

TATA STEEL



Celsius®

Hot finished hollow sections to EN 10210



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THE CELSIUS® RANGE





Celsius® offers stronger, lighter, more cost-effective and aesthetically pleasing structures to help meet and exceed the most demanding and challenging applications.

Available in a wide range of circular, square, rectangular and elliptical hollow sections, the strength and weldable qualities of Celsius® mean that it can be used for all structural and mechanical applications, including multi-storey columns, space frames, lattice beams and frames for cranes, machinery & trailers as well as critical parts like axles.

Made exclusively from normalized, fine grain steel the Celsius® range is fully stress-relieved with uniform mechanical properties and improved weldability thanks to a low Carbon Equivalent Value (CEV) while the controlled silicon content ensures good galvanisability.

Alongside the popular S355NH grade, we also manufacture Celsius® fully normalized true hot finished sections in high strength S420NH and S460NH to bring the advantages of Celsius® into a new age of light-weight, sustainable structures. For exceptional toughness in low temperature conditions, we can supply Celsius® in NLH grades too and we even manufacture a range of grades specifically certified for offshore structures (EN 10225 part 3). Celsius® is also now available in a weathering grade variant to provide ultimate durability in long-life, low-maintenance structures.

Celsius® - Hot finished hollow sections to EN 10210

	Circular (CHS)	✓ S355J2H*
	Square (SHS)	✓ S355NH
	Rectangular (RHS)	✓ S355NLH
	Elliptical (EHS)	✓ S355 Weathering
		✓ S420NH
		✓ S460NH

* Celsius S355NH fully complies to specification for EN 10210 S355J2H

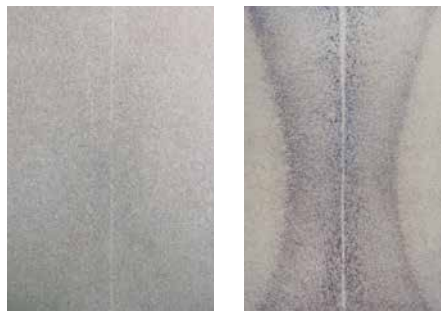
THE BENEFITS OF CELSIUS®

Celsius® is the ultimate structural hollow section. Whatever grade you choose, whatever shape or size, and whatever your application, the benefits are clear.

Metallurgical Performance

The final shape of Celsius® is always formed at normalizing temperature, giving an almost complete absence of internal stresses throughout the entire hollow section. This is not always the case for some other products which may comply with EN 10210 but are not always fully normalized. Only Celsius® provides all these benefits. This gives excellent yield behaviour, coupled with low-temperature toughness making Celsius® the default choice for demanding applications.

Weld line

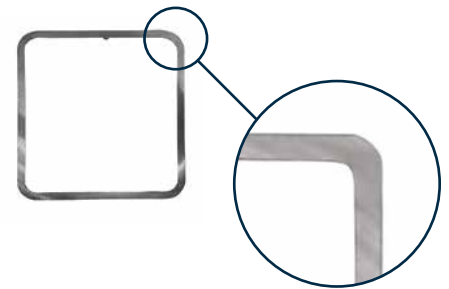


Celsius®

Cold formed

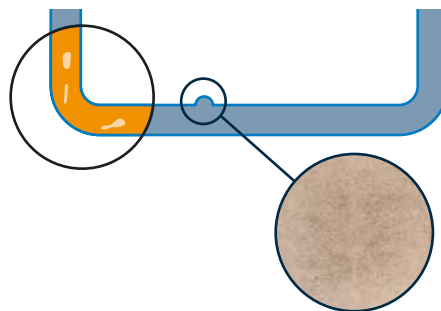
Celsius® is a true hot finished section and full body normalized. The steel is heated into the Austenite phase, thus enabling no hardness around the weld line. This is not the case for cold formed EN 10219 sections or even many others which may comply to EN 10210 but are not truly hot finished.

Structural/load capacity



Celsius® is full body normalized allowing a much tighter corner profile than cold formed hollow sections or even some other products to EN 10210. Because of this, the same size Celsius® section has more steel, a greater area and greater structural capacity than other hollow sections.

Ductility



Celsius® has consistent ductility around the whole perimeter and the weld line compared to cold formed hollow sections (EN 10219) which, due to their forming process, have hard areas. This consistent ductility is critical to fatigue resistance or similar load cycles.

Bending/welding



As the metallurgy is consistent throughout, even at the corners and around the weld-line, Celsius® is fully formable and weldable around the full perimeter. By contrast, care must be taken when welding, manipulating and bending cold formed hollow sections (EN 10219) and even some other products certified to EN 10210 but not fully normalized.

Aesthetics

The tight corner radius on Celsius® hollow sections not only provides a larger area for welding, but also makes for smarter aesthetics, whether in the exposed structure of buildings and bridges or in machinery and equipment.

And if smart, tight corners on square and rectangular sections isn't enough, Celsius® is also available in a range of elliptical sizes, giving a unique aesthetic. Particularly when used as columns in glazed areas, the elliptical sections minimize the visual impact of the structure.

Celsius® weathering grade provides ultimate durability in long-life, low-maintenance structures. The unique patina also helps steel structures to blend in to their natural landscape, providing a unique and always-evolving surface finish.

