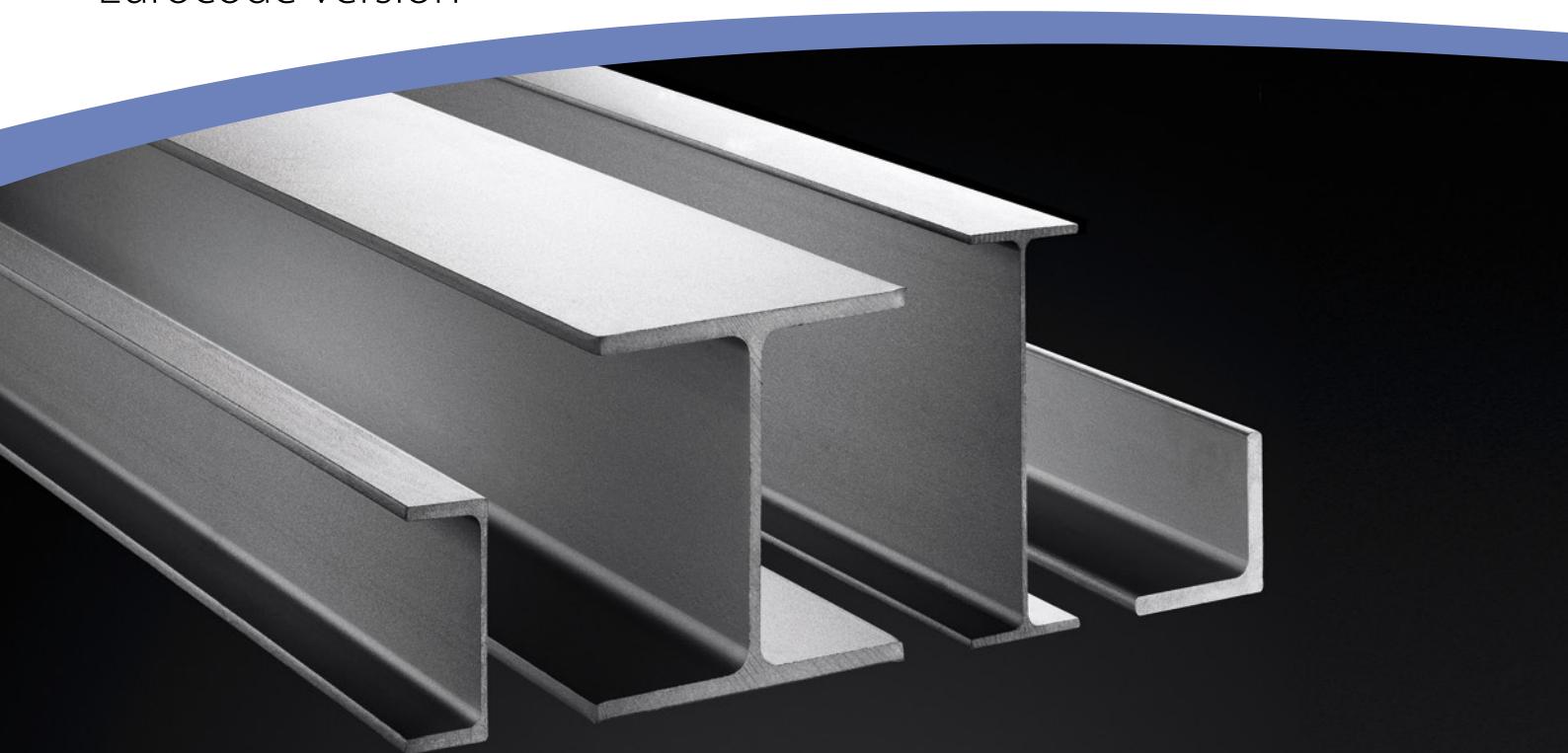


Advance® sections

CE marked structural sections

Eurocode version



'The Blue Book'

A copy of the full interactive blue book for Advance® sections is available for download from www.tatasteelconstruction.com

This essential tool for steel designers presents section properties and member capacities in tabular form to BS 5950-1 and BS EN 1993-1-1 and includes:

- Dimensions and properties,
- Effective properties (Compression, Bending, Axial and Bending),
- Reduced plastic modulus,
- Detailing and fire parameters,
- Axial compression,
- Bending moment,
- Combined axial and bending,
- Web bearing and buckling.

The screenshot shows the Tata Steel Advance® UKB software interface. The top navigation bar includes File, View, Help, and a search icon. The left sidebar contains a tree view of sections: Advance® Sections (with sub-options like Advance 355, Advance 275, Tolerances, Section properties, Dimensions and properties, Advance UK Beams, Advance UK Columns, Advance UK Bearing Piles, Advance UK Parallel Flange Channels, Advance UK Angles - Equal, Advance UK Angles - Unequal, ASB, Silmor® fabricated Beams, UKTees from Advance UK Beams, UKTees from Advance UK Columns, Detailing and fire parameters, Effective section properties, Axial compression, Axial tension, Bending moment, Web bearing and buckling, Axial force and bending, Tubular Products, Bolts & Welds, and Related tables). A 'UK EUROCODES' logo is present. The main area displays 'SECTION PROPERTIES' for 'UNIVERSAL BEAMS' under 'Advance® UKB'. It includes a diagram of a universal beam with dimensions labeled: b, h, t_w, t_f, r, d, c_u/t_w, c_u/t_f, N, C, and n. Two tables are shown: 'Table 1.1.1: BS EN 1993-1-1: 2005 BS 4-1: 2005' and 'Table 2.1.1: BS EN 1993-1-1: 2005 BS 4-1: 2005'. The table headers include Section Designation, Mass per Metre, Depth of Section, Width of Section, Thickness, Root Radius, Depth between Flanges, Ratios for Local Buckling, Dimensions for Detailing, Surface Area, and Section Designation, Second Moment of Area, Radius of Gyration, and Elastic Modulus. The bottom status bar includes 'BS 5950-1:2000 / BS 4-1: 2005', 'Version 4.03.043, October 2011', and 'Copyright © 2006-2013, Tata Steel Europe Limited'.

If you have not already done so, you will need to register with www.tatasteelconstruction.com to download the software.

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Tata Steel

Tata Steel is a top ten global steel maker with an annual crude steel capacity of over 28 million tonnes per annum (mtpa) and the world's second most geographically diversified steel producer with operations in 26 countries and a commercial presence in over 50 countries. In addition to manufacturing, processing and distributing steel products, the company provides related services in design, technology and consultancy.

Tata Steel was founded in India in 1907 and has always believed that the principle of mutual benefit - between countries, corporations, customers, employees and communities - is the most effective route to profitable and sustainable growth. Since 2004 the Company has expanded globally, and its larger production facilities include those in India, the UK, the Netherlands, Thailand, Singapore, China and Australia. Operating companies within the Group include Tata Steel Limited (India), Tata Steel Europe Limited (formerly Corus), NatSteel (Singapore), and Tata Steel Thailand (formerly Millennium Steel).

The Tata Steel Group, with a turnover of US\$ 26.13 billion in FY '11-12, has over 80,000 employees across five continents and is a Fortune 500 company. The Annual Report for 2011-12 can be downloaded from <http://www.tatasteel.com/investors/performance/annual-report.asp>

Tata Steel is part of the Tata Group, India's largest industrial conglomerate. Both Tata and Tata Steel have a long history of charitable donations and social responsibility, with Tata spending approximately 4% of the Company's profit after tax on corporate social responsibility initiatives.

Tata Steel endeavours to improve the quality of life in the communities in which the Company operates. Tata Steel's charitable projects have touched the lives of over 800,000 people in India.

Tata Steel's vision is to be the world's steel industry benchmark through the excellence of its people, its innovative approach and overall conduct. Underpinning this vision is a performance culture committed to aspiration targets, safety and social responsibility, continuous improvement, openness and transparency.

Our latest Corporate Citizenship report and the Company's Responsible Procurement Policy can be downloaded from <http://www.tatasteel.com/corporate-citizenship/index.asp> or you can contact us at the address on the rear cover for a copy.

Advance® section range

Our Advance® section range has been developed to reflect current structural design practice and make it easier to specify Tata Steel CE marked structural sections compliant with the EU Directive on Construction Products.

What's new?

Since the *Advance* range of sections was introduced in 2007, designers have gradually moved away from lower steel grades to take advantage of the reduced weight of structural framing materials afforded by the use of higher grades of steel. Our rolling programme reflects that migration and we recommend that you contact your steel supplier to check availability should you intend to design in S275 grade steel. Reference should also be made to our price list as it illustrates the wide range of options, in addition to grade, available to customers.

Why specify *Advance*® sections from Tata Steel?

As well as simple compliance with CPD and an enhanced range of sections to help maximise design effectiveness, specifying UK *Advance* sections from Tata Steel brings a number of other benefits.

Manufacturing excellence

Tata Steel was the first steelmaker in the world to gain approval to CE mark its structural sections and plates to meet the CPD requirements. *Advance* sections from Tata Steel were also the first in the world to achieve approval for the tough Lloyds Register materials quality scheme. Images of the Certificate of Conformity, the Certificate of Approval issued by Lloyds Register Verification confirming that our Quality Management System meets the requirements of ISO 9001 and the Certificate confirming that our manufacturing processes meet the requirements of ISO 14001 can be seen on page 6.

Significant investment in the manufacturing technology at our *Advance* section rolling mills at Scunthorpe and Teesside puts them amongst the most advanced in the world. Where the application needs it, we can produce structural sections to the most demanding of specifications, well beyond the minimum requirements set by national and international standards for dimensional tolerance and material performance. Subject to volume requirements our tight manufacturing control enables us to produce bespoke sections where the depth and flange/web thickness of a section can be tailored to the particular needs of the project. Please contact us if you want to discuss particular product requirements beyond our standard range.

Service leadership

Our *Advance* sections rolling programme offers unrivalled availability, ensuring that the products you specify are available when you need them. Our world-class automated distribution warehouse at Scunthorpe and the new off-line processing centre at Teesside will ensure that products are dispatched

on time and in the best possible condition. Free technical advisory services are available to assist with all aspects of the use of our products from initial material selection through to structural design and associated issues including fire engineering, durability, acoustic and vibration performance.

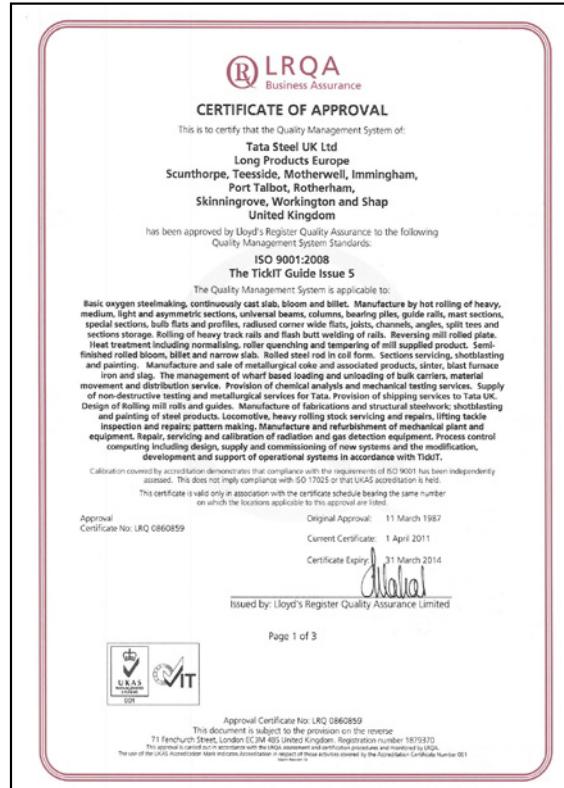
Commitment to technical development

We are committed to improving the effective application of steel in construction. Long-term investment in developments such as plastic design, fire engineering and composite construction has helped position structural steel as the preferred choice for the structural frame of industrial and commercial buildings in the UK. Research work on acoustics and vibration performance is now also showing steel to be an effective choice in the health and residential markets. Significant work on steel's contribution to sustainable development is ongoing along with the production of application guidance to help in the introduction of harmonised European design codes and ensure that construction clients, customers and designers are able to continue to make the most effective use of steel.

Sustainable performance

Steel construction products have many of the qualities that help to achieve the balance between the environmental, economic and social performance that is so important to sustainable development. Tata Steel takes its corporate responsibilities for health, safety and the environment very seriously. We also recognise that our operations influence the societies we operate in and take an active role in a broad range of community initiatives.

Certification of our processes



Specifying Advance® sections to the Eurocode

The simplified naming protocol adopted for Advance® sections covering both section designation and material specification makes it easier to specify steel sections which are fully compliant with CE marking.

Steel specification

Steel sections used in the UK should comply with EN10025. Non alloy structural steels are manufactured in accordance with Part 2 and thermo-mechanically rolled weldable fine grain structural steels in accordance with Part 4.

The tables here show the typical UK grades and properties for structural sections to EN10025:Parts 2 and 4 and how these relate to the simplified material specification for Advance sections from Tata Steel.

Advance® sections		EN10025:Part2			
Grade	Grade	Yield (R_{eH}^a) min	Tensile R_m^a	Charpy v-notch longitudinal Temp(°C)	Energy (J)
Strength at t=16mm (N/mm ²)					
Advance275JR	S275JR	275	410/560	20	27
Advance275J0	S275J0	275	410/560	0	27
Advance275J2	S275J2	275	410/560	-20	27
Advance355JR	S355JR	355	470/630	20	27
Advance355J0	S355J0	355	470/630	0	27
Advance355J2	S355J2	355	470/630	-20	27
Advance355K2	S355K2	355	470/630	-20	40

Advance® sections		EN10025: Part4			
Grade	Grade	Yield (R_{eH}^a) min	Tensile R_m^a	Charpy v-notch longitudinal Temp(°C)	Energy (J)
Strength at t=16mm (N/mm ²)					
Advance355M	S355M	355	470/630	-20	40
Advance355ML	S355ML	355	470/630	-50	27
Advance420M	S420M	420	520/680	-20	40
Advance420ML	S420ML	420	520/680	-50	27
Advance460M	S460M	460	540/720	-20	40
Advance460ML	S460ML	460	540/720	-50	27

a Values apply parallel to the rolling direction

It should be noted that Advance sections can be specified in JR, J0 and J2 sub-grades but for situations where greater toughness is required, sub-grade K2 is available in S355 grade steel. In addition, M and ML specifications are available for heavily loaded parts of welded structures such as, bridges, flood gates, storage tanks, water supply tanks, etc., for service at ambient and low temperatures.

It is vitally important that structural steelwork is specified correctly by the design engineer. The steel specification must cover the strength grade and the steel sub-grade. Specifying the correct steel sub-grade is important to ensure that brittle fracture is avoided.

Sub-grade selection

Selection of steel sub-grade to the Eurocodes is covered by EN 1993-1-10, *Eurocode 3: Design of steel structures. Material toughness and through-thickness properties – BSI*. The design rules in EN 1993-1-10 aim to verify that the thickness of a steel element does not exceed a maximum permissible thickness, appropriate to a steel grade and toughness, for a design reference temperature and design stress level. Brittle fracture is avoided by specifying an appropriate sub-grade and is affected by several factors that include material temperature, the state of stress, material thickness, local fabrication details, cold forming and strain rates higher than those assumed for static design. In EN 1993-1-10,

all of these factors are brought together in a ‘reference temperature’ which is a function of the ambient air temperature with adjustments to allow for the factors stated above.

The UK National Annex (UK NA) further clarifies the ‘reference temperature’ and makes reference to PD 6695-1-10, *Recommendations for the design of structures to BS EN 1993-1-10 – BSI*. PD 6695-1-10 is non-contradictory complementary information (NCI) that simplifies the process of sub-grade selection. The tables within PD 6695-1-10 are aligned with UK practice of ambient air temperatures for internal steelwork (-5°C) and external steelwork (-15°C) and allow for reasonable

assumptions to account for any adjustments. Maximum element thicknesses can be readily derived by consideration of the steelwork detail and the tensile stress levels.

The Steel Construction Institute has produced Technical Report ED 007, *Selection of sub-grade in accordance with the Eurocodes*, which offers helpful guidance and explanation of EN 1993-1-10, the UK NA and PD 6695-1-10.

ED007 illustrates typical steelwork details found in buildings and interprets the detail as Plain, Bolted, Welded (moderate, severe or very severe) in accordance with PD 6695-1-10.

Advance® sections

Table A

Detail type		Tensile stress level, $\sigma_{Ed}/f_y(t)$ appropriate to stress level and detail type									
Description	ΔT_{RD}	Comb. 1	Comb. 2	Comb. 3	Comb. 4	Comb. 5	Comb. 6	Comb. 7	Comb. 8	Comb. 9	Comb. 10
Plain Material	+30°C	≤ 0	0.15	0.3	≥ 0.5						
Bolted	+20°C		≤ 0	0.15	0.3	≥ 0.5					
Welded: moderate	0°C				≤ 0	0.15	0.3	≥ 0.5			
Welded: severe	-20°C						≤ 0	0.15	0.3	≥ 0.5	
Welded: v severe	-30°C							≤ 0	0.15	0.3	≥ 0.5

Table A and B, allow maximum element thicknesses for S355 grade material based on PD 6695-1-10 for internal (-5°C) and external (-15°C) ambient air temperatures to be calculated. The tables allow adjustments on detail type (ΔT_{RD}) and tensile stress level but are

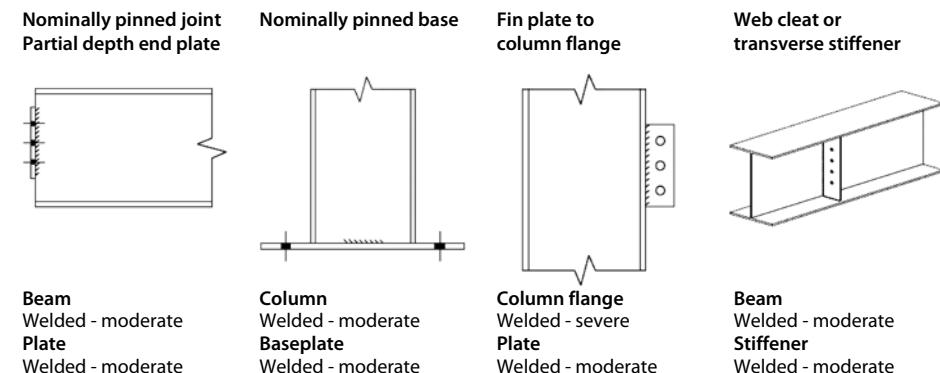
based on the condition that any gross stress concentration factor is less than unity and that adjustments for radiation loss, impact loading and cold forming = 0. See EN 1993-1-10, the UK NA, PD 6695-1-10 and ED 007 for further guidance on appropriate adjustments.

