grade 5 (Ti 6Al-4V) Grade 9 (Ti 3Al 2.5V)					
	BETA	21S					
NICKEL ALLOYS	COMMERCIALLY PURE NICKELS	200, 201	All Tempers Available	0.025 - 2.5	2 - 1000	Annealed Spring Hard	Round Wire 0.1 to 10.00 mm dia Upto 45 mm2 area Coils from 0.5 kg to 1000kgs Formers from 500kgs to 1000kgs Spools - Wide Range Available Cut Lengths/ Straightened from 10mm to 10mm
	NICKEL-COPPER ALLOYS	400					
	NICKEL-CHROMIUM & NICKEL-CHROMIUM-IRON ALLOYS	alloy K500, alloy X, C22, alloy C2000, alloy 600, alloy 601, alloy 625, alloy C 276, alloy 718, alloy X750					
	IRON-NICKEL-CHROMIUM ALLOYS	alloy 800, alloy 825					
	CONTROLLED EXPANSION ALLOYS	29/18			3 - 610		
ALUMINIUM	PURE ALUMINIUM	1000 SERIES	All Tempers Available	0.01 - 3.0	3 - 1000 Sheet up to 2000mm	Annealed (soft) 1/8 Hard 1/4 Hard 1/2 Hard Hard Spring Hard	Round Wire 0.1 to 10.0 mm dia Upto 45mm2 area Coils from 1kg to 1000kgs Formers from 500kgs to 1000kgs Spools - Wide Range Available Cut Lengths/ Straightened from 10 mm to 10m
	ALUMINIUM COPPER ALLOY	2000 SERIES					
	ALUMINIUM MANGANESE ALLOY	3000 SERIES					
	ALUMINIUM MAGNESIUM ALLOY	5000 SERIES		0.01 - 1.5			
	ALUMINIUM MAGNESIUM + SILICON ALLOY	6000 SERIES		0.01 - 3.0			
	ALUMINIUM ZINC ALLOY	7000 SERIES		Please contact us with your requirements			
	CLAD ALUMINIUM	n/a		Please contact us with your requirements			
COPPER, BRASS & BRONZE	COMMERCIALLY PURE HIGH CONDUCTIVITY COPPER	C101, C102, C103, C106	All Tempers Available	0.01 - 3.0	3 - 1220	Annealed (soft) 1/8 Hard 1/4 Hard 1/2 Hard Hard Spring Hard	Round Wire 0.1 to 10.00 mm dia Upto 45 mm2 area Coils from 1kg to 1000kgs Formers from 500kgs to 1000kgs Spools - Wide Range Available Cut Lengths/ Straightened from 10mm to 4m
	BRASS	CZ106, CZ107, CZ108					
	PHOSPHOR BRASS	PB102, PB103					
	NICKEL SILVERS CUPRONICKEL & HIGH COPPER CONTENT ALLOYS	NS103, NS104, NS106, NS107, C72500					
	COPPER BERYLLIUM ALLOYS	CB101					
MILD & CARBON STEEL	LOW CARBON STEEL	DC01, DC03, DC04, DC05, DC06	Annealed	0.01 - 3.0	3 - 1220	Annealed (soft) 1/8 Hard 1/4 Hard 1/2 Hard Hard Spring Hard	Round Wire 0.1 to 10.00 mm dia Upto 45 mm2 area Coils from 1kg to 1000kgs Formers from 500kgs to 1000kgs Spools - Wide Range Available Cut Lengths/ Straightened from 10mm to 10m
			All Other Tempers	0.01 - 2.0	3 - 1000		
	HIGH CARBON STEEL	C55S, C60S, C67S, C75S, C85S, C90S, C100S, C125S, 48Si7, 56Si7, 51CrV4, 80CrV2, 75Ni8, 125Cr2, 102Cr6	Annealed	0.05 - 3.0	3 - 650		
			All Other Tempers	0.05 - 1.6	3 - 610		
			Hardened & Tempered	0.127 - 3.0			

CLAD METALS AND PLATED METALS AVAILABLE, PLEASE CONTACT US WITH YOUR REQUIREMENTS

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