Quality

At Tata Steel, we manage the steel supply chain right through from primary steel-making to the finished steel tube, so you can be sure of consistent, high quality. Our manufacturing process works to the highest quality standards with traceability and certification second-to-none.

The result of our comprehensive approach to quality is not only consistency, but also an industry-leading standard of product, in terms of dimensional tolerances, straightness and surface finish.

Economy

Celsius® fully normalized hollow sections can give significant cost savings compared to other steel solutions, including cold-formed hollow sections.

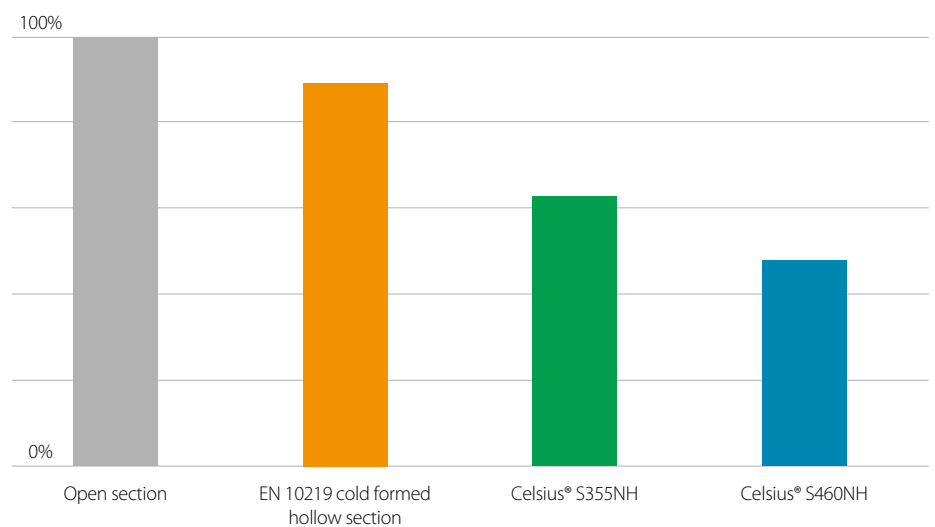
When used in structural design to Eurocode 3, Celsius® fully normalized true hot finished hollow sections use the a-buckling curve, where cold formed equivalents use the c-curve. This effectively means that, where buckling is critical, Celsius® has up to 39% more capacity, allowing smaller, lighter and cheaper sections to be used. Celsius® S460NH goes even further, using the a₀-curve and adding further efficiency.

A large part of the cost of a structure is not in the sections themselves, but in the fabrication. All grades of Celsius® have a CEV less than 0.45 to enable efficient welding, without pre-heating in most cases. The large flat faces of Celsius® also make welded joints simpler than cold formed sections where welds near to the corners can cause issues. And tight corners not only give larger weld faces, but reduce the need for weld infill in many cases.

We have developed our range of Celsius® S460NH specifically so that in most cases, you will be able to use a thinner section than with S355NH, saving at least 20% in steel weight for a lower overall cost.

Building on our Celsius® range, for structures which are exposed to the elements, our Celsius® weathering grade eliminates the need for galvanizing and painting, more than offsetting the additional steel costs in most cases.

Typical mass of steel required



DESIGNING WITH CELSIUS®

Design freedom is at the core of the Celsius® range. The complete range combines the ultimate structural steel grade with enhanced aesthetics to support your design ambitions, all backed by full technical support and specification guidance.

The homogeneous grain structure of Celsius® created during the manufacturing process means it is fully stress relieved. This allows the product to be welded at any point around its perimeter and also avoids distortion when manipulating and galvanising.

Celsius® fully normalized true hot finished hollow sections are ideal for challenging conditions such as where fatigue, low temperatures, offshore or seismic conditions occur. The additional high strength options give the designer further benefits for a safe, sustainable and economical application.

Unparalleled design support

We know that every use of Celsius® is the result of an engineering decision. Celsius® is widely used in structures from bridges and pylons to offices, stadia and airports as well as in various forms of equipment and machinery from cranes and ski lifts to buses, trailers and agricultural equipment. Our team of experienced engineers is always on-hand to help get the most out of Celsius® in whatever your application demands.

To help engineers easily access the information they require, we publish comprehensive properties tables for our full range of Celsius® hot finished hollow sections, together with tables of member resistances calculated according to Eurocode 3 for structures in our online Blue Book. The online Blue Book can be found at www.tatasteelbluebook.com