Advance® sections

Table B

Steel grade S355 Sub grade		Maximum thickness (mm) according to combination of stress level and detail type									
		Comb. 1	Comb. 2	Comb. 3	Comb. 4	Comb. 5	Comb. 6	Comb. 7	Comb. 8	Comb. 9	Comb. 10
Internal steelwork	JR	82.5	67.5	55	45	37.5	30	22.5	17.5	15	12.5
	J0	142.5	120	100	82.5	67.5	55	45	37.5	30	22.5
	J2	190	167.5	142.5	120	100	82.5	67.5	55	45	37.5
External steelwork	JR	45	37.5	30	22.5	17.5	15	12.5	10	7.5	5
	J0	120	100	82.5	67.5	55	45	37.5	30	22.5	17.5
	J2	167.5	142.5	120	100	82.5	67.5	55	45	37.5	30

Typical examples of steelwork details found in buildings are listed in Section 4 of ED 007. A few common details are shown opposite for reference which include guidance on the welding severity.



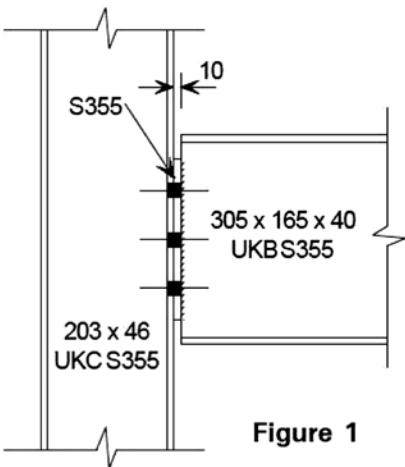


Figure 1

Examples of sub-grade selection.

Consider the connection shown in Figure 1 with a tensile stress level at the connection of 0.3*, and steelwork in an internal environment. From ED 007 the detail type can be assessed for each component part of the connection. From Table A the combination is given using

the detail type and stress level. Subsequently from Table B the maximum thickness for each sub-grade is obtained and compared to each component of the connection to give the appropriate sub-grade. This process is shown in Table C below.

Advance® sections

Table C

Member	Thickness (mm)	Detail type from ED 007	Load combination from Table A with stress level =0.3	Maximum thickness (mm) from Table B for internal steelwork
UKB web	6.0	Welded - moderate	Comb. 6	JR=30>6.0
UKC flange	11.0	Bolted	Comb. 4	JR=45>11.0
End plate	10.0	Welded - moderate	Comb. 6	JR=30>10.0

Note, if the example shown in Figure 1 were to be in an external environment then the maximum thickness for the three elements would reduce significantly (UKB web & End plate = 15mm, UKC flange = 22.5mm), however for this example the sub-grade remains JR.

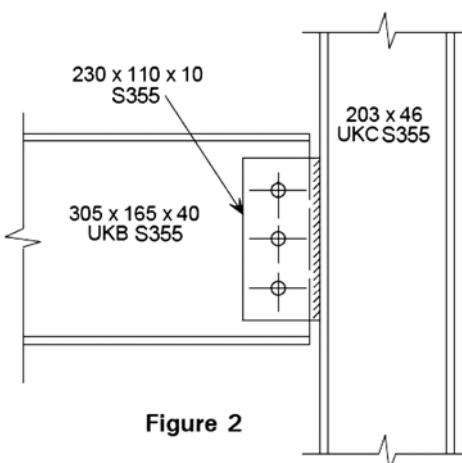


Figure 2

Figure 2 shows a connection with a tensile stress level at the connection of 0.15* and in an external environment. By following the same procedure as outlined in Example 1, Table D can be completed thereby giving the required sub-grade.

Advance® sections

Table D

Member	Thickness (mm)	Detail type from ED 007	Load combination from Table A with stress level =0.15	Maximum thickness (mm) from Table B for external steelwork
UKB web	6.0	Bolted	Comb. 3	JR=30>6.0
UKC flange	11.0	Welded - severe	Comb. 7	JR=12.5>11.0
End plate	10.0	Welded - moderate	Comb. 5	JR=17.5>10.0

Note, if the stress level for the example in Figure 2 were to be 0.3 at the connection, the load combination for the UKC flange would be Comb.8. This reduces the maximum thickness for the UKC flange to 10mm for JR. Therefore a J0 sub-grade would be required on the basis of $J_0 = 30 > 11.0$.

* For simplicity in the above examples the same tensile stress level has been adopted for all elements of the connection. In reality the tensile stress levels is likely to be different in all three elements.

In EN 1993-1-10 brittle fracture is considered to be an accidental load combination. For further guidance on the appropriate calculation of stress levels see ED 007.

Designers should be aware of when stress concentration is likely to be a consideration. Stress concentration will typically occur in buildings with welded connections to unstiffened flanges, around large holes and re-entrant corners. Section 4 of ED 007 indicates when stress concentrations are a consideration for common details and gives guidance of the allowance to be made in deciding the appropriate sub-grade.

CE marking of structural steel products

Components to be permanently incorporated into construction projects must be shown to comply with the EU Directive on Construction Products (CPD 89/106/EEC). The CPD is enforced in the UK through the Construction Products Regulations (CPR).

Compliance with the CPD can be demonstrated in two ways. A product can be CE marked by the manufacturer if it meets a set of Essential Characteristics given in the product's harmonised standard or the relevant authorities can declare that a product complies with the regulations on a case by case basis using information on the product provided by the manufacturer. Although it is generally agreed that the former is the easiest method, CE Marking is not yet mandatory in the UK but will be once the Construction Products Regulations come into force on 1st July 2013 and replace the existing Directive.

Because steel components are "safety critical", CE Marking is not allowed unless the Factory Production Control (FPC) system under which they are produced has been assessed by a suitable Notified body that has been approved to the European Commission. The Tata Steel declaration of conformity and Notified Body Approval Certificates can be viewed on line at http://www.tatasteel-europe.com/en/company/activities/long_products_europe/publications and on Page 6.

Specification of products that are CE marked gives confidence to designers that the materials they are proposing to use are compliant with both the manufacturing standards and the relevant Eurocodes for building and construction – and makes checking easier too.

However, it should not be assumed that compliance with CPD only applies to the as-rolled steel items. The fabrication process introduces changes to the steel elements by cutting, welding and drilling to name but three operations, all of which could affect the performance of the final item. As a result, with effect from 1st July 2013, steelwork subcontractors will also be required to demonstrate that their processes meet the necessary standards by applying a CE mark to certify that the fabrication process complies with BS EN 1090-1. Specification of CE marked components makes certification to BS EN 1090-1 significantly easier.

Consultants and main contractors should also be aware of the implications of CE Marking in respect of structural steelwork. The consultant is responsible for specifying the Execution Class for the structure as a whole - or individual components where appropriate – in accordance with the European fabrication standard BS EN 1090-2. The default is Execution Class 2 and the National Structural Steelwork Specification for Buildings 5th edition (CE Marking version) is based on this execution class.

With effect from the 1st July 2013, the main contractor must ensure that steelwork contractors, and other construction product manufacturers they employ, are certified to produce and CE Mark fabrications within the required Execution Class. After this date it will be illegal to trade fabricated steelwork and related products on the European market without the relevant certification.

Incorrect CE Marking and failure to CE Mark an item are criminal offences and anyone found guilty could face a fine, imprisonment or both. However a greater penalty may result from closure of the perpetrator's business until the proper certification is in place alongside a requirement to recall any non-compliant items already in the market place.

 <p>TATA</p> <p>TATA STEEL UK LIMITED P.O. Box 1, Brigg Road, Scunthorpe, North Lincolnshire, DN16 1BP. Telephone: 01724 404040 Fax: 402353 Telex: 52601</p>		INSPECTION CERTIFICATE	
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What to look for.

The following example is a Tata Steel certificate for structural steel sections which not only provides the chemical analysis and mechanical properties for the material identified in items 4 and 8 but also includes the CE mark to demonstrate that the product complies with CPD. The relevant parts of the certificate are:

1. The name and address of the supplier / manufacturer
2. Identification of the Inspection certificate type (e.g. EN10204, 3.1 or 3.2). This certificate complies with the requirements of EN10204 and is a Type 3.1 - which is a manufacturers test certificate showing actual results linked to the batch of material relevant to the certificate. A Type 3.2 certificate is endorsed by an independent inspection authority and will again show actual results linked to the relevant batch of material. If neither type is identified on the certificate then it is most probable that the certificate is just a Quality Report (Certificate type 2.2) and any information shown concerning properties / chemistry should be treated with care as it is only indicative of typical results from this type of material and does not give actual test results from the batch. It is recommended that the minimum acceptable certificate type for all metallic materials used in structural and pressure vessel applications is a 3.1. BS EN 1090 requires a Type 3.1 for compliance.

3. Date of issue of the certificate.
 4. Details of the specification and the product. This certificate covers UKC 203 x 203 x 46.1 to BS EN 10025 – 2. The steel grade is S355, the sub grade is J0 indicating that the Charpy impact tests were taken at 0°C; +AR indicates the as-rolled delivery condition.
 5. The CE mark and license number for the third party inspectorate issuing the manufacturer with the approval to apply the CE mark to their products (e.g. 0038, Lloyds Verification Services). The CE symbol has defined dimensions and if the font or size looks unusual it may indicate that the certificate is false.
 6. The unique number for the certificate confirming the chemical and mechanical properties of the tested items.
 7. The unique number for the CE marking certificate.
 8. The identifying information for the tested material. In this case there were 12 bars from Cast 83228 and 36 bars from Cast 83232. All bars are 18300mm long as indicated in the Specification/Product area.
 9. The mechanical properties (minimum yield, tensile strength and elongation) of the tested items – the header indicates the range of values to be achieved.
 10. Charpy test results indicating the toughness of the steel. The results cover three tests on each cast with the average value also displayed.
 11. Chemical analysis of the test material

- one analysis per cast. Results shown on the inspection certificate should be checked against the appropriate material specification/standard to confirm compliance and that the product is fit for the purpose for which it was bought but that should not be necessary for CE marked material.

12. CEV (Carbon Equivalent Value) for the cast, which is an indication of the weldability of the steel.
 13. Signature of an approved person.
 14. Name and address of the original customer.

Reputable suppliers of construction materials are aware of the requirements to certify their products and will have taken the necessary steps to meet the requirements of the system. The certificate above is genuine and provides information on specific cast numbers and test certificates to allow the product test information to be confirmed against the manufacturing records if necessary.

The benefits of steel construction

Designing and building in steel is the surest way to guarantee the many value benefits such as safety, cost, aesthetics, efficiency and other gains that are demanded by clients for modern structures. It is the best assurance that your project will be completed on time, cost-effectively, safely and to the most exacting quality and performance standards.

The market agrees, as is evidenced by steel construction's market share of 70% of multi-storey buildings, almost all single-storey industrial buildings, and an increasing share of other building sectors and bridges.

Here are some of the wide range of benefits that are routinely delivered simply by choosing steel.



Surety of Speed

You won't fail to be impressed by the speed at which your steel building frame is safely erected, with much of the hard work to exacting tolerances already achieved offsite in factory controlled conditions – a truly modern method of construction which reduces the impact of building activities on the surrounding area. There are no labour intensive shuttering and propping activities to worry about, and no need for on-site storage for these bulky items. Early erection of a steel frame means follow-on trades achieve a weather-protected environment in which to work sooner than is otherwise possible.

Site Safety Secured

Steel construction is inherently safer than alternative forms of construction. Fabrication takes place off-site in the far safer environment of a factory; almost all of the potentially hazardous activity that is unavoidable with other methods of construction is managed out of the construction process by selecting steel. Factory fabrication processes are standard and well practiced, providing a repeatable process that is predictable and inherently safe.

Highly trained, specialist erectors work from mobile elevating work platforms where they are securely harnessed. Trial erections can ensure that even the most complex operations, or where on-site time is at a premium, can be safely rehearsed to ensure that everyone understands their precise role when they reach site. Steel construction's proven safety record is the envy of the construction industry.



Long lasting

A steel building is as flexible as its owner or user needs it to be. The light and airy column free spaces that can only be created with steel are capable of easy adaptation to multiple uses, and can be easily extended or reconfigured.

Refurbishment and refreshing the appearance of a steel-framed building and changing its internal layout is relatively straightforward. However, steel buildings retain their modern appearance far longer than structures built with alternative materials. Consequently, refurbishment or alterations to exteriors are not usually needed.

Steel structures can be designed for dismantling; demountability will prove its worth on the legacy performance of the 2012 London Olympic and Paralympic Games where the main stadium and other venues have been designed to be reduced in size, if required, and possibly relocated elsewhere in the country.

Steel and Sustainability

Steel has sustainability built-in and has perhaps the strongest sustainability case of any rival material. It is the zero waste choice as steel is the world's most recycled material, none of it need ever go to landfill as it has a positive value and a key role to play in the production of new steel – some 94% of steel construction components in the UK are recycled or re-used.

Steel is multi-cycled, meaning it can be recycled repeatedly without any loss of its original properties – a characteristic not possessed by any other construction framing material. Steel structures generally have lower carbon footprints than concrete ones as a tonne of relatively strong and lightweight steel goes further than a tonne of concrete. Steel sections can also be re-used on other structures as the working life of a steel section will typically far outlast the life of a modern building.

Steel offers environmental, social and economic advantages that feed through to an outstanding sustainability case – the Triple Bottom Line of economic, social and environmental benefits.

Whole-life impacts

The cradle-to-gate approach to assessing environmental impacts is incomplete, and does not take into account the energy used during the building's operation and, importantly, at the end of life. As the whole-life LCA begins to feature more and more on the sustainability agenda, it will not be 'good enough' to ignore these burdens. Clients are increasingly asking about whole-life impacts of the buildings they commission, which brings the recyclability and low embodied carbon benefits of steel into sharp focus.





Support

The competitive nature of the construction market means that the steel industry is constantly striving for better solutions for the client. The steel industry has an excellent track record for innovation, whether it is in the form of new products backed up by sound research or improved methods of working. As well as looking to the future, the industry provides unrivalled support to users of steel through the network of Tata Steel Regional Technical Managers and organisations such as The British Constructional Steelwork Association (BCSA) and the Steel Construction Institute (SCI).

Aesthetics

The nature of steel construction expands the possibilities for architectural expression. Opportunities arise through the use of features such as shallow floor construction, storey high glazing, columns within separating walls and long-span internal structures. The versatility of steel construction allows complex geometries to be used that satisfy the architectural concept and create landmark designs with exposed steelwork and large, open spaces.

Fire safety and fire engineering

The need for safe and efficient buildings has meant that steel systems have been subjected to detailed research over many years to ensure that the effects of fire on the material and components is fully understood. The result of this research is the ability to fire engineer a steel structure to ensure that it meets the legislative requirements at the minimum cost, without compromising safety – in some circumstances without applied fire protection. Fire protection is often on the critical path so off-site application has significant benefits in terms of increased speed of construction.

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Note:

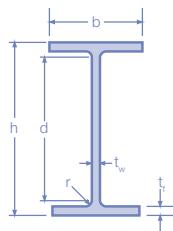
Advance® sections are supplied with a Class C surface condition in accordance with BS EN 10163-3.
Class D surface condition can be supplied by agreement.

The nomenclature used in the section refers to that used on the BS EN 1993 and the relevant
UK National Annexes.

Non-contradictory, complementary information (NCCI) supporting design to BS EN 1993 and
BS EN 1994 can be found at www.steel-ncci.co.uk

References to British Standards are in respect of the current versions and extracts are quoted by
permission of the British Standards Institute from whom copies of the full standards may be obtained.

