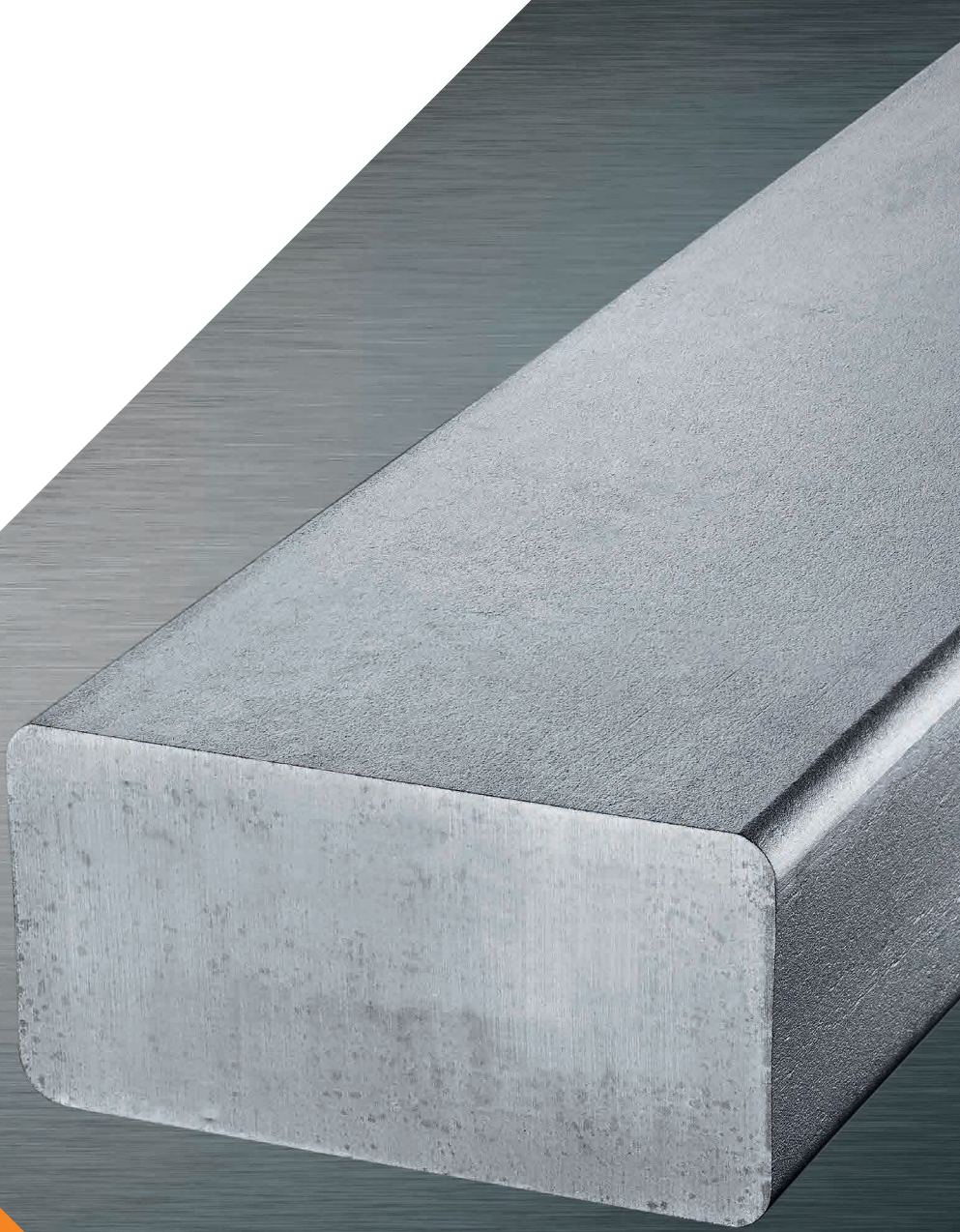




**BRITISH
STEEL**



Condumax[®]

Helping our customers improve
their energy performance

BUILDING STRONGER FUTURES

Introducing British Steel

British Steel is a world leader in the production of steel with facilities across the UK and France, supplying high quality steel products around the world.

What makes us different is our approach to business. We build collaborative relationships that create new success for our customers, delivering a wide range of products and services either direct to end users or through our extensive stockist network.

We offer guidance and solutions to our customers from the very early design stage to deliver real benefits through optimisation of fabrication and process routes.



Condumax has been developed to deliver market-leading electrical conductivity for steel cathode collector bars

At British Steel we understand how improving energy efficiency contributes significantly to business profitability and a sustainable economy.

The actual performance depends on many factors, typically Condumax exhibits 40% greater conductivity in use, reducing electricity costs by 20%.

Superior conductivity backed by superior service

We produce cathode collector bars at our world-renowned facilities in the UK. Our process route, from ore receipt to final product shipping, is fully accredited to ISO 9001 and ISO 14001 and is subject to regular customer specific approvals.