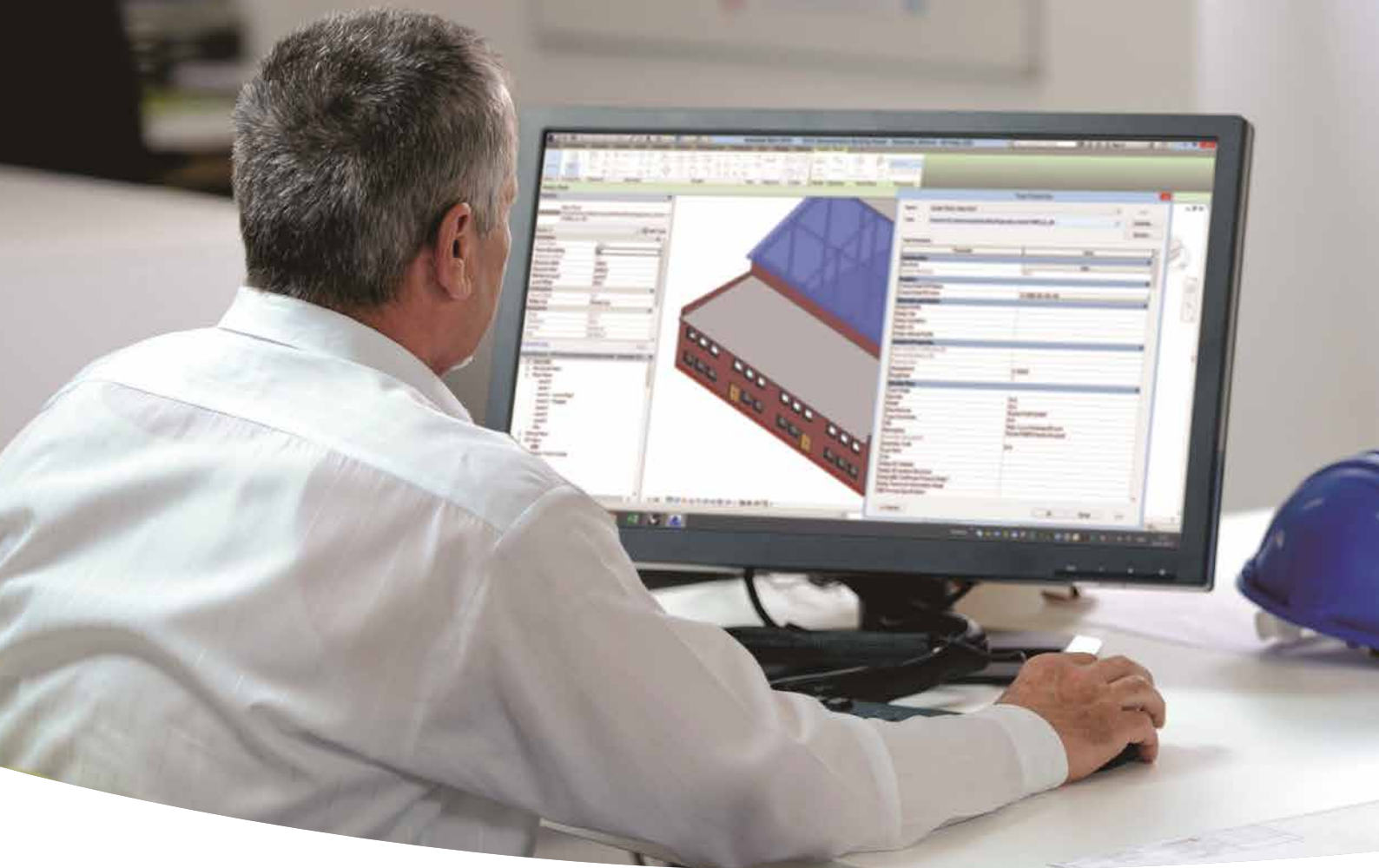
Our Celsius® design app, developed in partnership with the SCI, allows engineers to simply search the full range of Celsius® hollow sections based on design criteria for either axial or bending resistance. This app is available for both Apple and Android devices and can be downloaded from your app store or by scanning the QR codes.



Apple



Android



One of the key areas where our experience can assist engineers is in the design of joints when using hollow sections. We publish a 72-page guide, "Design of welded joints" which is the definitive guide to creating joints for hollow sections. To complement this guidance, we can provide bespoke software to help in the design of joints and for the most complex issues, our engineers themselves can provide further guidance.

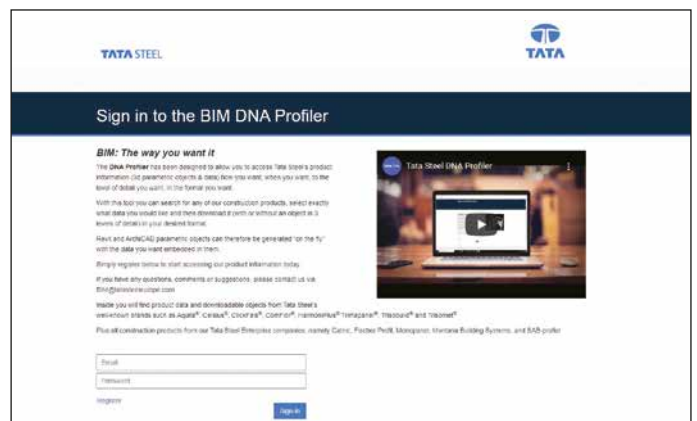
Over the years, we have pioneered the use of concrete-filled tubular steel columns for improved fire resistance in structures. To assist in this, we have developed a bespoke software package, used globally, to optimize the design of concrete filled columns. This is available free of charge from our Customer Technical Services team.

E: technicalmarketing@tatasteel.com

Increasingly, construction is being digitalized, enabling rapid integration and transfer of specific construction product data. All Tata Steel products used in construction, including the full Celsius® range of structural hollow sections, are accompanied by BIM models in a multi-configurable format through the Tata Steel BIM DNA Profiler. So Celsius® can integrate seamlessly within the BIM model of your next construction project.