Advance® UK Beams

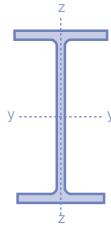


Designation		Serial size	Mass per metre kg/m	Depth of section h mm	Width of section b mm	Thickness of web t_w mm	Thickness of flange t_f mm	Root radius r mm	Depth between fillets d mm	Ratios for local buckling		Second moment of area I		Radius of gyration i	
										Flange c_r/t_f	Web c_w/t_w	Axis y-y cm ⁴	Axis z-z cm ⁴	Axis y-y cm	Axis z-z cm
➤	1016x305	487	486.7	1036.3	308.5	30.0	54.1	30.0	868.1	2.02	28.9	1021884	26721	40.6	6.57
➤		437	437.0	1026.1	305.4	26.9	49.0	30.0	868.1	2.23	32.3	910322	23447	40.4	6.49
➤		393	392.7	1015.9	303.0	24.4	43.9	30.0	868.1	2.49	35.6	807503	20496	40.2	6.40
➤		349	349.4	1008.1	302.0	21.1	40.0	30.0	868.1	2.76	41.1	723131	18460	40.3	6.44
➤		314	314.3	999.9	300.0	19.1	35.9	30.0	868.1	3.08	45.5	644063	16232	40.1	6.37
➤		272	272.3	990.1	300.0	16.5	31.0	30.0	868.1	3.6	52.6	553974	14004	40.0	6.35
➤		249	248.7	980.1	300.0	16.5	26.0	30.0	868.1	4.3	52.6	481192	11754	39.0	6.09
➤		222	222.0	970.3	300.0	16.0	21.1	30.0	868.1	5.31	54.3	407961	9546	38.0	5.81
914x419		388	388.0	921.0	420.5	21.4	36.6	24.1	799.6	4.79	37.4	719635	45438	38.2	9.59
		343	343.3	911.8	418.5	19.4	32.0	24.1	799.6	5.48	41.2	625780	39156	37.8	9.46
914x305		289	289.1	926.6	307.7	19.5	32.0	19.1	824.4	3.91	42.3	504187	15597	37.0	6.51
		253	253.4	918.4	305.5	17.3	27.9	19.1	824.4	4.48	47.7	436305	13301	36.8	6.42
		224	224.2	910.4	304.1	15.9	23.9	19.1	824.4	5.23	51.8	376414	11236	36.3	6.27
		201	200.9	903.0	303.3	15.1	20.2	19.1	824.4	6.19	54.6	325254	9423	35.7	6.07
838x292		226	226.5	850.9	293.8	16.1	26.8	17.8	761.7	4.52	47.3	339704	11360	34.3	6.27
		194	193.8	840.7	292.4	14.7	21.7	17.8	761.7	5.58	51.8	279175	9066	33.6	6.06
		176	175.9	834.9	291.7	14.0	18.8	17.8	761.7	6.44	54.4	246021	7799	33.1	5.90
762x267		197	196.8	769.8	268.0	15.6	25.4	16.5	686.0	4.32	44.0	239957	8175	30.9	5.71
		173	173.0	762.2	266.7	14.3	21.6	16.5	686.0	5.08	48.0	205282	6850	30.5	5.58
		147	146.9	754.0	265.2	12.8	17.5	16.5	686.0	6.27	53.6	168502	5455	30.0	5.40
		134	133.9	750.0	264.4	12.0	15.5	16.5	686.0	7.08	57.2	150692	4788	29.7	5.30
686x254		170	170.2	692.9	255.8	14.5	23.7	15.2	615.1	4.45	42.4	170326	6630	28.0	5.53
		152	152.4	687.5	254.5	13.2	21.0	15.2	615.1	5.02	46.6	150355	5784	27.8	5.46
		140	140.1	683.5	253.7	12.4	19.0	15.2	615.1	5.55	49.6	136267	5183	27.6	5.39
		125	125.2	677.9	253.0	11.7	16.2	15.2	615.1	6.51	52.6	117992	4383	27.2	5.24
610x305		238	238.1	635.8	311.4	18.4	31.4	16.5	540.0	4.14	29.3	209471	15837	26.3	7.23
		179	179.0	620.2	307.1	14.1	23.6	16.5	540.0	5.51	38.3	153024	11408	25.9	7.07
		149	149.2	612.4	304.8	11.8	19.7	16.5	540.0	6.6	45.8	125876	9308	25.7	7.00
610x229		140	139.9	617.2	230.2	13.1	22.1	12.7	547.6	4.34	41.8	111777	4505	25.0	5.03
		125	125.1	612.2	229.0	11.9	19.6	12.7	547.6	4.89	46.0	98610	3932	24.9	4.97
		113	113.0	607.6	228.2	11.1	17.3	12.7	547.6	5.54	49.3	87318	3434	24.6	4.88
		101	101.2	602.6	227.6	10.5	14.8	12.7	547.6	6.48	52.2	75780	2915	24.2	4.75
610x178		100	100.3	607.4	179.2	11.3	17.2	12.7	547.6	4.14	48.5	72528	1658	23.8	3.60
		92	92.2	603.0	178.8	10.9	15.0	12.7	547.6	4.75	50.2	64577	1436	23.4	3.50
		82	81.8	598.6	177.9	10.0	12.8	12.7	547.6	5.57	54.8	55869	1207	23.2	3.40
533x312		272	273.3	577.1	320.2	21.1	37.6	12.7	476.5	3.64	22.6	198578	20615	23.9	7.70
		219	218.8	560.3	317.4	18.3	29.2	12.7	476.5	4.69	26.0	150976	15589	23.3	7.48
		182	181.5	550.7	314.5	15.2	24.4	12.7	476.5	5.61	31.3	123222	12667	23.1	7.40
		150	150.6	542.5	312.0	12.7	20.3	12.7	476.5	6.75	37.5	100633	10285	22.9	7.32
533x210		138	138.3	549.1	213.9	14.7	23.6	12.7	476.5	3.68	32.4	86088	3864	22.1	4.68
		122	122.0	544.5	211.9	12.7	21.3	12.7	476.5	4.08	37.5	76043	3388	22.1	4.67
		109	109.0	539.5	210.8	11.6	18.8	12.7	476.5	4.62	41.1	66822	2943	21.9	4.60
		101	101.0	536.7	210.0	10.8	17.4	12.7	476.5	4.99	44.1	61519	2692	21.9	4.57
		92	92.1	533.1	209.3	10.1	15.6	12.7	476.5	5.57	47.2	55227	2389	21.7	4.51
		82	82.2	528.3	208.8	9.6	13.2	12.7	476.5	6.58	49.6	47539	2007	21.3	4.38
533x165		85	84.8	534.9	166.5	10.3	16.5	12.7	476.5	3.96	46.3	48631	1275	21.2	3.44
		74	74.7	529.1	165.9	9.7	13.6	12.7	476.5	4.81	49.1	41058	1040	20.8	3.30
		66	65.7	524.7	165.1	8.9	11.4	12.7	476.5	5.74	53.5	35028	859	20.5	3.20

Dimensions and properties to BS4-1.

➤ These sizes are in addition to our standard range of BS4 sections.

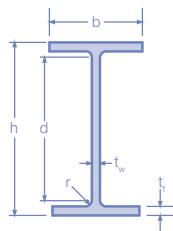
* Values in italics indicate the section is Class 4 in pure compression and allowance has been made in calculating the resistance.



UKB

Elastic modulus W_{el}		Plastic modulus W_{pl}		Buckling parameter U	Torsional index X	Warping constant I_w	Torsional constant I_t	Area of section	Indicative values for S355 steel		Designation
Axis y-y cm ³	Axis z-z cm ³	Axis y-y cm ³	Axis z-z cm ³			dm ⁶	cm ⁴	cm ²	kNm	N _{b,z,Rd} * for Lcr=3.5m kN	Serial size
19722	1732	23208	2799	0.867	21.1	64.4	4299	620	7770	15300	487 1016x305
17743	1535	20769	2467	0.868	23.1	56.0	3185	557	6970	13700	437
15897	1353	18538	2167	0.868	25.5	48.4	2330	500	6200	12200	393
14346	1223	16593	1940	0.872	27.9	43.3	1718	445	5730	11700	349
12883	1082	14850	1712	0.872	30.7	37.7	1264	400	5110	10100	314
11190	934	12827	1469	0.873	35.0	32.2	835	347	4420	8470	272
9819	784	11350	1244	0.861	39.8	26.8	582	317	3900	7510	249
8409	636	9808	1019	0.850	45.7	21.5	390	283	3380	6440	222
15627	2161	17666	3340	0.885	26.7	88.9	1734	494	6110	15200	388 914x419
13726	1871	15478	2889	0.883	30.1	75.8	1193	437	5350	12900	343
10883	1014	12570	1601	0.867	31.9	31.2	926	368	4350	9450	289 914x305
9501	871	10942	1370	0.866	36.2	26.4	626	323	3760	8030	253
8269	739	9535	1163	0.861	41.3	22.1	422	286	3290	6880	224
7204	621	8352	982	0.854	46.8	18.4	291	256	2880	5960	201
7985	773	9155	1211	0.870	35.0	19.3	514	289	3160	7140	226 838x292
6641	620	7640	974	0.862	41.6	15.2	306	247	2640	5860	194
5893	535	6808	842	0.856	46.5	13.0	221	224	2350	5160	176
6234	610	7167	958	0.869	33.2	11.3	404	251	2470	5980	197 762x267
5387	514	6198	807	0.864	38.1	9.39	267	220	2140	5070	173
4470	411	5156	647	0.858	45.2	7.40	159	187	1780	4110	147
4018	362	4644	570	0.854	49.8	6.46	119	171	1650	3710	134
4916	518	5631	811	0.872	31.8	7.42	308	217	1940	5350	170 686x254
4374	455	5001	710	0.871	35.5	6.42	220	194	1730	4450	152
3987	409	4558	638	0.868	38.7	5.72	169	178	1570	4000	140
3481	346	3994	542	0.862	43.9	4.80	116	159	1380	3450	125
6589	1017	7486	1574	0.886	21.3	14.5	785	303	2580	8620	238 610x305
4935	743	5548	1144	0.886	27.7	10.2	340	228	1910	6430	179
4111	611	4594	937	0.886	32.7	8.17	200	190	1580	5040	149
3622	391	4142	611	0.875	30.6	3.99	216	178	1430	4070	140 610x229
3221	343	3676	535	0.873	34.1	3.45	154	159	1270	3460	125
2874	301	3281	469	0.870	38.0	2.99	111	144	1130	3010	113
2515	256	2881	400	0.864	43.1	2.52	77.0	129	1020	2640	101
2388	185	2786	296	0.855	38.7	1.44	95.0	128	963	1980	100 610x178
2142	161	2511	258	0.848	42.8	1.24	71.0	117	891	1760	92
1867	136	2194	218	0.843	48.5	1.04	48.8	104	777	1490	82
6882	1288	7859	1985	0.890	15.9	15.0	1288	348	2720	10100	272 533x312
5389	982	6109	1514	0.884	19.8	11.0	642	279	2110	8040	219
4475	806	5030	1237	0.885	23.4	8.77	373	231	1740	6630	182
3710	659	4142	1009	0.885	27.8	7.01	216	192	1430	5490	150
3136	361	3613	568	0.873	25.0	2.67	250	176	1250	3760	138 533x210
2793	320	3196	500	0.877	27.6	2.32	178	155	1100	3300	122
2477	279	2829	436	0.875	30.9	1.99	126	139	976	2920	109
2292	256	2612	399	0.874	33.2	1.81	101	129	900	2690	101
2072	228	2360	355	0.872	36.5	1.60	75.7	117	838	2440	92
1800	192	2059	300	0.864	41.6	1.33	51.5	105	731	2010	82
1818	153	2107	243	0.862	35.5	0.857	73.8	108	725	1570	85 533x165
1552	125	1808	200	0.853	41.1	0.691	47.9	95.2	643	1310	74
1335	104	1561	166	0.847	47.0	0.566	32.0	83.7	554	1100	66

Advance® UK Beams

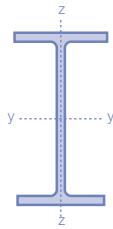


Designation		Serial size	Mass per metre kg/m	Depth of section h mm	Width of section b mm	Thickness of web t_w mm	Thickness of flange t_f mm	Root radius r mm	Depth between fillets d mm	Ratios for local buckling		Second moment of area I		Radius of gyration i	
										Flange c_r/t_f	Web c_w/t_w	Axis y-y cm ⁴	Axis z-z cm ⁴	Axis y-y cm	Axis z-z cm
► 457x191	161	161.4	492.0	199.4	18.0	32.0	10.2	407.6	2.52	22.6	79779	4250	19.7	4.55	
	133	133.3	480.6	196.7	15.3	26.3	10.2	407.6	3.06	26.6	63841	3350	19.4	4.44	
	106	105.8	469.2	194.0	12.6	20.6	10.2	407.6	3.91	32.3	48873	2515	19.0	4.32	
	98	98.3	467.2	192.8	11.4	19.6	10.2	407.6	4.11	35.8	45727	2347	19.1	4.33	
	89	89.3	463.4	191.9	10.5	17.7	10.2	407.6	4.55	38.8	41015	2089	19.0	4.29	
	82	82.0	460.0	191.3	9.9	16.0	10.2	407.6	5.03	41.2	37051	1871	18.8	4.23	
	74	74.3	457.0	190.4	9.0	14.5	10.2	407.6	5.55	45.3	33319	1671	18.8	4.20	
	67	67.1	453.4	189.9	8.5	12.7	10.2	407.6	6.34	48.0	29380	1452	18.5	4.12	
457x152	82	82.1	465.8	155.3	10.5	18.9	10.2	407.6	3.29	38.8	36589	1185	18.7	3.37	
	74	74.2	462.0	154.4	9.6	17.0	10.2	407.6	3.66	42.5	32674	1047	18.6	3.33	
	67	67.2	458.0	153.8	9.0	15.0	10.2	407.6	4.15	45.3	28927	913	18.4	3.27	
	60	59.8	454.6	152.9	8.1	13.3	10.2	407.6	4.68	50.3	25500	795	18.3	3.23	
	52	52.3	449.8	152.4	7.6	10.9	10.2	407.6	5.71	53.6	21369	645	17.9	3.11	
► 406x178	85	85.3	417.2	181.9	10.9	18.2	10.2	360.4	4.14	33.1	31703	1830	17.1	4.11	
	74	74.2	412.8	179.5	9.5	16.0	10.2	360.4	4.68	37.9	27310	1545	17.0	4.04	
	67	67.1	409.4	178.8	8.8	14.3	10.2	360.4	5.23	41.0	24331	1365	16.9	3.99	
	60	60.1	406.4	177.9	7.9	12.8	10.2	360.4	5.84	45.6	21596	1203	16.8	3.97	
	54	54.1	402.6	177.7	7.7	10.9	10.2	360.4	6.86	46.8	18722	1021	16.5	3.85	
► 406x140	53	53.3	406.6	143.3	7.9	12.9	10.2	360.4	4.46	45.6	18283	635	16.4	3.06	
	46	46.0	403.2	142.2	6.8	11.2	10.2	360.4	5.13	53.0	15685	538	16.4	3.03	
	39	39.0	398.0	141.8	6.4	8.6	10.2	360.4	6.69	56.3	12508	410	15.9	2.87	
356x171	67	67.1	363.4	173.2	9.1	15.7	10.2	311.6	4.58	34.2	19463	1362	15.1	3.99	
	57	57.0	358.0	172.2	8.1	13.0	10.2	311.6	5.53	38.5	16038	1108	14.9	3.91	
	51	51.0	355.0	171.5	7.4	11.5	10.2	311.6	6.25	42.1	14136	968	14.8	3.86	
	45	45.0	351.4	171.1	7.0	9.7	10.2	311.6	7.41	44.5	12066	811	14.5	3.76	
356x127	39	39.1	353.4	126.0	6.6	10.7	10.2	311.6	4.63	47.2	10172	358	14.3	2.68	
	33	33.1	349.0	125.4	6.0	8.5	10.2	311.6	5.82	51.9	8249	280	14.0	2.58	
305x165	54	54.0	310.4	166.9	7.9	13.7	8.9	265.2	5.15	33.6	11696	1063	13.0	3.93	
	46	46.1	306.6	165.7	6.7	11.8	8.9	265.2	5.98	39.6	9899	896	13.0	3.90	
	40	40.3	303.4	165.0	6.0	10.2	8.9	265.2	6.92	44.2	8503	764	12.9	3.86	
305x127	48	48.1	311.0	125.3	9.0	14.0	8.9	265.2	3.52	29.5	9575	461	12.5	2.74	
	42	41.9	307.2	124.3	8.0	12.1	8.9	265.2	4.07	33.2	8196	389	12.4	2.70	
	37	37.0	304.4	123.4	7.1	10.7	8.9	265.2	4.6	37.4	7171	336	12.3	2.67	
305x102	33	32.8	312.7	102.4	6.6	10.8	7.6	275.9	3.73	41.8	6501	194	12.5	2.15	
	28	28.2	308.7	101.8	6.0	8.8	7.6	275.9	4.58	46.0	5366	155	12.2	2.08	
	25	24.8	305.1	101.6	5.8	7.0	7.6	275.9	5.76	47.6	4455	123	11.9	1.97	
254x146	43	43.0	259.6	147.3	7.2	12.7	7.6	219.0	4.92	30.4	6544	677	10.9	3.52	
	37	37.0	256.0	146.4	6.3	10.9	7.6	219.0	5.73	34.8	5537	571	10.8	3.48	
	31	31.1	251.4	146.1	6.0	8.6	7.6	219.0	7.26	36.5	4413	448	10.5	3.36	
254x102	28	28.3	260.4	102.2	6.3	10.0	7.6	225.2	4.04	35.7	4005	179	10.5	2.22	
	25	25.2	257.2	101.9	6.0	8.4	7.6	225.2	4.8	37.5	3415	149	10.3	2.15	
	22	22.0	254.0	101.6	5.7	6.8	7.6	225.2	5.93	39.5	2841	119	10.1	2.06	
203x133	30	30.0	206.8	133.9	6.4	9.6	7.6	172.4	5.85	26.9	2896	385	8.71	3.17	
	25	25.1	203.2	133.2	5.7	7.8	7.6	172.4	7.2	30.2	2340	308	8.56	3.10	
203x102	23	23.1	203.2	101.8	5.4	9.3	7.6	169.4	4.37	31.4	2105	164	8.46	2.36	
178x102	19	19.0	177.8	101.2	4.8	7.9	7.6	146.8	5.14	30.6	1356	137	7.48	2.37	
152x89	16	16.0	152.4	88.7	4.5	7.7	7.6	121.8	4.48	27.1	834	90	6.41	2.10	
127x76	13	13.0	127.0	76.0	4.0	7.6	7.6	96.6	3.74	24.2	473	56	5.35	1.84	

Dimensions and properties to BS4-1.

► These sizes are in addition to our standard range of BS4 sections.

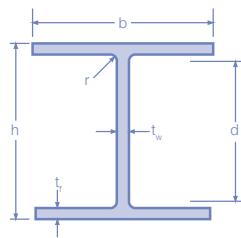
* Values in italics indicate the section is Class 4 in pure compression and allowance has been made in calculating the resistance.