Utilising our long-established global sales network ensures we are able to provide a local service wherever you are based. Your British Steel account team manages all aspects of contract delivery, tailoring our standard product and delivery programmes to meet your requirements.

Our technical team successfully develops innovative solutions in collaboration with our customers and their supply chains, helping you to optimise your performance.

40% GREATER CONDUCTIVITY
20% REDUCED ELECTRICITY COSTS

PRODUCT BENEFITS

- Up to 40% lower resistivity than mild steel cathode bars
- 10% lower measured electrical resistivity in production trials vs. competitors' ultra low resistivity (ULR) cathode bars
- Longer service life and lower energy use in service
- Condumax offers a 60 tonne reduction of CO₂ emissions per pot over the lifetime of the pot
- Market leading high purity 0.01% maximum carbon content with low residual elements

Year	Pots Switched to Condumax	Savings per year (£ k)	Cumulative Savings (£ k)
1	58	25	25
2	117	75	100
3	175	125	225
4	233	175	400
5	292	225	624
6	350	275	899
7	All 350	300	1199

8+ All pots now converted to Condumax savings continue ▼

See how much Condumax could save you at:

britishsteel.co.uk/condumax

Data gathered from tests at an aluminium smelter plant in Europe

Condumax steel grade

The tables below indicate the chemical analysis units and mechanical properties for British Steel's Condumax steel grade.

Chemical composition

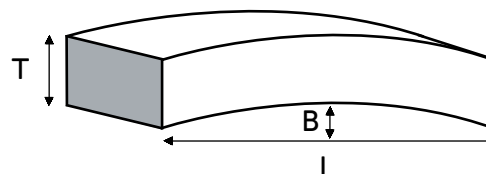
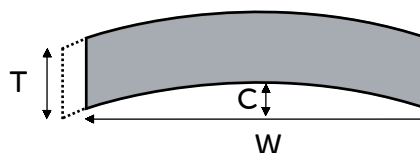
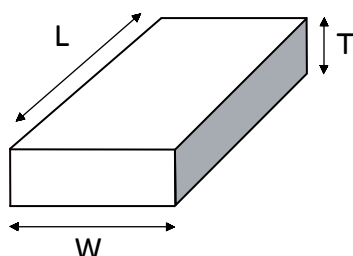
Maximum	C	Si	Mn	S	P	Cr	Mo	Nb	V	Ni	B	Al
(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Condumax	0.01	0.01	0.20	0.015	0.02	0.05	0.02	0.01	0.015	0.07	0.0008	0.02

Size range and production tolerances

Our standard product sizes are in the following range:

Width (W)	122 to 279mm
Thickness (T)	90 to 160mm
Length (L)	1.5 to 10m

Bow (B)	2mm/m max
Camber (C)	2mm/m max
Twist	1mm/m max



Production tolerances

Surface:	EN10163-3: 2004, Class C, Subclass 3
Quantity tolerance:	±10% based on the quantity of bars
Length tolerance:	-0 / +10 mm
Width tolerance:	+3 / -2 mm
Thickness tolerance:	+3 / -2 mm

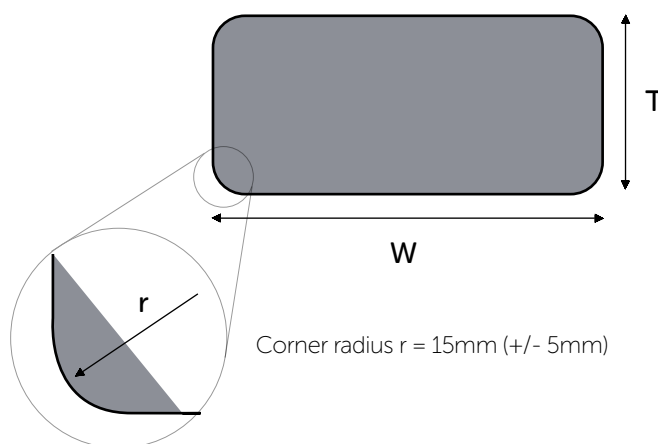
Rhomboidity



Squareness angle $\theta = 1.5^\circ$ maximum
Rhomboidity $R = T \times \tan \theta$