A PDF of the guide can be downloaded by clicking [here](#).



Register to access the BIM DNA Profiler by clicking [here](#).

AVAILABILITY OF CELSIUS®

Celsius® is the leading brand of hot finished hollow section to EN 10210 and is widely available through the most extensive network of supply chain partners.

All grades of Celsius® are available across a wide size range as indicated in the tables on the following pages. Many intermediate sizes not shown here can also be available on special request. Minimum order quantities may apply to certain sizes and requirements.

All grades of Celsius® are available with internal weld bead trimmed where specified. Celsius® is offered as standard in lengths of 7.5m, 10.0m, 12.0m and 14.5m, but other lengths are also available, subject to minimum quantities, from 6.0m to 14.5m for sizes up to 193.7mm (CHS) 100/100mm (SHS) or 120/80mm (RHS) and up to 15.3m for all other sizes with lengths available in increments of 100mm.

For further information please contact your Tata Steel representative for details or our technical team on T: +44 (0) 1536 404561
E: technicalmarketing@tatasteel.com



Celsius® hot finished hollow sections (EN 10210 S355NH and weathering grade)

Circular hollow sections (CHS)

mm	3.2	3.6	4.0	5.0	6.3	8.0	10.0	12.5	14.2	16.0	17.5
42.4	3.09	3.44	3.79	4.61							
48.3	3.56	3.97	4.37	5.34	6.53						
60.3	4.51	5.03	5.55	6.82	8.39	10.30					
76.1	5.75	6.44	7.11	8.77	10.8	13.4					
88.9	6.76	7.57	8.38	10.3	12.8	16.0	19.5				
114.3		9.83	10.9	13.5	16.8	21.0	25.7	31.4**			
139.7		12.1	13.4	16.6	20.7	26.0	32.0**	39.2**			
168.3				20.1	25.2	31.6	39.0	48.0			
193.7				23.2	29.1	36.6	45.3	55.9	62.9	70.1	
219.1				26.4	33.1	41.6	51.6	63.7	71.8	80.1	
244.5				29.5	37.0	46.7	57.8	71.5	80.6	90.2	
273.0				33.0	41.4	52.3	64.9	80.3	90.6	101	110
323.9				39.3	49.3	62.3	77.4	96.0	108	121	132
355.6					54.3	68.6	85.2	106	120	134	146
406.4					62.2**	78.6**	97.8	121	137	154	168
457.0					70.0**	88.6**	110	137	155	174	190
508.0					77.9**	98.6**	123	153	173	194	212

Square hollow sections (SHS)

mm	3.2	3.6	4.0	5.0	6.3	8.0	10.0	12.5	14.2	16.0	17.5
40/40	3.61	4.01	4.39	5.28	6.33						
50/50	4.62	5.14	5.64	6.85	8.31	10.0					
60/60	5.62	6.27	6.90	8.42	10.3	12.5					
70/70	6.63	7.40	8.15	9.99	12.3	15.0	18.0				
80/80	7.63	8.53	9.41	11.6	14.2	17.5	21.1				
90/90		9.66	10.7	13.1	16.2	20.1	24.3	29.1**			
100/100		10.8	11.9	14.7	18.2	22.6	27.4	33.0**			
120/120			14.4	17.8	22.2	27.6	33.7	40.9			
140/140				21.0	26.1	32.6	40.0	48.7	54.4	60.1	
150/150			18.2	22.6	28.1	35.1	43.1	52.7	58.9	65.2	
160/160				24.1	30.1	37.6	46.3	56.6	63.3	70.2	
180/180				27.3**	34.0	42.7	52.5	64.4	72.2	80.2	
200/200				30.4	38.0	47.7	58.8	72.3	81.1	80.3	97.7
220/220						52.7	65.1	80.1	90.1	100	109
250/250				38.3	47.9	60.3	74.5	91.9	103	115	125
260/260					49.9*	62.8*	77.7	95.8	108	120	131
300/300					57.8	82.8	90.2	112	126	141	153
350/350						85.4	106	131	148	166	180
400/400						97.9	122	151	170	191	208

* Corner radius < 3T

** S355J2H

For availability of other sizes, please contact us.

Figures in tables give mass of sections in kg/m.

Rectangular hollow sections (RHS)