UKB

Elastic modulus W_{el}		Plastic modulus W_{pl}		Buckling parameter U	Torsional index X	Warping constant I_w	Torsional constant I_t	Area of section	Indicative values for S355 steel		Designation	
Axis y-y cm ³	Axis z-z cm ³	Axis y-y cm ³	Axis z-z cm ³			dm ⁶	cm ⁴	cm ²	kNm	N _{b,z,Rd} * for Lcr=3.5m kN	Serial size	
3243	426	3778	672	0.882	16.4	2.25	515	206	1300	4280	161 457x191	
2657	341	3070	535	0.880	19.6	1.73	292	170	1060	3440	133	
2083	259	2389	405	0.877	24.4	1.27	146	135	825	2650	106	
1957	243	2232	379	0.881	25.7	1.18	121	125	769	2460	98	
1770	218	2014	338	0.880	28.3	1.04	90.7	114	693	2220	89	
1611	196	1831	304	0.877	30.9	0.922	69.2	104	650	2010	82	
1458	176	1653	272	0.877	33.9	0.818	51.8	94.6	586	1820	74	
1296	153	1471	237	0.872	37.9	0.705	37.1	85.5	522	1600	67	
1571	153	1812	240	0.873	27.4	0.591	89.2	105	624	1480	82 457x152	
1414	136	1627	213	0.873	30.1	0.518	65.9	94.5	562	1310	74	
1263	119	1453	187	0.869	33.6	0.448	47.7	85.6	515	1160	67	
1122	104	1287	163	0.868	37.5	0.387	33.8	76.2	458	1010	60	
950	85	1096	133	0.859	43.9	0.311	21.4	66.6	391	833	52	
1520	201	1733	313	0.881	24.4	0.728	93.0	109	597	2020	85 406x178	
1323	172	1501	267	0.882	27.6	0.608	62.8	94.5	533	1730	74	
1189	153	1346	237	0.880	30.5	0.533	46.1	85.5	479	1540	67	
1063	135	1200	209	0.880	33.8	0.466	33.3	76.5	426	1370	60	
930	115	1055	178	0.871	38.3	0.392	23.1	69.0	373	1180	54	
899	89	1031	139	0.870	34.1	0.246	29.0	67.9	366	827	53 406x140	
778	76	888	118	0.871	38.9	0.207	19.0	58.6	315	703	46	
629	58	724	91	0.858	47.5	0.155	10.7	49.7	257	545	39	
1071	157	1211	243	0.886	24.4	0.412	55.7	85.5	430	1540	67 356x171	
896	129	1010	199	0.882	28.8	0.330	33.4	72.6	359	1270	57	
796	113	896	174	0.881	32.1	0.286	23.8	64.9	318	1120	51	
687	95	775	147	0.874	36.8	0.237	15.8	57.3	275	952	45	
576	57	659	89	0.871	35.2	0.105	15.1	49.8	234	487	39 356x127	
473	45	543	70	0.863	42.2	0.0812	8.79	42.1	193	386	33	
754	127	846	196	0.889	23.6	0.234	34.8	68.8	300	1210	54 305x165	
646	108	720	166	0.891	27.1	0.195	22.2	58.7	256	1030	46	
560	93	623	142	0.889	31.0	0.164	14.7	51.3	221	884	40	
616	74	711	116	0.873	23.3	0.102	31.8	61.2	252	621	48 305x127	
534	63	614	98	0.872	26.5	0.0846	21.1	53.4	218	529	42	
471	54	539	85	0.872	29.7	0.0725	14.8	47.2	191	459	37	
416	38	481	60	0.866	31.6	0.0442	12.2	41.8	171	277	33 305x102	
348	31	403	48	0.859	37.4	0.0349	7.40	35.9	143	224	28	
292	24	342	39	0.846	43.4	0.0273	4.77	31.6	121	179	25	
504	92	566	141	0.891	21.2	0.103	23.9	54.8	201	829	43 254x146	
433	78	483	119	0.890	24.3	0.0857	15.3	47.2	171	702	37	
351	61	393	94	0.880	29.6	0.0660	8.55	39.7	140	560	31	
308	35	353	55	0.874	27.5	0.0280	9.57	36.1	125	254	28 254x102	
266	29	306	46	0.866	31.5	0.0230	6.42	32.0	109	212	25	
224	23	259	37	0.856	36.4	0.0182	4.15	28.0	91.9	172	22	
280	57	314	88	0.881	21.5	0.0374	10.3	38.2	111	493	30 203x133	
230	46	258	71	0.877	25.6	0.0294	5.96	32.0	91.6	398	25	
207	32	234	50	0.888	22.5	0.0154	7.02	29.4	83.1	230	23 203x102	
153	27	171	42	0.888	22.6	0.0099	4.41	24.3	60.7	192	19 178x102	
109	20	123	31	0.890	19.6	0.0047	3.56	20.3	43.7	129	16 152x89	
75	15	84	23	0.895	16.3	0.0020	2.85	16.5	29.9	82.4	13 127x76	

Advance® UK Columns

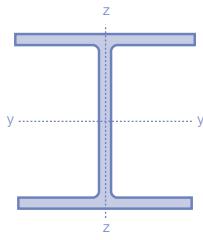


Designation		Serial size	Mass per metre kg/m	Depth of section h mm	Width of section b mm	Thickness of web t_w mm	Thickness of flange t_f mm	Root radius r mm	Depth between fillets d mm	Ratios for local buckling		Second moment of area I		Radius of gyration i	
										Flange c_r/t_f	Web c_w/t_w	Axis y-y cm^4	Axis z-z cm^4	Axis y-y cm	Axis z-z cm
356x406	634	633.9	474.6	424.0	47.6	77.0	15.2	290.2	2.25	6.1	274845	98125	18.4	11.0	
	551	551.0	455.6	418.5	42.1	67.5	15.2	290.2	2.56	6.89	226938	82671	18.0	10.9	
	467	467.0	436.6	412.2	35.8	58.0	15.2	290.2	2.98	8.11	183003	67834	17.5	10.7	
	393	393.0	419.0	407.0	30.6	49.2	15.2	290.2	3.52	9.48	146618	55367	17.1	10.5	
	340	339.9	406.4	403.0	26.6	42.9	15.2	290.2	4.03	10.9	122543	46853	16.8	10.4	
	287	287.1	393.6	399.0	22.6	36.5	15.2	290.2	4.74	12.8	99875	38677	16.5	10.3	
	235	235.1	381.0	394.8	18.4	30.2	15.2	290.2	5.73	15.8	79085	30993	16.3	10.2	
356x368	202	201.9	374.6	374.7	16.5	27.0	15.2	290.2	6.07	17.6	66261	23688	16.1	9.60	
	177	177.0	368.2	372.6	14.4	23.8	15.2	290.2	6.89	20.2	57118	20529	15.9	9.54	
	153	152.9	362.0	370.5	12.3	20.7	15.2	290.2	7.92	23.6	48589	17553	15.8	9.49	
	129	129.0	355.6	368.6	10.4	17.5	15.2	290.2	9.4	27.9	40246	14611	15.6	9.43	
305x305	283	282.9	365.3	322.2	26.8	44.1	15.2	246.7	3.0	9.21	78872	24635	14.8	8.27	
	240	240.0	352.5	318.4	23.0	37.7	15.2	246.7	3.51	10.7	64203	20315	14.5	8.15	
	198	198.1	339.9	314.5	19.1	31.4	15.2	246.7	4.22	12.9	50904	16299	14.2	8.04	
	158	158.1	327.1	311.2	15.8	25.0	15.2	246.7	5.3	15.6	38747	12569	13.9	7.90	
	137	136.9	320.5	309.2	13.8	21.7	15.2	246.7	6.11	17.9	32814	10700	13.7	7.83	
	118	117.9	314.5	307.4	12.0	18.7	15.2	246.7	7.09	20.6	27672	9059	13.6	7.77	
	97	96.9	307.9	305.3	9.9	15.4	15.2	246.7	8.6	24.9	22249	7308	13.4	7.69	
254x254	167	167.1	289.1	265.2	19.2	31.7	12.7	200.3	3.48	10.4	29998	9870	11.9	6.81	
	132	132.0	276.3	261.3	15.3	25.3	12.7	200.3	4.36	13.1	22529	7531	11.6	6.69	
	107	107.1	266.7	258.8	12.8	20.5	12.7	200.3	5.38	15.6	17510	5928	11.3	6.59	
	89	88.9	260.3	256.3	10.3	17.3	12.7	200.3	6.38	19.4	14268	4857	11.2	6.55	
	73	73.1	254.1	254.6	8.6	14.2	12.7	200.3	7.77	23.3	11407	3908	11.1	6.48	
> 203x203	127	127.5	241.4	213.9	18.1	30.1	10.2	160.8	2.91	8.88	15437	4920	9.75	5.50	
	113	113.5	235.0	212.1	16.3	26.9	10.2	160.8	3.26	9.87	13301	4285	9.59	5.45	
	100	99.6	228.6	210.3	14.5	23.7	10.2	160.8	3.7	11.1	11298	3679	9.44	5.39	
	86	86.1	222.2	209.1	12.7	20.5	10.2	160.8	4.29	12.7	9449	3127	9.28	5.34	
	71	71.0	215.8	206.4	10.0	17.3	10.2	160.8	5.09	16.1	7618	2537	9.18	5.30	
	60	60.0	209.6	205.8	9.4	14.2	10.2	160.8	6.2	17.1	6125	2065	8.96	5.20	
	52	52.0	206.2	204.3	7.9	12.5	10.2	160.8	7.04	20.4	5259	1778	8.91	5.18	
	46	46.1	203.2	203.6	7.2	11.0	10.2	160.8	8.0	22.3	4568	1548	8.82	5.13	
> 152x152	51	51.2	170.2	157.4	11.0	15.7	7.6	123.6	4.18	11.2	3227	1022	7.04	3.96	
	44	44.0	166.0	155.9	9.5	13.6	7.6	123.6	4.82	13.0	2703	860	6.94	3.92	
	37	37.0	161.8	154.4	8.0	11.5	7.6	123.6	5.7	15.5	2210	706	6.85	3.87	
	30	30.0	157.6	152.9	6.5	9.4	7.6	123.6	6.98	19.0	1748	560	6.76	3.83	
	23	23.0	152.4	152.2	5.8	6.8	7.6	123.6	9.65	21.3	1250	400	6.54	3.70	

Dimensions and properties to BS4-1.

► These sizes are in addition to our standard range of BS4 sections.

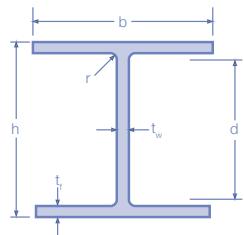
* Values in italics indicate the section is Class 3 for major axis bending.



UKC

Elastic modulus W_{el}		Plastic modulus W_{pl}		Buckling parameter U	Torsional index X	Warping constant I_w	Torsional constant I_t	Area of section	Indicative values for S355 steel		Designation
Axis y-y cm ³	Axis z-z cm ³	Axis y-y cm ³	Axis z-z cm ³			dm ⁶	cm ⁴	cm ²	kNm	N _{b,z,Rd} for Lcr=3.5m kN	Serial size
11582	4629	14235	7108	0.843	5.46	38.8	13720	808	4630	23600	634 356x406
9962	3951	12076	6058	0.841	6.05	31.1	9240	702	3920	20400	551
8383	3291	10003	5034	0.839	6.86	24.3	5809	595	3350	17700	467
6998	2721	8223	4154	0.837	7.86	18.9	3545	501	2750	14800	393
6031	2325	6999	3544	0.836	8.85	15.5	2343	433	2340	12800	340
5075	1939	5813	2949	0.835	10.2	12.3	1441	366	2010	11100	287
4151	1570	4687	2383	0.834	12.1	9.54	812	299	1620	9020	235
3538	1264	3972	1919	0.844	13.4	7.16	558	257	1370	7620	202 356x368
3103	1102	3455	1671	0.844	15.0	6.09	381	226	1190	6690	177
2684	948	2965	1435	0.844	17.0	5.11	251	195	1020	5760	153
2264	793	2479	1199	0.844	19.9	4.18	153	164	781	4840	129
4318	1529	5105	2342	0.855	7.65	6.35	2034	360	1710	9910	283 305x305
3643	1276	4247	1950	0.854	8.74	5.03	1271	306	1470	8570	240
2995	1037	3440	1581	0.854	10.2	3.88	734	252	1190	7020	198
2369	808	2681	1230	0.851	12.5	2.87	378	201	925	5560	158
2048	692	2297	1052	0.851	14.2	2.39	249	174	792	4800	137
1760	589	1958	895	0.850	16.2	1.98	161	150	675	4120	118
1445	479	1592	726	0.850	19.3	1.56	91.2	123	513	3440	97
2075	744	2424	1137	0.851	8.49	1.63	626	213	836	5490	167 254x254
1631	576	1869	878	0.850	10.3	1.19	319	168	645	4290	132
1313	458	1485	697	0.848	12.4	0.898	172	136	512	3440	107
1096	379	1224	575	0.850	14.5	0.717	102	113	422	2850	89
898	307	992	465	0.849	17.3	0.562	57.6	93.1	352	2380	73
1279	460	1517	704	0.854	7.38	0.549	427	162	523	3630	127 203x203
1132	404	1329	618	0.853	8.11	0.464	305	145	459	3220	113
988	350	1148	534	0.852	9.02	0.386	210	127	396	2800	100
850	299	977	456	0.850	10.2	0.318	137	110	337	2400	86
706	246	799	374	0.853	11.9	0.250	80.2	90.4	276	1960	71
584	201	656	305	0.846	14.1	0.197	47.2	76.4	233	1660	60
510	174	567	264	0.848	15.8	0.167	31.8	66.3	201	1430	52
450	152	497	231	0.847	17.7	0.143	22.2	58.7	177	1260	46
379	130	438	199	0.848	10.1	0.0610	48.8	65.2	155	1050	51 152x152
326	110	372	169	0.848	11.5	0.0499	31.7	56.1	132	894	44
273	91	309	140	0.848	13.3	0.0399	19.2	47.1	110	738	37
222	73	248	112	0.849	16.0	0.0308	10.5	38.3	87.9	592	30
164	53	182	80	0.840	20.7	0.0212	4.63	29.2	58.2	431	23

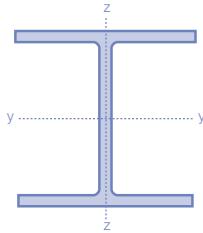
Advance® UK Bearing Piles



Designation		Serial size	Mass per metre kg/m	Depth of section h mm	Width of section b mm	Thickness of web t_w mm	Thickness of flange t_f mm	Root radius r mm	Depth between fillets d mm	Ratios for local buckling		Second moment of area I		Radius of gyration i	
										Flange c_r/t_f	Web c_w/t_w	Axis y-y cm^4	Axis z-z cm^4	Axis y-y cm	Axis z-z cm
356x368	174	173.9	361.4	378.5	20.3	20.4	15.2	290.2	8.03	14.3	51009	18463	15.2	9.13	
	152	152.0	356.4	376.0	17.8	17.9	15.2	290.2	9.16	16.3	43972	15877	15.1	9.05	
	133	133.0	352.0	373.8	15.6	15.7	15.2	290.2	10.44	18.6	37983	13680	15.0	8.99	
	109	108.9	346.4	371.0	12.8	12.9	15.2	290.2	12.71	22.7	30632	10987	14.9	8.90	
305x305	223	222.9	337.9	325.7	30.3	30.4	15.2	246.7	4.36	8.14	52699	17577	13.6	7.87	
	186	186.0	328.3	320.9	25.5	25.6	15.2	246.7	5.18	9.67	42610	14143	13.4	7.73	
	149	149.1	318.5	316.0	20.6	20.7	15.2	246.7	6.4	12.0	33067	10910	13.2	7.58	
	126	126.1	312.3	312.9	17.5	17.6	15.2	246.7	7.53	14.1	27408	9002	13.1	7.49	
	110	110.0	307.9	310.7	15.3	15.4	15.2	246.7	8.6	16.1	23563	7709	13.0	7.42	
	95	94.9	303.7	308.7	13.3	13.3	15.2	246.7	9.96	18.5	20045	6529	12.9	7.35	
	88	88.0	301.7	307.8	12.4	12.3	15.2	246.7	10.77	19.9	18425	5984	12.8	7.31	
254x254	79	78.9	299.3	306.4	11.0	11.1	15.2	246.7	11.94	22.4	16444	5326	12.8	7.28	
	85	85.1	254.3	260.4	14.4	14.3	12.7	200.3	7.71	13.9	12284	4215	10.6	6.24	
	71	71.0	249.7	258.0	12.0	12.0	12.7	200.3	9.19	16.7	10071	3439	10.6	6.17	
203x203	63	63.0	247.1	256.6	10.6	10.7	12.7	200.3	10.31	18.9	8860	3016	10.5	6.13	
	54	53.9	204.0	207.7	11.3	11.4	10.2	160.8	7.72	14.2	5027	1705	8.55	4.98	
	45	44.9	200.2	205.9	9.5	9.5	10.2	160.8	9.26	16.9	4100	1384	8.46	4.92	

Dimensions and properties to BS4-1.

* Values in italics indicate the section is Class 3 for major axis bending.