T (mm)	Maximum R (mm)
<100	3
100 <150	4
150 <200	5
200 <250	6
250 <300	7

Corner radius



Corner radius $r = 15\text{mm} (+/- 5\text{mm})$

Alternative tolerances available upon request

Product properties

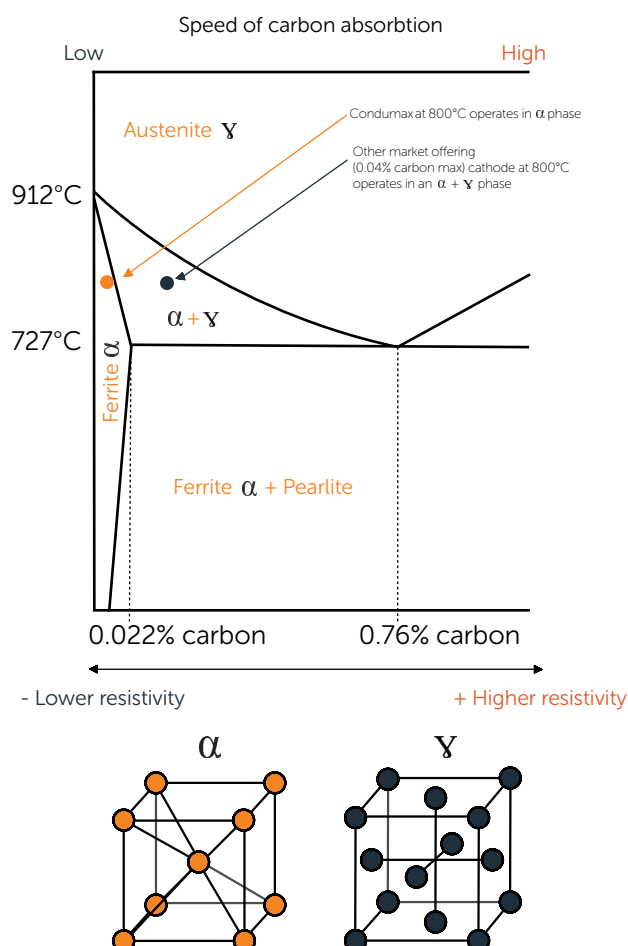
Condumax has a unique chemical composition of 0.01% carbon, significantly lower than the 0.04-0.06% carbon content present in other commercially available ULR steel cathode collector bars. Our quality steelmaking practices ensure tight control of chemistry giving consistency of carbon and other trace elements such as silicon, manganese, chromium and molybdenum between bars for predictable performance.

Our tight chemistry controls are able to restrict the levels of austenite stabilisers in the steel and ensure the product remains in the delta ferrite stage for longer, resisting carbon absorption and offering prolonged energy savings compared with competitors' products.

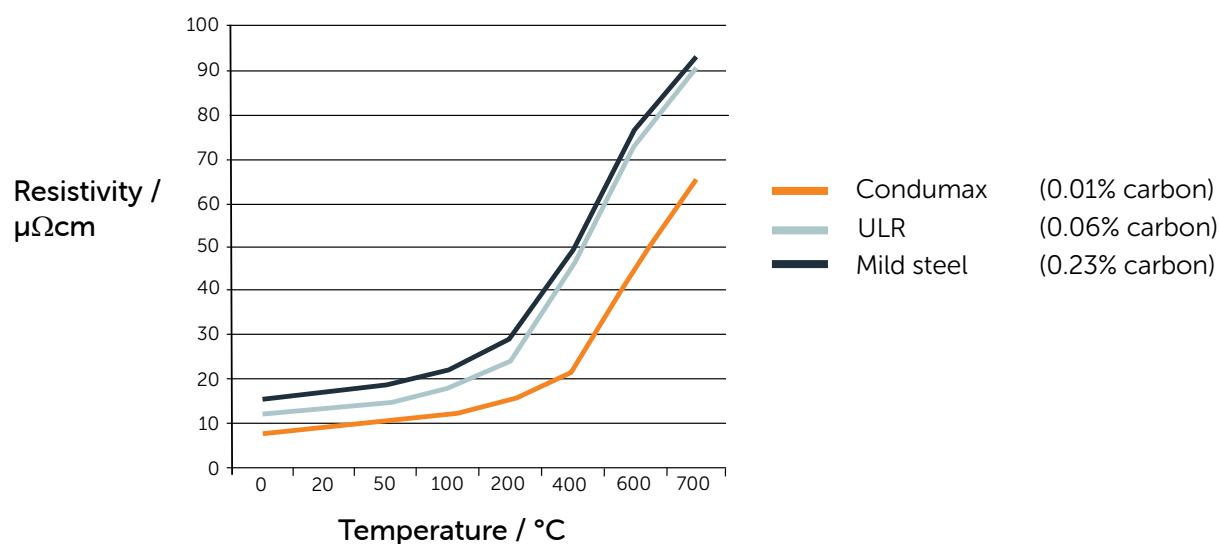
Metallurgy

- British Steel's world-leading Basic Oxygen Steelmaking facilities are capable of controlling carbon and other trace elements to unrivalled levels
- Condumax (0.01% carbon cathode) operates in the ferrite α phase of the iron-carbon phase at typical operating temperatures $\sim 800^{\circ}\text{C}$
- Standard 0.04-0.06% low carbon cathodes operate in the ferrite / austenite 2 phase region
- Ferrite is more resistant to carbon diffusion from the graphite
- Austenite can readily hold up to 2% more carbon in the lattice than ferrite

Our Condumax will remain at the optimum ferrite phase for longer at higher temperatures, reducing carbon intake and ensuring lower resistivity for longer life.



Electrical resistivity for different carbon levels





**BRITISH
STEEL**

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