mm	3.2	3.6	4.0	5.0	6.3	8.0	10.0	12.5	14.2	16.0	17.5
50/30	3.61	4.01	4.39	5.28	6.33						
60/40	4.62	5.14	5.64	6.85	8.31	10.0					
80/40	5.62	6.27	6.90	8.42	10.3	12.5					
90/50	6.63	7.40	8.15	9.99	12.3	15.0	18.0				
100/50	7.13	7.96	8.78	10.8	13.3	16.3	19.6				
100/60	7.63	8.53	9.41	11.6	14.2	17.5	21.1				
120/60		9.66	10.7	13.1	16.2	20.1	24.3				
120/80		10.8	11.9	14.7	18.2	22.6	27.4				
150/100			15.1	18.6	23.1	28.9	35.3	42.8			
160/80			14.4	17.8	22.2	27.6	33.7	40.9			
180/100				21.0	26.1	32.6	40.0	48.7			
200/100			18.2	22.6	28.1	35.1	43.1	52.7	58.9	65.2	
200/120				24.1*	30.1*	37.6	46.3	56.6	63.3	70.2	
200/150				26.5	33.0	41.4	51.0	62.5	70.0	77.7	
220/120				25.7**	32.0**	40.2	49.4	60.5	67.8	75.2	
250/100				26.5	33.0	41.4	51.0	62.5	70.0	77.7	
250/150				30.4	38.0	47.7	58.8	72.3	81.1	90.3	97.7
260/140				30.4	38.0	47.7	58.8	72.3	81.1	90.3	97.7
260/180						52.7	65.1	80.1	90.1	100.0	109.0
300/100				30.4	38.0	47.7	58.8	72.3	81.1	90.3	97.7
300/150						54.0*	66.7*	82.1*	92.3*	103.0*	111*
300/200				38.3	47.9	60.3	74.5	91.9	103	115	125
300/250					57.8	72.8	90.2	112.0	126	141	139
350/150				38.3	47.9	60.3	74.5	91.9	103	115	125
350/250					57.8	72.8	90.2	112	126	141	153
400/120					49.9*	62.8*	77.7*	95.8*	108*	120*	131*
400/200					57.8	72.8	90.2	112	126	141	153
400/300						85.4	106	131	148	166	180
450/250						85.4	106	131	148	166	180
500/200						85.4	106	131	148	166	180
500/300						97.9	122	151	170	191	208

Elliptical hollow sections (EHS)

mm	8	10	12.5	16
300/150	42.8	53.0	65.5	82.5
400/200	57.6	71.5	88.6	112
500/250		90.0	112	142

Celsius® hot finished hollow sections (EN 10210 S420NH)

Circular hollow sections (CHS)

mm	3.2	3.6	4.0	5.0	6.3	8.0	10.0	12.5	14.2	16.0
42.4	3.09	3.44	3.79	4.61						
48.3	3.56	3.97	4.37	5.34	6.53					
60.3	4.51	5.03	5.55	6.82	8.39	10.30				
76.1	5.75	6.44	7.11	8.77	10.8	13.4				
88.9	6.76	7.57	8.38	10.3	12.8	16.0				
114.3		9.83	10.9	13.5	16.8	21.0				
139.7		12.1	13.4	16.6	20.7	26.0				
168.3				20.1	25.2	31.6	39.0			
193.7				23.2	29.1	36.6	45.3			
219.1				26.4	33.1	41.6	51.6	63.7	71.8	80.1
244.5				29.5	37.0	46.7	57.8	71.5	80.6	90.2
273.0				33.0	41.4	52.3	64.9	80.3	90.6	101
323.9				39.3	49.3	62.3	77.4	96.0	108	121
355.6					54.3	68.6	85.2	106	120	134
406.4							97.8	121	137	154
457.0							110	137	155	174
508.0							123	153	173	194

Square hollow sections (SHS)

mm	3.2	3.6	4.0	5.0	6.3	8.0	10.0	12.5	14.2	16.0
40/40	3.61	4.01	4.39	5.28	6.33					
50/50	4.62	5.14	5.64	6.85	8.31	10.0				
60/60	5.62	6.27	6.90	8.42	10.3	12.5				
70/70	6.63	7.40	8.15	9.99	12.3	15.0				
80/80	7.63	8.53	9.41	11.6	14.2	17.5				
90/90		9.66	10.7	13.1	16.2	20.1				
100/100		10.8	11.9	14.7	18.2	22.6				
120/120			14.4	17.8	22.2	27.6	33.7			
140/140				21.0	26.1	32.6	40.0			
150/150				22.6	28.1	35.1	43.1	52.7	58.9	65.2
160/160				24.1	30.1	37.6	46.3	56.6	63.3	70.2
180/180					34.0	42.7	52.5	64.4	72.2	80.2
200/200				30.4	38.0	47.7	58.8	72.3	81.1	80.3
220/220						52.7	65.1	80.1	90.1	100
250/250				38.3	47.9	60.3	74.5	91.9	103	115
260/260					49.9	62.8	77.7	95.8	108	120
300/300					57.8	82.8	90.2	112	126	141
350/350						85.4	106	131	148	166
400/400						97.9	122	151	170	191

* Corner radius < 3T

For availability of other sizes, please contact us.
 Figures in tables give mass of sections in kg/m.

Rectangular hollow sections (RHS)