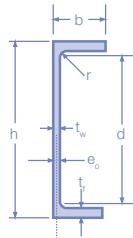


UKBP

Elastic modulus W_{el}		Plastic modulus W_{pl}		Buckling parameter U	Torsional index X	Warping constant I_w	Torsional constant I_t	Area of section	Indicative $N_{b,z,Rd}^*$ values for S355 steel for $Lcr=3.5m$	Designation
Axis y-y cm^3	Axis z-z cm^3	Axis y-y cm^3	Axis z-z cm^3			dm^6	cm^4	cm^2	kN	Serial size
2823	976	3186	1497	0.821	15.8	5.37	330	221	6450	174 356x368
2468	845	2767	1293	0.821	17.8	4.55	223	194	5650	152
2158	732	2406	1118	0.822	20.1	3.87	151	169	5030	133
1769	592	1956	903	0.823	24.2	3.05	84.6	139	4120	109
3119	1079	3653	1680	0.826	9.55	4.15	943	284	7850	223 305x305
2596	881	3003	1366	0.827	11.1	3.24	560	237	6500	186
2076	691	2370	1065	0.828	13.5	2.42	295	190	5160	149
1755	575	1986	885	0.829	15.7	1.95	182	161	4350	126
1531	496	1720	762	0.830	17.7	1.65	122	140	3850	110
1320	423	1475	648	0.830	20.2	1.38	80.0	121	3310	95
1221	389	1361	595	0.830	21.6	1.25	64.2	112	3060	88
1099	348	1218	531	0.832	23.9	1.11	46.9	100	2730	79
966	324	1092	498	0.825	15.6	0.607	81.8	108	2700	85 254x254
807	267	904	409	0.826	18.4	0.486	48.4	90.4	2240	71
717	235	799	360	0.827	20.5	0.421	34.3	80.2	1980	63
493	164	557	252	0.827	15.8	0.158	32.7	68.7	1430	54 203x203
410	134	459	206	0.827	18.6	0.126	19.2	57.2	1180	45

Advance® UK

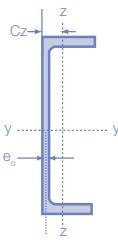
Parallel Flange Channels



Designation

Serial size	Mass per metre kg/m	Depth of section h mm	Width of section b mm	Thickness of web t_w mm	Thickness of flange t_f mm	Distance of e_o cm	Root radius r mm	Depth between fillets d mm	Ratios for local buckling		Second moment of area I		
									Flange c_i/t_f	Web c_w/t_w	Axis y-y cm ⁴	Axis z-z cm ⁴	
430x100	64	64.4	430	100	11.0	19.0	3.27	15	362	3.89	32.9	21939	722
380x100	54	54.0	380	100	9.5	17.5	3.48	15	315	4.31	33.2	15034	643
300x100	46	45.5	300	100	9.0	16.5	3.68	15	237	4.61	26.3	8229	568
300x90	41	41.4	300	90	9.0	15.5	3.18	12	245	4.45	27.2	7218	404
260x90	35	34.8	260	90	8.0	14.0	3.32	12	208	5.0	26.0	4728	353
260x75	28	27.6	260	75	7.0	12.0	2.62	12	212	4.67	30.3	3619	185
230x90	32	32.2	230	90	7.5	14.0	3.46	12	178	5.04	23.7	3518	334
230x75	26	25.7	230	75	6.5	12.5	2.78	12	181	4.52	27.8	2748	181
200x90	30	29.7	200	90	7.0	14.0	3.6	12	148	5.07	21.1	2523	314
200x75	23	23.4	200	75	6.0	12.5	2.91	12	151	4.56	25.2	1963	170
180x90	26	26.1	180	90	6.5	12.5	3.64	12	131	5.72	20.2	1817	277
180x75	20	20.3	180	75	6.0	10.5	2.87	12	135	5.43	22.5	1370	146
150x90	24	23.9	150	90	6.5	12.0	3.71	12	102	5.96	15.7	1162	253
150x75	18	17.9	150	75	5.5	10.0	2.99	12	106	5.75	19.3	861	131
125x65	15	14.8	125	65	5.5	9.5	2.56	12	82	5.0	14.9	483	80.0
100x50	10	10.2	100	50	5.0	8.5	1.94	9	65	4.24	13.0	208	32.3

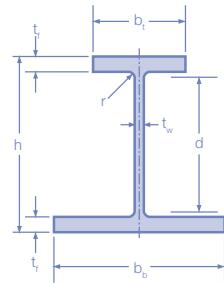
Dimensions and properties to BS4-1.



UKPFC

Radius of gyration <i>i</i>		Elastic modulus <i>W_{el}</i>		Plastic modulus <i>W_{pl}</i>		Buckling parameter <i>U</i>	Torsional index <i>X</i>	Warping constant <i>I_w</i>	Torsional constant <i>I_T</i>	Area of section	Indicative values for S355 steel		Designation
Axis y-y cm	Axis z-z cm	Axis y-y cm ³	Axis z-z cm ³	Axis y-y cm ³	Axis z-z cm ³			dm ⁶	cm ⁴	cm ²	kNm	N _{b,z,Rd} for Lcr=3.5m kN	Serial size
16.3	2.97	1020	97.9	1222	176	0.917	22.5	0.219	63.0	82.1	422	872	64 430x100
14.8	3.06	791	89.2	933	161	0.932	21.2	0.150	45.7	68.7	322	764	54 380x100
11.9	3.13	549	81.7	641	148	0.944	17.0	0.0813	36.8	58.0	221	668	46 300x100
11.7	2.77	481	63.1	568	114	0.934	18.4	0.0581	28.8	52.7	202	504	41 300x90
10.3	2.82	364	56.3	425	102	0.942	17.2	0.0379	20.6	44.4	151	437	35 260x90
10.1	2.30	278	34.4	328	62.0	0.932	20.5	0.0203	11.7	35.1	116	246	28 260x75
9.27	2.86	306	55.0	355	99.2	0.950	15.1	0.0279	19.3	41.0	126	413	32 230x90
9.17	2.35	239	34.8	278	63.2	0.947	17.3	0.0153	11.8	32.7	98.7	238	26 230x75
8.16	2.88	252	53.4	291	94.6	0.954	12.9	0.0197	18.3	37.9	103	386	30 200x90
8.11	2.39	196	33.8	227	60.8	0.956	14.8	0.0107	11.1	29.9	80.6	224	23 200x75
7.40	2.89	202	47.4	232	83.5	0.949	12.8	0.0141	13.3	33.2	82.4	340	26 180x90
7.27	2.38	152	28.8	176	52.0	0.946	15.3	0.0075	7.34	25.9	62.5	193	20 180x75
6.18	2.89	155	44.4	179	77.0	0.936	10.8	0.0089	11.8	30.4	63.5	311	24 150x90
6.15	2.40	115	26.6	132	47.3	0.946	13.1	0.0047	6.10	22.8	46.9	172	18 150x75
5.07	2.06	77.3	18.8	89.9	33.5	0.942	11.1	0.0019	4.72	18.8	31.9	109	15 125x65
4.00	1.58	41.5	9.9	48.9	17.6	0.942	10.0	0.0005	2.53	13.0	17.4	46.7	10 100x50

Asymmetric Slimflor® Beams

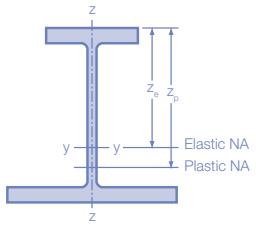


Designation		Serial size	Mass per metre kg/m	Depth of section h mm	Width of top flange b_t mm	Width of bottom flange b_b mm	Thickness of web t_w mm	Thickness of flange t_f mm	Root radius r mm	Depth between fillets d mm	Ratios for local buckling			Elastic neutral axis position z_e cm	Second moment of area I	
											Top flange c_f/t_f	Bottom flange c_b/t_f	Web c_w/t_w		Axis y-y cm^4	Axis z-z cm^4
300ASB	249*	249.2	342	203	313	40	40	27	208	1.36	2.74	5.20	19.2	52920	13194	
	196	195.5	342	183	293	20	40	27	208	1.36	2.74	10.4	19.8	45871	10463	
	185*	184.6	320	195	305	32	29	27	208	1.88	3.78	6.50	18.0	35657	8752	
	155	155.4	326	179	289	16	32	27	208	1.7	3.42	13.0	18.9	34514	7989	
	153*	152.8	310	190	300	27	24	27	208	2.27	4.56	7.70	17.4	28398	6840	
280ASB	136*	136.4	288	190	300	25	22	24	196	2.66	5.16	7.84	16.3	22216	6256	
	124	123.9	296	178	288	13	26	24	196	2.25	4.37	15.1	17.2	23453	6410	
	105	104.7	288	176	286	11	22	24	196	2.66	5.16	17.8	16.8	19249	5298	
	100*	100.3	276	184	294	19	16	24	196	3.66	7.09	10.3	15.6	15506	4245	
	74	73.6	272	175	285	10	14	24	196	4.18	8.11	19.6	15.7	12191	3334	

For further information see the 'Slimdek® – Engineered flooring solution' brochure or refer to the contact details on page 59. Free design software is available.

The elastic and plastic neutral axis positions are measured from the upper surface of the beam.

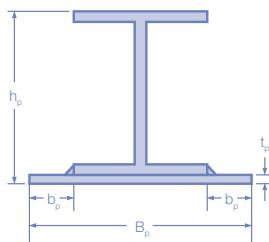
*These sections have been specially developed with thicker webs for improved performance in fire.



ASB

Elastic modulus W_{el}			Radius of gyration i		Plastic neutral axis position		Plastic modulus W_{pl}		Buckling parameter U	Torsional index X	Warping constant I_w	Torsional constant I_T	Area of section	Designation
Axis y-y top cm ³	Axis y-y bottom cm ³	Axis z-z cm ³	Axis y-y cm	Axis z-z cm	Z_p cm	Axis y-y cm ³	Axis z-z cm ³			dm ⁶	cm ⁴	cm ²	Serial size	
2757	3528	843	12.9	6.45	22.6	3761	1512	0.825	6.80	2.00	2004	317	249*	300ASB
2321	3185	714	13.6	6.48	28.1	3055	1229	0.845	7.86	1.50	1177	249	196	
1984	2547	574	12.3	6.10	21.0	2658	1030	0.822	8.56	1.20	871	235	185*	
1825	2519	553	13.2	6.35	27.3	2361	949	0.843	9.40	1.07	620	198	155	
1628	2088	456	12.1	5.93	20.4	2160	816	0.822	9.97	0.895	513	195	153*	
1367	1777	417	11.3	6.00	19.2	1806	740	0.814	10.2	0.710	379	174	136*	280ASB
1360	1891	445	12.2	6.37	25.8	1730	761	0.832	10.5	0.721	332	158	124	
1145	1604	370	12.0	6.30	25.4	1441	632	0.831	12.1	0.574	207	133	105	
995	1292	289	11.0	5.76	18.4	1295	510	0.815	13.1	0.451	160	128	100*	
776	1060	234	11.4	5.96	21.3	979	402	0.830	16.6	0.338	72.2	93.7	74	

Slimflor® Beams



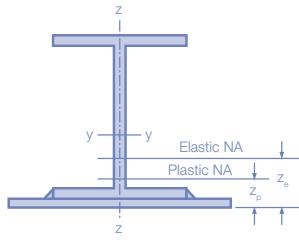
Base section		Thickness of plate mm	Width of outstand mm	Mass per metre of compound section kg/m	Depth of compound section h_p mm	Width of compound section B_p mm	Area of compound section cm²	Second moment of area I		
Serial size	Mass per metre kg/m							Elastic neutral axis position z_e cm	Axis y-y cm⁴	Axis z-z cm⁴
356x406	634	15	100	707.4	490	624	901.1	22.7	325128	128496
	551	15	100	623.8	471	619	794.7	21.5	272325	112246
	467	15	100	539.1	452	612	686.7	20.3	223580	96514
	393	15	100	464.4	434	607	591.6	19.1	182911	83323
	340	15	100	410.9	421	603	523.5	18.2	155777	74260
	287	15	100	357.6	409	599	455.6	17.2	129997	65543
	235	15	100	305.1	396	595	388.7	16.0	106050	57297
356x368	202	15	100	269.6	390	575	343.4	15.3	90779	47415
	177	15	100	244.4	383	573	311.4	14.6	79968	43997
	153	15	100	220.1	377	571	280.4	13.8	69732	40763
	129	15	100	196.0	371	569	249.6	12.9	59541	37590
305x305	283	15	100	344.4	380	522	438.8	16.4	102152	42435
	240	15	100	301.1	368	518	383.5	15.4	85149	37729
	198	15	100	258.7	355	515	329.6	14.3	69530	33323
	158	15	100	218.3	342	511	278.0	13.1	55009	29268
	137	15	100	196.9	336	509	250.8	12.4	47776	27203
	118	15	100	177.7	330	507	226.3	11.7	41397	25388
	97	15	100	156.4	323	505	199.2	10.8	34504	23435
254x254	167	15	100	221.9	304	465	282.6	12.2	42160	22454
	132	15	100	186.3	291	461	237.3	11.1	32941	19802
	107	15	100	161.1	282	459	205.2	10.1	26597	18000
	89	15	100	142.7	275	456	181.8	9.33	22366	16733
	73	15	100	126.6	269	455	161.3	8.52	18546	15651
➤ 203x203	127	15	100	176.3	256	414	224.5	10.0	22831	13783
➤ 113	15	100		162.0	250	412	206.4	9.51	20077	13034
➤ 100	15	100		147.9	244	410	188.4	8.95	17457	12313
86	15	100		134.2	237	409	171.0	8.35	14994	11686
71	15	100		118.8	231	406	151.4	7.64	12479	10927
60	15	100		107.7	225	406	137.2	7.00	10408	10418
52	15	100		99.6	221	404	126.9	6.53	9144	10038
46	15	100		93.6	218	404	119.3	6.12	8128	9766
➤ 152x152	51	15	100	93.3	185	357	118.8	5.83	5760	6729
➤ 44	15	100		85.9	181	356	109.5	5.39	4953	6495
37	15	100		78.7	177	354	100.3	4.90	4172	6270
30	15	100		71.6	173	353	91.2	4.37	3412	6054
23	15	100		64.4	167	352	82.1	3.73	2579	5861

Dimensions and properties to BS4-1.

Slimflor® Beams are based on the range of UKC sections from Tata Steel.

➤ These sizes are in addition to our standard range of BS4 sections.

The elastic and plastic neutral axis positions are measured from the underside of the plate.

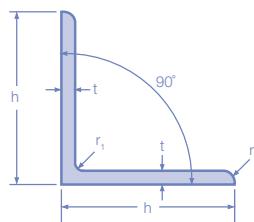


SFB

Elastic modulus W_{el}			Radius of gyration i		Plastic neutral axis position		Plastic modulus W_{pl}		Buckling parameter U	Torsional index X	Warping constant I_w	Torsional constant I_T	Base section	
Axis y-y top cm ³	Axis y-y bottom cm ³	Axis z-z cm ³	Axis y-y cm	Axis z-z cm	z_p cm	Axis y-y cm ³	Axis z-z cm ³			dm ⁶	cm ⁴	Mass per metre kg/m	Serial size	
12375	14331	4118	19.0	11.9	15.4	16065	8568	0.797	6.31	57.4	13790	634	356x406	
10668	12647	3630	18.5	11.9	13.3	13747	7492	0.793	6.98	46.3	9310	551		
8997	11008	3153	18.0	11.9	10.5	11486	6440	0.787	7.89	36.4	5878	467		
7530	9571	2745	17.6	11.9	7.57	9520	5535	0.776	9.03	28.7	3613	393		
6501	8569	2463	17.3	11.9	5.75	8139	4907	0.764	10.15	23.7	2411	340		
5483	7580	2188	16.9	12.0	4.96	6788	4295	0.748	11.68	19.2	1508	287		
4495	6626	1927	16.5	12.1	4.16	5491	3710	0.724	13.77	15.1	879	235		
3843	5918	1650	16.3	11.8	3.78	4687	3158	0.723	15.18	11.6	623	202	356x368	
3375	5468	1537	16.0	11.9	3.37	4085	2900	0.703	16.86	9.98	445	177		
2923	5036	1429	15.8	12.1	2.97	3510	2655	0.677	18.77	8.51	315	153		
2469	4598	1322	15.4	12.3	2.57	2943	2411	0.643	21.06	7.08	217	129		
4716	6240	1625	15.3	9.83	5.88	6024	3365	0.782	8.90	10.3	2093	283	305x305	
3988	5529	1456	14.9	9.92	5.08	5040	2958	0.767	10.14	8.25	1329	240		
3287	4849	1295	14.5	10.1	4.29	4104	2573	0.744	11.84	6.46	792	198		
2610	4187	1145	14.1	10.3	3.50	3226	2210	0.710	14.23	4.88	436	158		
2261	3848	1068	13.8	10.4	3.09	2775	2025	0.685	15.86	4.12	306	137		
1947	3543	1001	13.5	10.6	2.71	2374	1861	0.654	17.59	3.46	218	118		
1602	3209	928	13.2	10.8	2.28	1939	1683	0.606	19.71	2.78	148	97		
2315	3455	965	12.2	8.91	4.20	2936	1949	0.721	9.98	2.87	678	167	254x254	
1824	2976	859	11.8	9.13	3.39	2281	1676	0.679	11.94	2.12	371	132		
1473	2630	785	11.4	9.37	2.81	1826	1486	0.628	13.90	1.63	224	107		
1229	2397	733	11.1	9.60	2.38	1506	1356	0.575	15.51	1.31	153	89		
1008	2178	689	10.7	9.85	1.99	1228	1240	0.493	17.03	1.04	109	73		
1462	2277	666	10.1	7.83	3.85	1890	1347	0.684	8.82	1.033	474	127	203x203	
1296	2112	633	9.86	7.95	3.45	1664	1255	0.657	9.61	0.877	351	113		
1133	1950	600	9.63	8.08	3.05	1445	1166	0.620	10.52	0.734	256	100		
976	1795	571	9.36	8.27	2.65	1236	1084	0.566	11.60	0.608	183	86		
808	1633	538	9.08	8.50	2.21	1011	993	0.477	12.86	0.481	126	71		
673	1487	513	8.71	8.71	1.88	843	923	0.000	13.93	0.381	93	60		
586	1401	497	8.49	8.89	1.64	728	877	0.000	14.50	0.324	77	52		
518	1328	484	8.25	9.05	1.48	642	842	0.000	14.86	0.278	68	46		
454	988	377	6.96	7.53	1.87	593	678	0.000	10.62	0.124	89	51	152x152	
390	920	365	6.73	7.70	1.59	505	644	0.000	11.13	0.102	72	44		
327	851	354	6.45	7.91	1.41	421	611	0.000	11.51	0.081	59	37		
265	781	343	6.12	8.15	1.29	340	579	0.000	11.66	0.062	50	30		
198	691	333	5.61	8.45	1.17	259	545	0.000	11.49	0.043	44	23		

Advance® UK Angles

Equal Angles

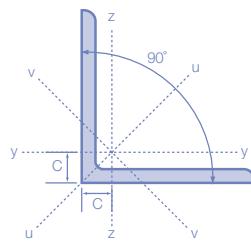


Designation						Distance to centre of gravity	Second moment of area		
Serial size h x h mm x mm	Thickness t mm	Mass per metre kg/mm	Root radius r ₁ mm	Toe radius r ₂ mm	Area of section cm ²		Axis y-y, z-z cm ⁴	I Axis u-u cm ⁴	Axis v-v cm ⁴
200x200	24	71.1	18	9.0	90.6	5.84	3331	5280	1380
	20	59.9	18	9.0	76.3	5.68	2851	4530	1170
	18	54.2	18	9.0	69.1	5.60	2600	4150	1050
	16	48.5	18	9.0	61.8	5.52	2342	3720	960
➤ 150x150	18	40.1	16	8.0	51.0	4.37	1050	1680	440
	15	33.8	16	8.0	43.0	4.25	898	1430	370
	12	27.3	16	8.0	34.8	4.12	737	1170	303
	10	23.0	16	8.0	29.3	4.03	624	990	258
➤ 120x120	15	26.6	13	6.5	33.9	3.51	445	710	186
	12	21.6	13	6.5	27.5	3.40	368	584	152
	10	18.2	13	6.5	23.2	3.31	313	497	129
	8	14.7	13	6.5	18.7	3.23	256	411	107
➤ 100x100	15	21.9	12	6.0	27.9	3.02	249	395	105
	12	17.8	12	6.0	22.7	2.90	207	328	85.7
	10	15.0	12	6.0	19.2	2.82	177	280	73.0
	8	12.2	12	6.0	15.5	2.74	145	230	59.9
➤ 90x90	12	15.9	11	5.5	20.3	2.66	148	235	62.0
	10	13.4	11	5.5	17.1	2.58	127	201	52.6
	8	10.9	11	5.5	13.9	2.50	104	166	43.1
	7	9.6	11	5.5	12.2	2.45	92.6	147	38.3

Dimensions and properties to BS EN 10056-1.