mm	3.2	3.6	4.0	5.0	6.3	8.0	10.0	12.5	14.2	16.0
50/30	3.61	4.01	4.39	5.28						
60/40	4.62	5.14	5.64	6.85	8.31	10.0				
80/40	5.62	6.27	6.90	8.42	10.3	12.5				
90/50	6.63	7.40	8.15	9.99	12.3	15.0				
100/50	7.13	7.96	8.78	10.8	13.3	16.3				
100/60	7.63	8.53	9.41	11.6	14.2	17.5				
120/60		9.66	10.7	13.1	16.2	20.1				
120/80		10.8	11.9	14.7	18.2	22.6				
150/100			15.1	18.6	23.1	28.9	35.3			
160/80			14.4	17.8	22.2	27.6	33.7			
180/100				21.0	26.1	32.6	40.0			
200/100			18.2	22.6	28.1	35.1	43.1	52.7	58.9	65.2
200/120				24.1	30.1	37.6	46.3	56.6	63.3	70.2
200/150				26.5	33.0	41.4	51.0	62.5	70.0	77.7
220/120						40.2	49.4	60.5	67.8	75.2
250/100				26.5	33.0	41.4	51.0	62.5	70.0	77.7
250/150				30.4	38.0	47.7	58.8	72.3	81.1	90.3
260/140				30.4	38.0	47.7	58.8	72.3	81.1	90.3
260/180						52.7	65.1	80.1	90.1	100.0
300/100				30.4	38.0	47.7	58.8	72.3	81.1	90.3
300/200				38.3	47.9	60.3	74.5	91.9	103	115
300/250					57.8	72.8	90.2	112.0	126	141
350/150				38.3	47.9	60.3	74.5	91.9	103	115
350/250					57.8	72.8	90.2	112	126	141
400/200					57.8	72.8	90.2	112	126	141
400/300							106	131	148	166
450/250							106	131	148	166
500/200							106	131	148	166
500/300							122	151	170	191

Celsius® hot finished hollow sections (EN 10210 S460NH)

Circular hollow sections (CHS)

mm	5.0	6.3	8.0	10.0	12.5	14.2	16.0
219.1	26.4	33.1	41.6	51.6	63.7	71.8	80.1
244.5	29.5	37.0	46.7	57.8	71.5	80.6	90.2
273.0	33.0	41.4	52.3	64.9	80.3	90.6	101
323.9	39.3	49.3	62.3	77.4	96.0	108	121
355.6		54.3	68.6	85.2	106	120	134
406.4				97.8	121	137	154
457.0				110	137	155	174
508.0				123	153	173	194

Square hollow sections (SHS)

mm	3.2	3.6	4.0	5.0	6.3	8.0	10.0	12.5	14.2	16.0
40/40	3.61	4.01	4.39	5.28						
50/50	4.62	5.14	5.64	6.85						
60/60	5.62	6.27	6.90	8.42						
70/70	6.63	7.40	8.15	10.0						
80/80		8.53	9.41	11.6						
90/90		9.66	10.7	13.1						
100/100		10.8	11.9	14.7						
150/150							43.1	52.7	58.9	65.2
160/160				24.1	30.1	37.6	46.3	56.6	63.3	70.2
180/180					34.0	42.7	52.5	64.4	72.2	80.2
200/200				30.4	38.0	47.7	58.8	72.3	81.1	80.3
220/220					52.7	65.1	80.1	90.1	100	
250/250				38.3	47.9	60.3	74.5	91.9	103	115
260/260						77.7	95.8	108	120	
300/300					57.8	82.8	90.2	112	126	141
350/350						85.4	106	131	148	166
400/400						97.9	122	151	170	191

For availability of other sizes, please contact us.

Figures in tables give mass of sections in kg/m.

Rectangular hollow sections (RHS)

mm	3.2	3.6	4.0	5.0	6.3	8.0	10.0	12.5	14.2	16.0
50/30	3.61	4.01	4.39	5.28						
60/40	4.62	5.14	5.64	6.85						
80/40	5.62	6.27	6.90	8.42						
90/50	6.63	7.40	8.15	10.0						
100/50	7.13	7.96	8.78	10.8						
100/60	7.63	8.53	9.41	11.6						
120/60		9.66	10.7	13.1						
120/80		10.8	11.9	14.7						
200/100							43.1	52.7	58.9	65.2
200/120				24.1	30.1	37.6	46.3	56.6	63.3	70.2
200/150				26.5	33.0	41.4	51.0	62.5	70.0	77.7
220/120						40.2	49.4	60.5	67.8	75.2
250/100				26.5	33.0	41.4	51.0	62.5	70.0	77.7
250/150				30.4	38.0	47.7	58.8	72.3	81.1	90.3
260/140				30.4	38.0	47.7	58.8	72.3	81.1	90.3
260/180						52.7	65.1	80.1	90.1	100.0
300/100				30.4	38.0	47.7	58.8	72.3	81.1	90.3
300/200				38.3	47.9	60.3	74.5	91.9	103	115
300/250					57.8	72.8	90.2	112.0	126	141
350/150				38.3	47.9	60.3	74.5	91.9	103	115
350/250					57.8	72.8	90.2	112	126	141
400/200					57.8	72.8	90.2	112	126	141
400/300						85.4	106	131	148	166
450/250						85.4	106	131	148	166
500/200						85.4	106	131	148	166
500/300						97.9	122	151	170	191

SUSTAINABILITY

Tata Steel is building a leading European steel business which is sustainable in every sense. Every day our 20,000+ employees make a difference, creating added value in ever-closer partnerships with customers while enjoying working, innovating, sharing and learning together.

We aim to play a positive role in shaping a sustainable society for generations to come. In order to achieve this, we are focusing on three main pillars: to be leading in CO₂ neutral steel production, being a responsible steel supplier and enabling our customers to become more sustainable.

Transparency & responsibility

At Tata Steel, transparency and responsibility are more than just words – they are a way of life.

We are the first steel company to become independently accredited for the production of Environmental Product Declarations (EPDs) and we can provide EPDs for our range of tube products, including a specific EPD for our Celsius® range. We are a member of ResponsibleSteel™ and have BES 6001 responsible sourcing certification for all of our main manufacturing sites in both the UK and the Netherlands.



Celsius® – enabling sustainable design

Whilst we take responsibility for our own industrial operations, at Tata Steel we recognize that the biggest impact we can have is in enabling our customers to become more sustainable. Our Celsius® range of true hot finished hollow sections is central to this strategy.

Celsius® can help greatly in making more efficient, lower-impact structures.

- For building structures designed to Eurocodes, hot-finished Celsius® hollow sections use the buckling curve a, while cold formed sections are required to use buckling curve c. This gives Celsius® up to 39% more capacity than an equivalent cold-formed hollow section, so you can use thinner, smaller sections and minimize steel usage.
- Our advanced Celsius® S460NH grade means that in most cases you can down-gauge your structures, saving even more weight and reducing your environmental footprint even further.
- Celsius® weathering grade forms a natural protective patina which makes structures last much longer without protection and, where structures would normally be galvanized, it can eliminate the need for the zinc coating.



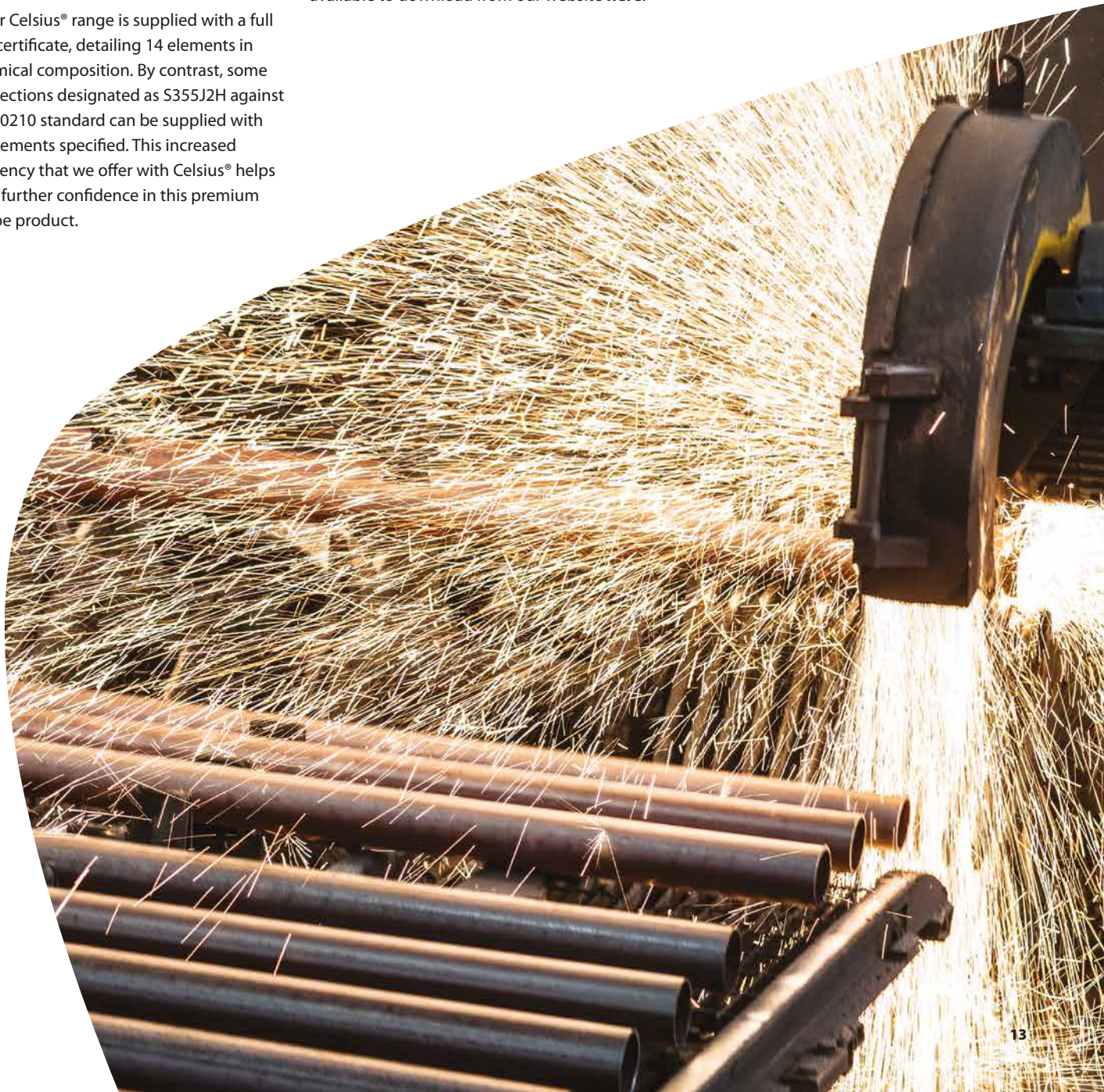
QUALITY & TRACEABILITY

All Celsius® hollow sections are manufactured from steel made at our own primary steel-making facility at Port Talbot, Wales, UK. This integrated supply chain means that we can be 100% confident of the high level of quality right from the production of liquid iron through to the finished tube itself.