➤ These sizes are in addition to our standard range to the BS EN 10056-1 specification.

* Values in italics indicate the section is Class 4 in pure compression and allowance has been made in calculating the resistance.

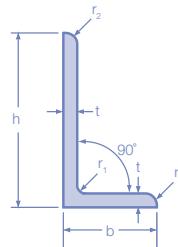


UKA

Axis y-y, z-z cm	Radius of gyration i	Axis u-u cm	Axis v-v cm	Elastic modulus W_{el}	Torsional constant I_T cm ⁴	Equivalent slenderness coefficient Φa	Indicative $N_{b,Rd}^*$ values for S355 steel for $Lcr=3.5m$ kN	Designation	
	Axis y-y, z-z cm			Axis y-y, z-z cm				Thickness t mm	Serial size h x h mm x mm
6.06	7.63	3.90		235	182	2.50	1560	24	200x200
6.11	7.71	3.92		199	107	3.05	1320	20	
6.13	7.75	3.90		181	78.9	3.43	1190	18	
6.16	7.76	3.94		162	56.1	3.85	1050	16	
4.54	5.74	2.94		98.8	58.6	2.48	653	18	150x150
4.57	5.77	2.93		83.5	34.6	3.01	555	15	
4.60	5.80	2.95		67.8	18.2	3.77	440	12	
4.62	5.81	2.97		56.9	10.8	4.51	352	10	
3.62	4.58	2.34		52.4	27.0	2.37	329	15	120x120
3.65	4.61	2.35		42.7	14.2	2.99	268	12	
3.67	4.63	2.36		36.0	8.41	3.61	224	10	
3.69	4.69	2.39		29.1	4.44	4.56	173	8	
2.98	3.76	1.94		35.6	22.3	1.92	208	15	100x100
3.02	3.80	1.94		29.1	11.8	2.44	168	12	
3.04	3.82	1.95		24.6	6.97	2.94	143	10	
3.06	3.85	1.97		20.0	3.68	3.70	115	8	
2.70	3.40	1.75		23.4	10.5	2.17	129	12	90x90
2.72	3.43	1.75		19.8	6.20	2.64	109	10	
2.74	3.46	1.76		16.1	3.28	3.33	89.1	8	
2.75	3.47	1.77		14.1	2.24	3.80	77.2	7	

Advance® UK Angles

Unequal Angles

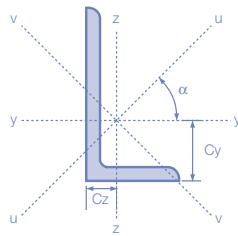


Designation						Distance to centre of gravity		Second moment of area			
Serial size h x b mm x mm	Thickness t mm	Mass per metre kg/mm	Root radius r ₁ mm	Toe radius r ₂ mm	Area of section cm ²	C _y cm	C _z cm	Axis I y-y cm ⁴	Axis I z-z cm ⁴	Axis I u-u cm ⁴	Axis I v-v cm ⁴
➤ 200x150	18	47.1	15	7.5	60.0	6.33	3.85	2376	1146	2920	623
	15	39.6	15	7.5	50.5	6.21	3.73	2023	979	2480	526
	12	32.0	15	7.5	40.8	6.08	3.61	1653	803	2030	430
200x100	15	33.7	15	7.5	43.0	7.16	2.22	1759	299	1860	193
	12	27.3	15	7.5	34.8	7.03	2.10	1441	247	1530	159
	10	23.0	15	7.5	29.2	6.93	2.01	1219	210	1290	135
150x90	15	26.6	12	6.0	33.9	5.21	2.23	761	205	841	126
	12	21.6	12	6.0	27.5	5.08	2.12	627	171	694	104
	10	18.2	12	6.0	23.2	5.00	2.04	533	146	591	88.3
150x75	15	24.8	12	6.0	31.7	5.52	1.81	713	119	753	78.6
	12	20.2	12	6.0	25.7	5.40	1.69	589	99.6	623	64.7
	10	17.0	12	6.0	21.7	5.31	1.61	501	85.4	531	55.1
125x75	12	17.8	11	5.5	22.7	4.31	1.84	354	95.5	391	58.5
	10	15.0	11	5.5	19.1	4.23	1.76	302	82.1	334	49.9
	8	12.2	11	5.5	15.5	4.14	1.68	247	67.6	274	40.9
100x75	12	15.4	10	5.0	19.7	3.27	2.03	189	90.2	230	49.5
	10	13.0	10	5.0	16.6	3.19	1.95	162	77.6	197	42.2
	8	10.6	10	5.0	13.5	3.10	1.87	133	64.1	162	34.6
➤ 100x65	10	12.3	10	5.0	15.6	3.36	1.63	154	51.0	175	30.1
➤ 8	9.9	10	5.0	12.7	3.27	1.55	127	42.2	144	24.8	
➤ 7	8.8	10	5.0	11.2	3.23	1.51	113	37.6	128		22.0

Dimensions and properties to BS EN 10056-1.

➤ These sizes are in addition to our standard range to the BS EN 10056-1 specification.

* Values in italics indicate the section is Class 4 in pure compression and allowance has been made in calculating the resistance.

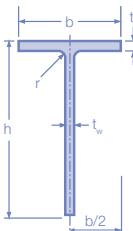


Radius of gyration i				Elastic modulus W_{el}		Angle Axis y-y to Axis u-u $\tan \alpha$	Torsional constant	Equivalent slenderness coefficient		Mono-symmetry index	Indicative $N_{b,z,Rd}^*$ values for S355 steel for $Lcr=3.5m$		Designation	
Axis y-y cm	Axis z-z cm	Axis u-u cm	Axis v-v cm	Axis y-y cm	Axis z-z cm ³			Min. Φa	Max. Φa	Ψa	kN	t mm	Serial size h x b mm x mm	
6.29	4.37	6.98	3.22	174	103	0.549	67.9	2.93	3.72	4.60	854	18	200x150	
6.33	4.40	7.01	3.23	147	86.9	0.551	39.9	3.53	4.50	5.55	691	15		
6.36	4.44	7.05	3.25	119	70.5	0.552	20.9	4.43	5.70	6.97	515	12		
6.40	2.64	6.58	2.12	137	38.4	0.260	34.3	3.54	5.17	9.19	350	15	200x100	
6.43	2.67	6.63	2.14	111	31.3	0.262	18.0	4.42	6.57	11.5	271	12		
6.46	2.68	6.65	2.15	93.3	26.3	0.263	10.7	5.26	7.92	13.9	217	10		
4.74	2.46	4.98	1.93	77.7	30.4	0.354	26.8	2.58	3.59	5.96	249	15	150x90	
4.78	2.49	5.02	1.94	63.3	24.8	0.358	14.1	3.24	4.58	7.50	200	12		
4.80	2.51	5.05	1.95	53.3	21.0	0.360	8.30	3.89	5.56	9.03	164	10		
4.75	1.94	4.87	1.57	75.2	21.0	0.253	25.1	2.62	3.74	6.84	172	15	150x75	
4.78	1.97	4.92	1.59	61.3	17.1	0.258	13.2	3.30	4.79	8.60	139	12		
4.81	1.99	4.95	1.59	51.7	14.5	0.261	7.80	3.95	5.83	10.4	114	10		
3.95	2.05	4.15	1.61	43.2	16.9	0.354	11.6	2.66	3.73	6.23	127	12	125x75	
3.97	2.07	4.18	1.62	36.5	14.3	0.357	6.87	3.21	4.55	7.50	105	10		
4.00	2.09	4.20	1.62	29.6	11.6	0.360	3.62	4.00	5.75	9.43	83.4	8		
3.10	2.14	3.42	1.59	28.1	16.5	0.540	10.0	2.10	2.64	3.46	108	12	100x75	
3.12	2.16	3.44	1.59	23.8	14.0	0.544	5.95	2.54	3.22	4.17	91	10		
3.14	2.18	3.46	1.60	19.3	11.4	0.547	3.13	3.18	4.08	5.24	73.6	8		
3.14	1.81	3.35	1.39	23.2	10.5	0.410	5.61	2.52	3.43	5.45	69.1	10	100x65	
3.16	1.83	3.37	1.40	18.9	8.54	0.413	2.96	3.14	4.35	6.86	56.1	8		
3.17	1.83	3.38	1.40	16.6	7.53	0.415	2.02	3.58	5.00	7.85	48.5	7		

Dimensions and properties

Advance® UK Tees

Split from Advance® UK Beams



Designation										Ratios for local buckling	Dimension	Second moment of area I	
Serial size	Mass per metre kg/m	Cut from UKB	Width of section b mm	Depth of section h mm	Thickness of web t_w mm	Thickness of flange t_f mm	Root radius r mm	Flange c_f/t_f	Web c_w/t_w			c_y cm	Axis z-z cm^4
254x343	63	62.6	686x254x125	253.0	338.9	11.7	16.2	15.2	6.51	29.0	8.85	8976	2191
► 305x305	119	119.0	610x305x238	311.4	317.9	18.4	31.4	16.5	4.14	17.3	7.11	12355	7918
	90	89.5	610x305x179	307.1	310.0	14.1	23.6	16.5	5.51	22.0	6.69	9043	5704
	75	74.6	610x305x149	304.8	306.1	11.8	19.7	16.5	6.6	25.9	6.45	7415	4654
229x305	70	69.9	610x229x140	230.2	308.5	13.1	22.1	12.7	4.34	23.5	7.61	7741	2253
	63	62.5	610x229x125	229.0	306.0	11.9	19.6	12.7	4.89	25.7	7.54	6898	1966
	57	56.5	610x229x113	228.2	303.7	11.1	17.3	12.7	5.54	27.4	7.58	6265	1717
	51	50.6	610x229x101	227.6	301.2	10.5	14.8	12.7	6.48	28.7	7.78	5691	1457
► 178x305	50	50.1	610x178x100	179.2	303.7	11.3	17.2	12.7	4.14	26.9	8.57	5893	829
	46	46.1	610x178x92	178.8	301.5	10.9	15.0	12.7	4.75	27.7	8.78	5454	718
	41	40.9	610x178x82	177.9	299.3	10.0	12.8	12.7	5.57	29.9	8.88	4842	603
► 312x267	137	136.7	533x312x272	320.2	288.8	21.1	37.6	12.7	3.64	13.7	6.28	10606	10308
	110	109.4	533x312x219	317.4	280.4	18.3	29.2	12.7	4.69	15.3	6.09	8529	7795
	91	90.7	533x312x182	314.5	275.6	15.2	24.4	12.7	5.61	18.1	5.78	6894	6333
	75	75.3	533x312x150	312.0	271.5	12.7	20.3	12.7	6.75	21.4	5.54	5616	5143
► 210x267	69	69.1	533x210x138	213.9	274.5	14.7	23.6	12.7	3.68	18.7	6.94	5986	1932
	61	61.0	533x210x122	211.9	272.2	12.7	21.3	12.7	4.08	21.4	6.66	5161	1694
	55	54.5	533x210x109	210.8	269.7	11.6	18.8	12.7	4.62	23.3	6.61	4604	1471
	51	50.5	533x210x101	210.0	268.3	10.8	17.4	12.7	4.99	24.8	6.53	4245	1346
	46	46.0	533x210x92	209.3	266.5	10.1	15.6	12.7	5.57	26.4	6.55	3885	1195
	41	41.1	533x210x82	208.8	264.1	9.6	13.2	12.7	6.58	27.5	6.75	3527	1004
► 165x267	43	42.3	533x165x85	166.5	267.1	10.3	16.5	12.7	3.96	25.9	7.23	3750	637
	37	37.4	533x165x74	165.9	264.5	9.7	13.6	12.7	4.81	27.3	7.46	3352	520
	33	32.8	533x165x66	165.1	262.4	8.9	11.4	12.7	5.74	29.5	7.59	2960	429
► 191x229	81	80.7	457x191x161	199.4	246.0	18.0	32.0	10.2	2.52	13.7	6.22	5162	2125
	67	66.6	457x191x133	196.7	240.3	15.3	26.3	10.2	3.06	15.7	5.96	4178	1675
	53	52.9	457x191x106	194.0	234.6	12.6	20.6	10.2	3.91	18.6	5.73	3264	1257
	49	49.1	457x191x98	192.8	233.5	11.4	19.6	10.2	4.11	20.5	5.53	2967	1174
	45	44.6	457x191x89	191.9	231.6	10.5	17.7	10.2	4.55	22.1	5.47	2684	1045
	41	41.0	457x191x82	191.3	229.9	9.9	16.0	10.2	5.03	23.2	5.47	2474	935
	37	37.1	457x191x74	190.4	228.4	9.0	14.5	10.2	5.55	25.4	5.38	2224	836
	34	33.5	457x191x67	189.9	226.6	8.5	12.7	10.2	6.34	26.7	5.46	2034	726
152x229	41	41.0	457x152x82	155.3	232.8	10.5	18.9	10.2	3.29	22.2	5.96	2596	592
	37	37.1	457x152x74	154.4	230.9	9.6	17.0	10.2	3.66	24.1	5.88	2332	523
	34	33.6	457x152x67	153.8	228.9	9.0	15.0	10.2	4.15	25.4	5.91	2121	456
	30	29.9	457x152x60	152.9	227.2	8.1	13.3	10.2	4.68	28.0	5.84	1879	397
	26	26.1	457x152x52	152.4	224.8	7.6	10.9	10.2	5.71	29.6	6.04	1670	322

Dimensions and properties to BS4-1.

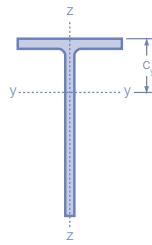
► These sizes are in addition to our standard range of BS4 sections.

* Note that the warping constant units are cm⁶ not dm⁶.

Properties have been calculated assuming that there is no loss of material owing to splitting.

The buckling parameter is omitted when the second moment of area about the z-z axis exceeds that about the y-y axis as lateral torsional buckling due to bending about the y-y axis is not possible.

Non-standard offline process – please consult with Tata Steel for availability – see pages 59.



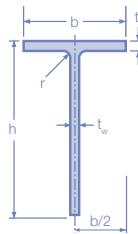
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Radius of gyration i		Elastic modulus			Plastic modulus		Buckling parameter U	Torsional index X	Mono-symmetry index ψ	Warping constant (*) I_w	Torsional constant I_T	Area of section	Designation
Axis y-y cm	Axis z-z cm	Axis y-y Flange cm ³	W _{el} Axis y-y cm ³	Axis z-z cm ³	Axis y-y W _{pl} cm ³	Axis z-z cm ³				cm ⁶	cm ⁴	cm ²	Serial size
10.6	5.24	1014	358	173	643	271	0.651	22.0	0.740	2089	57.9	79.7	63 254x343
9.03	7.23	1738	501	509	894	787	0.483	10.6	0.662	11268	391	152	119 305x305
8.91	7.07	1353	372	371	656	572	0.484	13.8	0.664	4709	170	114	90
8.83	7.00	1150	307	305	538	469	0.483	16.4	0.666	2690	99.8	95.0	75
9.32	5.03	1017	333	196	592	306	0.613	15.3	0.727	2558	108	89.1	70 229x305
9.31	4.97	915	299	172	531	268	0.617	17.1	0.728	1844	76.9	79.7	63
9.33	4.88	826	275	150	489	235	0.626	19.0	0.731	1403	55.5	72.0	57
9.40	4.76	732	255	128	456	200	0.644	21.6	0.736	1081	38.3	64.4	51
9.60	3.60	688	270	92.5	490	148	0.694	19.4	0.768	1233	47.3	63.9	50 178x305
9.64	3.50	621	255	80.3	468	129	0.710	21.5	0.774	1048	35.3	58.7	46
9.64	3.40	545	230	67.8	425	109	0.722	24.3	0.778	780	24.3	52.1	41
7.81	7.69	1688	469	644	857	993	0.247	7.96	0.613	17255	642	174	137 312x267
7.82	7.48	1400	389	491	696	757	0.332	9.93	0.617	8725	320	139	110
7.72	7.40	1193	317	403	562	619	0.324	11.7	0.618	4921	186	116	91
7.65	7.32	1014	260	330	458	505	0.326	14.0	0.619	2780	108	95.9	75
8.24	4.68	862	292	181	520	284	0.609	12.5	0.719	2493	125	88.1	69 210x267
8.15	4.67	775	251	160	446	250	0.600	13.8	0.719	1657	88.9	77.7	61
8.14	4.60	697	226	140	401	218	0.605	15.5	0.721	1197	63.0	69.4	55
8.12	4.57	650	209	128	371	200	0.606	16.6	0.722	951	50.3	64.3	51
8.14	4.51	593	193	114	343	178	0.613	18.3	0.724	737	37.7	58.7	46
8.21	4.38	523	179	96.1	320	150	0.634	20.8	0.730	565	25.7	52.3	41
8.34	3.44	519	192	76.6	346	122	0.672	17.7	0.758	670	36.8	54.0	43 165x267
8.39	3.30	449	176	62.7	321	100	0.693	20.6	0.765	514	23.9	47.6	37
8.41	3.20	390	159	52.0	291	83.1	0.708	23.6	0.771	378	15.9	41.9	33
7.09	4.55	830	281	213	507	336	0.573	8.24	0.699	3775	256	103	81 191x229
7.01	4.44	702	231	170	414	267	0.576	9.82	0.702	2127	146	84.9	67
6.96	4.32	569	184	130	328	203	0.583	12.2	0.706	1070	72.6	67.4	53
6.88	4.33	536	167	122	296	189	0.573	12.9	0.705	835	60.5	62.6	49
6.87	4.29	491	152	109	269	169	0.576	14.1	0.706	628	45.2	56.9	45
6.88	4.23	452	141	97.8	250	152	0.583	15.5	0.709	494	34.5	52.2	41
6.86	4.20	413	127	87.8	225	136	0.583	16.9	0.709	365	25.8	47.3	37
6.90	4.12	372	118	76.5	209	119	0.597	18.9	0.713	280	18.5	42.7	34
7.05	3.37	436	150	76.3	267	120	0.634	13.7	0.740	534	44.5	52.3	41 152x229
7.03	3.33	397	135	67.8	242	107	0.636	15.1	0.742	396	32.9	47.2	37
7.04	3.27	359	125	59.3	223	93.3	0.646	16.8	0.745	305	23.8	42.8	34
7.02	3.23	322	111	52.0	199	81.5	0.648	18.8	0.746	217	16.9	38.1	30
7.08	3.11	276	102	42.3	183	66.6	0.671	22.0	0.753	161	10.7	33.3	26

Dimensions and properties

Advance® UK Tees

Split from Advance® UK Beams



Designation										Ratios for local buckling	Dimension	Second moment of area I	
Serial size	Mass per metre kg/m	Cut from UKB	Width of section b mm	Depth of section h mm	Thickness of web t_w mm	Thickness of flange t_f mm	Root radius r mm	Flange c_f/t_f	Web c_w/t_w			c_y cm	Axis z-z cm^4
> 178x203	43	42.6	406x178x85	181.9	208.6	10.9	18.2	10.2	4.14	19.1	4.91	2028	915
	37	37.1	406x178x74	179.5	206.3	9.5	16.0	10.2	4.68	21.7	4.76	1736	773
	34	33.5	406x178x67	178.8	204.6	8.8	14.3	10.2	5.23	23.3	4.73	1573	682
	30	30.0	406x178x60	177.9	203.1	7.9	12.8	10.2	5.84	25.7	4.64	1395	602
	27	27.0	406x178x54	177.7	201.2	7.7	10.9	10.2	6.86	26.1	4.83	1294	511
> 140x203	27	26.6	406x140x53	143.3	203.3	7.9	12.9	10.2	4.46	25.7	5.16	1320	317
	23	23.0	406x140x46	142.2	201.5	6.8	11.2	10.2	5.13	29.6	5.02	1123	269
	20	19.5	406x140x39	141.8	198.9	6.4	8.6	10.2	6.69	31.1	5.32	979	205
171x178	34	33.5	356x171x67	173.2	181.6	9.1	15.7	10.2	4.58	20.0	4.00	1154	681
	29	28.5	356x171x57	172.2	178.9	8.1	13.0	10.2	5.53	22.1	3.97	986	554
	26	25.5	356x171x51	171.5	177.4	7.4	11.5	10.2	6.25	24.0	3.94	882	484
	23	22.5	356x171x45	171.1	175.6	7.0	9.7	10.2	7.41	25.1	4.05	798	406
127x178	20	19.5	356x127x39	126.0	176.6	6.6	10.7	10.2	4.63	26.8	4.43	728	179
	17	16.5	356x127x33	125.4	174.4	6.0	8.5	10.2	5.82	29.1	4.56	626	140
165x152	27	27.0	305x165x54	166.9	155.1	7.9	13.7	8.9	5.15	19.6	3.21	642	531
	23	23.0	305x165x46	165.7	153.2	6.7	11.8	8.9	5.98	22.9	3.07	536	448
	20	20.1	305x165x40	165.0	151.6	6.0	10.2	8.9	6.92	25.3	3.03	468	382
127x152	24	24.0	305x127x48	125.3	155.4	9.0	14.0	8.9	3.52	17.3	3.94	662	231
	21	20.9	305x127x42	124.3	153.5	8.0	12.1	8.9	4.07	19.2	3.87	573	194
	19	18.5	305x127x37	123.4	152.1	7.1	10.7	8.9	4.60	21.4	3.78	501	168
102x152	17	16.4	305x102x33	102.4	156.3	6.6	10.8	7.6	3.73	23.7	4.14	487	97.1
	14	14.1	305x102x28	101.8	154.3	6.0	8.8	7.6	4.58	25.7	4.20	420	77.7
	13	12.4	305x102x25	101.6	152.5	5.8	7.0	7.6	5.76	26.3	4.43	377	61.5
146x127	22	21.5	254x146x43	147.3	129.7	7.2	12.7	7.6	4.92	18.0	2.64	343	339
	19	18.5	254x146x37	146.4	127.9	6.3	10.9	7.6	5.73	20.3	2.55	292	285
	16	15.5	254x146x31	146.1	125.6	6.0	8.6	7.6	7.26	20.9	2.66	259	224
102x127	14	14.1	254x102x28	102.2	130.1	6.3	10.0	7.6	4.04	20.7	3.24	277	89.3
	13	12.6	254x102x25	101.9	128.5	6.0	8.4	7.6	4.80	21.4	3.32	250	74.3
	11	11.0	254x102x22	101.6	126.9	5.7	6.8	7.6	5.93	22.3	3.45	223	59.7
133x102	15	15.0	203x133x30	133.9	103.3	6.4	9.6	7.6	5.85	16.1	2.11	154	192
	13	12.5	203x133x25	133.2	101.5	5.7	7.8	7.6	7.20	17.8	2.10	131	154

Dimensions and properties to BS4-1.

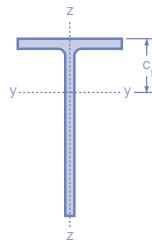
> These sizes are in addition to our standard range of BS4 sections.

* Note that the warping constant units are cm⁶ not dm⁶.

Properties have been calculated assuming that there is no loss of material owing to splitting.

The buckling parameter is omitted when the second moment of area about the z-z axis exceeds that about the y-y axis as lateral torsional buckling due to bending about the y-y axis is not possible.

Non-standard offline process – please consult with Tata Steel for availability – see pages 59.



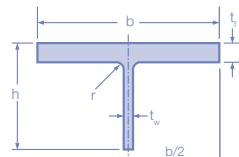
UKT

Radius of gyration <i>i</i>		Elastic modulus			Plastic modulus		Buckling parameter <i>U</i>	Torsional index <i>X</i>	Mono-symmetry index <i>ψ</i>	Warping constant (*) <i>I_w</i>	Torsional constant <i>I_T</i>	Area of section	Designation
Axis y-y cm	Axis z-z cm	Axis y-y Flange cm ³	W _{el} Axis y-y cm ³	Axis z-z cm ³	Axis y-y W _{pl} cm ³	Axis z-z cm ³				cm ⁶	cm ⁴	cm ²	Serial size
6.11	4.11	413	127	101	226	157	0.556	12.2	0.694	538	46.3	54.3	43 178x203
6.06	4.04	365	109	86.1	194	133	0.555	13.8	0.696	350	31.3	47.2	37
6.07	3.99	332	100	76.3	177	118	0.561	15.2	0.698	262	23.0	42.8	34
6.04	3.97	301	89.0	67.6	157	104	0.561	16.9	0.699	186	16.6	38.3	30
6.13	3.85	268	84.6	57.5	150	89.1	0.588	19.2	0.705	146	11.5	34.5	27
6.23	3.06	256	87.0	44.3	155	69.5	0.636	17.1	0.739	148	14.4	34.0	27 140x203
6.19	3.03	224	74.2	37.8	132	59.0	0.633	19.5	0.740	93.7	9.49	29.3	23
6.28	2.87	184	67.2	28.9	121	45.4	0.668	23.8	0.750	66.3	5.33	24.8	20
5.20	3.99	288	81.5	78.6	145	121	0.500	12.2	0.672	249	27.8	42.7	34 171x178
5.21	3.91	248	70.9	64.4	125	99.4	0.514	14.4	0.676	154	16.6	36.3	29
5.21	3.86	224	63.9	56.5	113	87.1	0.521	16.1	0.677	110	11.9	32.4	26
5.28	3.76	197	59.1	47.4	104	73.3	0.546	18.4	0.683	79.2	7.90	28.7	23
5.41	2.68	164	55.0	28.4	98.0	44.5	0.632	17.6	0.739	57.1	7.53	24.9	20 127x178
5.45	2.58	137	48.6	22.3	87.2	35.1	0.655	21.1	0.746	38.0	4.38	21.1	17
4.32	3.93	200	52.2	63.7	92.8	97.8	0.389	11.8	0.636	128	17.3	34.4	27 165x152
4.27	3.91	174	43.7	54.1	77.1	82.8	0.380	13.6	0.636	78.6	11.1	29.4	23
4.27	3.86	155	38.6	46.3	67.6	70.9	0.393	15.5	0.638	52.0	7.35	25.7	20
4.65	2.74	168	57.1	36.8	102	58.0	0.602	11.7	0.714	104	15.8	30.6	24 127x152
4.63	2.70	148	49.9	31.3	88.9	49.2	0.606	13.3	0.716	69.2	10.5	26.7	21
4.61	2.67	132	43.8	27.2	77.9	42.7	0.606	14.9	0.718	47.4	7.36	23.6	19
4.82	2.15	118	42.3	19.0	75.8	30.0	0.656	15.8	0.749	36.8	6.08	20.9	17 102x152
4.84	2.08	100	37.4	15.3	67.5	24.2	0.673	18.7	0.756	25.2	3.69	17.9	14
4.88	1.97	85	34.8	12.1	63.9	19.4	0.705	21.8	0.766	20.4	2.37	15.8	13
3.54	3.52	130	33.2	46.0	59.5	70.5	0.202	10.6	0.613	64.9	11.9	27.4	22 146x127
3.52	3.48	115	28.5	39.0	50.7	59.7	0.233	12.2	0.616	41.0	7.65	23.6	19
3.61	3.36	97.4	26.2	30.6	46.0	47.1	0.376	14.8	0.623	24.5	4.26	19.8	16
3.92	2.22	85.5	28.3	17.5	50.4	27.4	0.607	13.8	0.720	21.0	4.77	18.0	14 102x127
3.95	2.15	75.3	26.2	14.6	46.9	23.0	0.628	15.8	0.727	15.9	3.20	16.0	13
3.99	2.06	64.5	24.1	11.7	43.5	18.6	0.656	18.2	0.736	12.0	2.06	14.0	11
2.84	3.17	73.1	18.8	28.7	33.5	44.1	-	10.7	0.569	21.7	5.13	19.1	15 133x102
2.86	3.10	62.4	16.2	23.1	28.7	35.5	-	12.8	0.572	12.6	2.97	16.0	13

Dimensions and properties

Advance® UK Tees

Split from Advance® UK Columns



Designation										Ratios for local buckling	Dimension	Second moment of area	
Serial size	Mass per metre kg/m	Cut from UKC	Width of section b mm	Depth of section h mm	Thickness of web t_w mm	Thickness of flange t_f mm	Root radius r mm	Flange c_r/t_f	Web c_w/t_w			c_y cm	Axis z-z cm^4
305x152	79	79.0	305x305x158	311.2	163.5	15.8	25.0	15.2	5.30	10.3	3.04	1532	6285
	69	68.4	305x305x137	309.2	160.2	13.8	21.7	15.2	6.11	11.6	2.86	1286	5350
	59	58.9	305x305x118	307.4	157.2	12.0	18.7	15.2	7.09	13.1	2.69	1079	4530
	49	48.4	305x305x97	305.3	153.9	9.9	15.4	15.2	8.60	15.5	2.50	858	3654
➤ 254x127	84	83.5	254x254x167	265.2	144.5	19.2	31.7	12.7	3.48	7.53	3.07	1199	4935
	66	66.0	254x254x132	261.3	138.1	15.3	25.3	12.7	4.36	9.03	2.70	871	3766
	54	53.5	254x254x107	258.8	133.3	12.8	20.5	12.7	5.38	10.4	2.45	676	2964
	45	44.4	254x254x89	256.3	130.1	10.3	17.3	12.7	6.38	12.6	2.21	524	2429
	37	36.5	254x254x73	254.6	127.0	8.6	14.2	12.7	7.77	14.8	2.05	417	1954
➤ 203x102	64	63.7	203x203x127	213.9	120.7	18.1	30.1	10.2	2.91	6.67	2.73	637	2460
➤ 57	56.7	203x203x113	212.1	117.5	16.3	26.9	10.2	3.26	7.21	2.56	540	2143	
➤ 50	49.8	203x203x100	210.3	114.3	14.5	23.7	10.2	3.70	7.88	2.38	453	1840	
43	43.0	203x203x86	209.1	111.0	12.7	20.5	10.2	4.29	8.74	2.20	373	1564	
36	35.5	203x203x71	206.4	107.8	10.0	17.3	10.2	5.09	10.8	1.95	280	1269	
30	30.0	203x203x60	205.8	104.7	9.4	14.2	10.2	6.20	11.1	1.89	244	1032	
26	26.0	203x203x52	204.3	103.0	7.9	12.5	10.2	7.04	13.0	1.75	200	889	
23	23.0	203x203x46	203.6	101.5	7.2	11.0	10.2	8.00	14.1	1.69	177	774	
➤ 152x76	26	25.6	152x152x51	157.4	85.1	11.0	15.7	7.6	4.18	7.74	1.79	141	511
➤ 22	22.0	152x152x44	155.9	83.0	9.5	13.6	7.6	4.82	8.74	1.66	116	430	
19	18.5	152x152x37	154.4	80.8	8.0	11.5	7.6	5.70	10.1	1.53	93.1	353	
15	15.0	152x152x30	152.9	78.7	6.5	9.4	7.6	6.98	12.1	1.41	72.2	280	
12	11.5	152x152x23	152.2	76.1	5.8	6.8	7.6	9.65	13.1	1.39	58.5	200	

Dimensions and properties to BS4-1.

➤ These sizes are in addition to our standard range of BS4 sections.

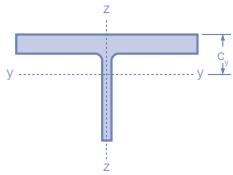
* Note that the warping constant units are cm^6 not dm^6 .

Properties have been calculated assuming that there is no loss of material owing to splitting.

Values for the buckling parameter u and torsional index x are not given as the second moment of area about the z-z axis

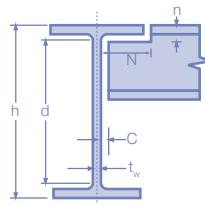
exceeds that about the y-y axis and lateral torsional buckling due to bending about the y-y axis is not possible.

Non-standard offline process – please consult with Tata Steel for availability – see pages 59.