Every step of the process is carried out under the highest quality standards to give you peace-of-mind and ensure the highest level of consistency in quality.

All of our Celsius® range is supplied with a full 3.1 test certificate, detailing 14 elements in the chemical composition. By contrast, some hollow sections designated as S355J2H against the EN 10210 standard can be supplied with only 5 elements specified. This increased transparency that we offer with Celsius® helps to bring further confidence in this premium steel tube product.

All of our Celsius® range of fully normalized true hot finished hollow sections are covered by Declarations of Performance (DoP's) to enable CE marking of structures. DoP's are available to download from our website [here](#).



TECHNICAL INFORMATION

Tolerances

Dimensional tolerances are to EN 10210: Part 2 except for corner radius which is max 2T (standard states max 3T). In many cases, tighter tolerances can be offered on a specific basis – please contact your Tata Steel representative for details.

Inspection and Testing

All Celsius® hollow sections are subject to specific inspection and testing and are supplied with an inspection certificate type 3.1 to EN 10204. All Celsius® sections undergo 100% weld line NDT inspection.

Designation

Celsius® hollow sections are designated by their product name, nominal outside dimensions and thickness in millimetres.

CE Marking

All Celsius® hollow sections are fully CE marked with DoPs available to download from www.tatasteelconstruction.com

Mechanical properties

	Yield strength R _{eH} min N/mm ²		Tensile strength R _m N/mm ²	Elongation % min L ₀ = 5.65 √S ₀ specimen	Impact strength 10mm x 10mm		Carbon equivalent (CEV) max
	T ≤ 16mm	T > 16mm	3mm < T ≤ 100mm	T	°C	J	
S355NH*	355	345	470-630	22	-20	40	0.43
S355NLH	355	345	470-630	22	-50	27	0.43
S420NH	420	400	520-680	19	-20	40	0.45
S460NH	460	440	540-720	17	-20	40	0.45
Weathering grade	355	345	470-630	22	-20	40	0.44

Chemical composition % by mass

	C max	Si max	Mn	P max	S max	Nb max	V max	Al total min	Ti max	Cr max	Ni max	Mo max	Cu max	N Max
S355NH*	0.20	0.50	0.90-1.65	0.035	0.030	0.050	0.12	0.020	0.03	0.30	0.50	0.10	0.35	0.020
S355NLH	0.18	0.50	0.90-1.65	0.030	0.025	0.050	0.12	0.020	0.03	0.30	0.50	0.10	0.35	0.020
S420NH	0.22	0.60	1.00-1.70	0.035	0.030	0.050	0.20	0.020	0.03	0.30	0.80	0.10	0.70	0.025
S460NH	0.22	0.60	1.00-1.70	0.035	0.030	0.050	0.20	0.020	0.03	0.30	0.80	0.10	0.70	0.025
Weathering grade	0.16	0.50	0.50-1.50	0.025	0.008	0.050	0.10	0.020	0.03	0.40 min 0.65 max	0.40	0.10	0.25 min 0.40 max	0.012

* Celsius® S355NH also fully complies with all requirements of EN 10210 S355J2H

Dimensional tolerances EN10210: Part 2

	Circular/Ellipticals	Square/Rectangular
Outside dimension (D B and H)	Circular ±1% with a min of ±0.5mm and maximum of ±10mm Ellipticals ±1% with a min of ±0.5mm (The permitted tolerance is twice the value for H<250)	±1% with a min of ±0.5mm
Thickness (T)	-10% (Note: Positive deviation limited by mass tolerance)	-10% (Note: Positive deviation limited by mass tolerance)
Squareness of side	-	90 degrees ±1 degree
External corner profile	-	2T max at each corner (EN10210 has 3T max)
Concavity/convexity (x)	-	±1% of the side, measured independently of the tolerance on the outside dimension
Twist (V)	Ellipticals: 2mm plus 0.5mm/m max (The permitted tolerance is twice the value for H<250)	2mm plus 0.5mm/m max
Mass (M)	±6% on individual lengths	±6% on individual lengths
Straightness	Maximum 0.2% of the total length & 3mm over every 1m length Ellipticals: The permitted tolerance is twice the value for H<250	Maximum 0.2% of the total length & 3mm over every 1m length
Length	±150mm/-0mm	±150mm/-0mm
Out-of-roundness (O)	Circular 2% for hollow sections having a diameter to thickness ratio not exceeding 100	-



SUPPORT

We want you to get the best from Celsius® hollow sections. Our application engineers and trained sales staff are always happy to answer your questions on steel selection and application.

Our engineers are available to assist you with the application of high strength grades S420NH and S460NH, including their use in construction and in light-weighting of machinery, while we can also provide guidance on the appropriate use of Weathering grade Celsius® hollow sections for long-life, low-maintenance and cost-effective structures.

We can also provide expert advice on welded joints and the use of concrete-filled columns, including software which can help in their design.

T: +44 (0) 1536 404561

E: technicalmarketing@tatasteeleurope.com

www.tatasteeleurope.com

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Copyright 2022
Tata Steel Europe Limited

Tata Steel

Weldon Road

Corby

Northants

NN17 5UA

United Kingdom

T: +44 (0) 1536 404561

E: technicalmarketing@tatasteeleurope.com

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