UKT

Radius of gyration i		Elastic modulus W_{el}			Plastic modulus W_{pl}			Mono-symmetry index ψ	Warping constant (*) I_w	Torsional constant I_T	Area of section	Designation
Axis y-y cm	Axis z-z cm	Axis y-y Flange cm ³	Axis y-y Toe cm ³	Axis z-z cm ³	Axis y-y cm ³	Axis z-z cm ³		cm ⁶	cm ⁴	cm ²		Serial size
3.90	7.90	503	115	404	225	615	0.268	3647	188	101	79	305x152
3.84	7.83	450	97.7	346	188	526	0.263	2341	124	87.2	69	
3.79	7.77	401	82.8	295	156	448	0.262	1474	80.3	75.1	59	
3.73	7.69	343	66.5	239	123	363	0.258	806	45.5	61.7	49	
3.36	6.81	391	105	372	220	569	0.261	4545	312	106	84	254x127
3.22	6.69	323	78.3	288	159	439	0.250	2203	159	84.1	66	
3.15	6.59	276	62.1	229	122	348	0.245	1146	85.9	68.2	54	
3.04	6.55	237	48.5	190	94.0	288	0.242	660	51.1	56.7	45	
2.99	6.48	204	39.2	153	74.0	233	0.236	359	28.8	46.5	37	
2.80	5.50	233	68.2	230	145	352	0.279	2048	212	81.2	64	203x102
2.73	5.45	211	58.8	202	123	309	0.270	1425	152	72.3	57	
2.67	5.39	190	50.0	175	103	267	0.266	951	104	63.4	50	
2.61	5.34	169	41.9	150	84.6	228	0.257	605	68.1	54.8	43	
2.49	5.30	143	31.8	123	63.6	187	0.254	343	40.0	45.2	36	
2.53	5.20	129	28.4	100	54.3	153	0.245	195	23.5	38.2	30	
2.46	5.18	115	23.4	87.0	44.5	132	0.243	128	15.8	33.1	26	
2.45	5.13	105	20.9	76.0	39.0	115	0.242	87.2	11.0	29.4	23	
2.08	3.96	79.0	21.0	64.9	41.4	100	0.281	122	24.3	32.6	26	152x76
2.04	3.92	70.0	17.5	55.2	34.0	84.4	0.281	76.7	15.8	28.0	22	
1.99	3.87	60.7	14.2	45.7	27.1	69.8	0.277	44.9	9.54	23.5	19	
1.94	3.83	51.4	11.2	36.7	20.9	55.8	0.269	23.7	5.24	19.1	15	
2.00	3.70	41.9	9.4	26.3	16.9	40.1	0.278	9.78	2.30	14.6	12	



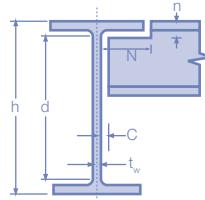
UKB

Designation	Dimensions for detailing and surface areas							A/V ratio (m^{-1})			
	Serial size	End clearance C mm	Notch		Surface area per metre m^2	two end faces m^2	Profile 3 sides	Profile 4 sides	Box 3 sides	Box 4 sides	
			N mm	n mm							
> 1016x305	487	17	150	86	3.20	6.58	0.124	45	50	40	45
	437	15	150	80	3.17	7.25	0.111	50	55	40	50
	393	14	150	74	3.14	8.00	0.100	55	65	45	55
	349	13	152	70	3.13	8.96	0.0890	65	70	50	60
	314	12	152	66	3.11	9.89	0.0800	70	80	55	65
	272	10	152	62	3.10	11.4	0.0694	80	90	65	75
	249	10	152	56	3.08	12.4	0.0634	90	95	70	80
	222	10	152	52	3.06	13.8	0.0566	95	110	80	90
914x419	388	13	210	62	3.44	8.87	0.0988	60	70	45	55
	343	12	210	58	3.42	9.96	0.0874	70	80	50	60
914x305	289	12	156	52	3.01	10.4	0.0736	75	80	60	65
	253	11	156	48	2.99	11.8	0.0646	85	95	65	75
	224	10	156	44	2.97	13.2	0.0572	95	105	75	85
	201	10	156	40	2.96	14.7	0.0512	105	115	80	95
838x292	226	10	150	46	2.81	12.4	0.0578	85	100	70	80
	194	9	150	40	2.79	14.4	0.0494	100	115	80	90
	176	9	150	38	2.78	15.8	0.0448	110	125	90	100
762x267	197	10	138	42	2.55	13.0	0.0502	90	100	70	85
	173	9	138	40	2.53	14.6	0.0440	105	115	80	95
	147	8	138	34	2.51	17.1	0.0374	120	135	95	110
	134	8	138	32	2.51	18.7	0.0342	130	145	105	120
686x254	170	9	132	40	2.35	13.8	0.0434	95	110	75	90
	152	9	132	38	2.34	15.4	0.0388	105	120	85	95
	140	8	132	36	2.33	16.6	0.0356	115	130	90	105
	125	8	132	32	2.32	18.5	0.0318	130	145	100	115
610x305	238	11	158	48	2.45	10.3	0.0606	70	80	50	60
	179	9	158	42	2.41	13.5	0.0456	90	105	70	80
	149	8	158	38	2.39	16.0	0.0380	110	125	80	95
610x229	140	9	120	36	2.11	15.1	0.0356	105	120	80	95
	125	8	120	34	2.09	16.7	0.0318	115	130	90	105
	113	8	120	30	2.08	18.4	0.0288	130	145	100	115
	101	7	120	28	2.07	20.5	0.0258	145	160	110	130
610x178	100	8	94	30	1.89	18.8	0.0256	135	150	110	125
	92	7	94	28	1.88	20.4	0.0234	145	160	120	135
	82	7	94	26	1.87	22.9	0.0208	160	180	130	150
533x312	272	13	160	52	2.37	8.67	0.0696	60	70	40	50
	219	11	160	42	2.33	10.7	0.0558	70	85	50	65
	182	10	160	38	2.31	12.7	0.0462	85	100	60	75
	150	8	160	34	2.29	15.2	0.0384	105	120	75	90
	138	9	110	38	1.90	13.7	0.0352	95	110	75	85
533x210	122	8	110	34	1.89	15.5	0.0310	110	120	85	95
	109	8	110	32	1.88	17.2	0.0278	120	135	95	110
	101	7	110	32	1.87	18.5	0.0258	130	145	100	115
	92	7	110	30	1.86	20.2	0.0234	140	160	110	125
	82	7	110	26	1.85	22.5	0.0210	155	175	120	140
	85	7	90	30	1.69	19.9	0.0216	140	155	115	130
533x165	74	7	90	28	1.68	22.5	0.0190	160	175	130	145
	66	6	90	26	1.67	25.4	0.0167	180	200	145	165

➤ These sizes are in addition to our standard range of BS4 sections.

The dimension n = $\frac{h-d}{2}$ to the nearest 2mm above. The dimension C = $t_w/2 + 2\text{mm}$ to the nearest 1mm.

The dimension N is based on the outstand from web face to flange edge + 10mm to the nearest 2mm above and allows for rolling tolerances.



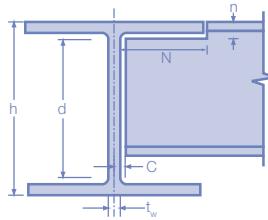
UKB

Designation			Dimensions for detailing and surface areas						A/V ratio (m^{-1})			
Serial size	End clearance C mm	N mm	Notch		Surface area per tonne m^2	two end faces m^2	Profile 3 sides	Profile 4 sides	Box 3 sides	Box 4 sides		
			n mm	per metre m^2								
► 457x191	161	11	102	44	1.73	10.7	0.0412	75	85	60	65	
	133	10	102	38	1.70	12.8	0.0340	90	100	70	80	
	106	8	102	32	1.67	15.8	0.0270	110	125	85	100	
	98	8	102	30	1.67	17.0	0.0250	120	135	90	105	
	89	7	102	28	1.66	18.6	0.0228	130	145	100	115	
	82	7	102	28	1.65	20.1	0.0208	140	160	105	125	
	74	7	102	26	1.64	22.1	0.0189	155	175	115	135	
	67	6	102	24	1.63	24.3	0.0171	170	190	130	150	
457x152	82	7	84	30	1.51	18.4	0.0210	130	145	105	120	
	74	7	84	28	1.50	20.2	0.0189	145	160	115	130	
	67	7	84	26	1.50	22.3	0.0171	155	175	125	145	
	60	6	84	24	1.49	24.9	0.0152	175	195	140	160	
	52	6	84	22	1.48	28.3	0.0133	200	220	160	180	
► 406x178	85	7	96	30	1.52	17.8	0.0218	125	140	95	110	
	74	7	96	28	1.51	20.4	0.0189	140	160	105	125	
	67	6	96	26	1.50	22.3	0.0171	155	175	115	140	
	60	6	96	24	1.49	24.8	0.0153	170	195	130	155	
	54	6	96	22	1.48	27.3	0.0138	190	215	145	170	
► 406x140	53	6	78	24	1.35	25.3	0.0136	180	200	140	160	
	46	5	78	22	1.34	29.1	0.0117	205	230	160	185	
	39	5	78	20	1.33	34.1	0.0099	240	270	190	215	
356x171	67	7	94	26	1.38	20.6	0.0171	140	160	105	125	
	57	6	94	24	1.37	24.1	0.0124	165	190	120	145	
	51	6	94	22	1.36	26.7	0.0130	185	210	135	160	
	45	6	94	20	1.36	30.2	0.0115	205	235	150	180	
356x127	39	5	70	22	1.18	30.2	0.0100	210	235	165	195	
	33	5	70	20	1.17	35.4	0.0084	250	280	195	225	
305x165	54	6	90	24	1.26	23.3	0.0138	160	185	115	140	
	46	5	90	22	1.25	27.1	0.0117	185	210	135	160	
	40	5	90	20	1.24	30.8	0.0103	210	240	150	185	
305x127	48	7	70	24	1.09	22.7	0.0122	160	180	120	145	
	42	6	70	22	1.08	25.8	0.0107	180	200	140	160	
	37	6	70	20	1.07	28.9	0.0094	200	225	155	180	
305x102	33	5	58	20	1.01	30.8	0.0084	215	240	175	200	
	28	5	58	18	1.00	35.5	0.0072	250	280	200	230	
	25	5	58	16	0.992	40.0	0.0063	280	315	225	255	
254x146	43	6	82	22	1.08	25.1	0.0110	170	195	120	150	
	37	5	82	20	1.07	28.9	0.0094	195	225	140	170	
	31	5	82	18	1.06	34.0	0.0079	230	270	165	200	
254x102	28	5	58	18	0.904	31.9	0.0072	220	250	175	200	
	25	5	58	16	0.897	35.7	0.0064	250	280	190	225	
	22	5	58	16	0.890	40.5	0.0056	280	320	220	255	
203x133	30	5	74	18	0.923	30.8	0.0076	205	240	145	180	
	25	5	74	16	0.915	36.5	0.0064	245	285	170	210	
203x102	23	5	60	18	0.790	34.2	0.0059	235	270	175	205	
178x102	19	4	60	16	0.738	38.7	0.0049	260	305	190	230	
152x89	16	4	54	16	0.638	40.0	0.0041	270	315	195	235	
127x76	13	4	46	16	0.537	41.4	0.0033	280	325	200	245	

► These sizes are in addition to our standard range of BS4 sections.

The dimension n = $\frac{h-d}{2}$ to the nearest 2mm above. The dimension C = $t_w/2 + 2\text{mm}$ to the nearest 1mm.

The dimension N is based on the outstand from web face to flange edge + 10mm to the nearest 2mm above and allows for rolling tolerances.



UKC

Designation

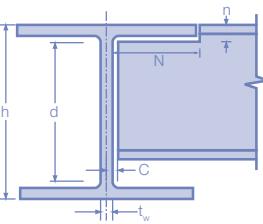
Dimensions for detailing and surface areas

A/V ratio (m^{-1})

Serial size	End clearance C mm	Notch			Surface area per metre m^2	two end faces m^2				
		N mm	n mm	per tonne m^2			Profile 3 sides	Profile 4 sides	Box 3 sides	Box 4 sides
356x406	634	26	200	94	2.52	3.98	0.162	25	30	15
	551	23	200	84	2.47	4.48	0.140	30	35	20
	467	20	200	74	2.42	5.18	0.119	35	40	20
	393	17	200	66	2.38	6.06	0.100	40	50	25
	340	15	200	60	2.35	6.91	0.0866	45	55	30
	287	13	200	52	2.31	8.05	0.0732	50	65	30
	235	11	200	46	2.28	9.70	0.0598	65	75	45
356x368	202	10	190	44	2.19	10.8	0.0514	70	85	45
	177	9	190	40	2.17	12.3	0.0452	80	95	50
	153	8	190	36	2.16	14.1	0.0390	90	110	55
	129	7	190	34	2.14	16.6	0.0328	110	130	65
305x305	283	15	158	60	1.94	6.86	0.0720	45	55	30
	240	14	158	54	1.91	7.96	0.0612	50	60	35
	198	12	158	48	1.87	9.44	0.0504	60	75	40
	158	10	158	42	1.84	11.6	0.0402	75	90	50
	137	9	158	38	1.82	13.3	0.0348	85	105	55
	118	8	158	34	1.81	15.4	0.0300	100	120	60
	97	7	158	32	1.79	18.5	0.0246	120	145	75
254x254	167	12	134	46	1.58	9.46	0.0426	60	75	40
	132	10	134	38	1.55	11.7	0.0336	75	90	50
	107	8	134	34	1.52	14.2	0.0272	95	110	60
	89	7	134	30	1.50	16.9	0.0226	110	135	70
	73	6	134	28	1.49	20.4	0.0186	130	160	80
> 203x203	127	11	108	42	1.28	10.0	0.0324	65	80	45
	113	10	108	38	1.27	11.2	0.0290	75	90	45
	100	9	108	34	1.25	12.6	0.0254	80	100	55
	86	8	110	32	1.24	14.4	0.0220	95	115	60
	71	7	110	28	1.22	17.2	0.0181	110	135	70
	60	7	110	26	1.21	20.2	0.0153	130	160	80
	52	6	110	24	1.20	23.1	0.0133	150	180	95
	46	6	110	22	1.19	25.8	0.0117	170	200	105
	46	6	110	22	1.19	25.8	0.0117	170	200	140
> 152x152	51	8	84	24	0.935	18.3	0.0130	120	145	75
	44	7	84	22	0.924	21.0	0.0112	135	165	85
	37	6	84	20	0.912	24.7	0.0094	160	195	100
	30	5	84	18	0.901	30.0	0.0077	195	235	120
	23	5	84	16	0.889	38.7	0.0058	250	305	155
<p>> These sizes are in addition to our standard range of BS4 sections. The dimension n = $\frac{h-d}{2}$ to the nearest 2mm above.</p>										

The dimension C = $t_w/2 + 2\text{mm}$ to the nearest 1mm.

The dimension N is based on the outstand from web face to flange edge + 10mm to the nearest 2mm above and allows for rolling tolerances.



Designation

Dimensions for detailing and surface areas

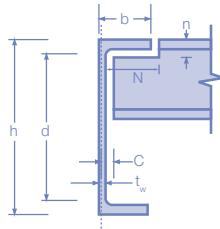
A/V ratio (m^{-1})

Serial size	End clearance C mm	Notch		Surface area per metre m^2	two end faces m^2	Profile 3 sides	Profile 4 sides	Box 3 sides	Box 4 sides
		N mm	n mm						
356x368	174	12	190	36	2.17	12.5	0.0442	80	100
	152	11	190	34	2.16	14.2	0.0388	90	110
	133	10	190	32	2.14	16.1	0.0338	105	125
	109	8	190	30	2.13	19.6	0.0278	125	155
305x305	223	17	158	46	1.89	8.48	0.0568	55	65
	186	15	158	42	1.86	10.0	0.0474	65	80
	149	12	158	36	1.83	12.3	0.0380	80	95
	126	11	158	34	1.82	14.4	0.0322	95	115
	110	10	158	32	1.80	16.4	0.0280	105	130
	95	9	158	30	1.79	18.9	0.0242	120	150
	88	8	158	28	1.78	20.2	0.0224	130	160
	79	8	158	28	1.78	22.6	0.0200	145	175
254x254	85	9	134	28	1.50	17.6	0.0216	115	140
	71	8	134	26	1.49	21.0	0.0181	135	165
	63	7	134	24	1.48	23.5	0.0160	150	185
203x203	54	8	110	22	1.20	22.2	0.0137	145	175
	45	7	110	20	1.19	26.5	0.0114	170	210

The dimension n = $\frac{h-d}{2}$ to the nearest 2mm above. The dimension C = $t_w/2 + 2\text{mm}$ to the nearest 1mm.

The dimension N is based on the outstand from web face to flange edge + 10mm to the nearest 2mm above and allows for rolling tolerances.

Advance® UK Parallel Flange Channels



UKPFC

Designation

Dimensions for detailing and surface areas

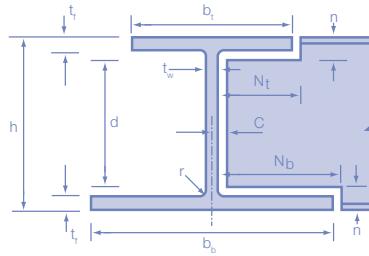
A/V ratio (m^{-1})

Serial size	End clearance			Notch		Surface area per metre m^2		Surface area per tonne m^2		Profile 3 sides		Profile 3 sides		Profile 3 sides		Profile 4 sides		Box 3 sides		Box 3 sides		Box 3 sides		Box 4 sides	
	C mm	N mm	n mm			per metre m^2	per tonne m^2			Profile 3 sides	Profile 3 sides	Profile 3 sides	Profile 4 sides	Box 3 sides	Box 3 sides	Box 3 sides	Box 3 sides	Box 4 sides	Box 4 sides	Box 3 sides	Box 3 sides	Box 3 sides	Box 4 sides		
430x100	64	13	96	36	1.23	19.1		135	95	75	150	115	75	75	130										
380x100	54	12	98	34	1.13	20.9		150	110	85	165	125	85	85	140										
300x100	46	11	98	32	0.969	21.3		150	115	85	165	120	85	85	140										
300x90	41	11	88	28	0.932	22.5		160	120	90	175	130	90	90	150										
260x90	35	10	88	28	0.854	24.5		170	135	100	190	135	100	100	160										
260x75	28	9	74	26	0.796	28.8		205	150	115	225	170	115	115	190										
230x90	32	10	90	28	0.795	24.7		170	140	100	195	135	100	100	155										
230x75	26	9	76	26	0.737	28.7		200	155	115	225	165	115	115	185										
200x90	30	9	90	28	0.736	24.8		170	140	100	195	130	100	100	155										
200x75	23	8	76	26	0.678	29.0		200	160	115	225	160	115	115	185										
180x90	26	9	90	26	0.697	26.7		185	155	110	210	135	110	110	165										
180x75	20	8	76	24	0.638	31.4		215	175	125	245	170	125	125	195										
150x90	24	9	90	26	0.637	26.7		180	160	110	210	130	110	110	160										
150x75	18	8	76	24	0.579	32.3		220	190	130	255	165	130	130	200										
125x65	15	8	66	22	0.489	33.0		225	195	135	260	170	135	135	200										
100x50	10	7	52	18	0.382	37.5		255	215	155	295	190	155	155	230										

Dimensions and properties to BS4-1.

The dimension $n = \frac{h-d}{2}$ to the nearest 2mm above.The dimension $C = t_w + 2\text{mm}$ to the nearest 1mm.The dimension N is equal to $(b-t_w) + 6\text{mm}$ to the nearest 2mm above.

Asymmetric Slimflor® Beams



Designation		Dimensions for detailing and surface areas												
Serial size	Mass per metre kg/m	Depth of section h mm	Width of top flange b_t mm	Width of bottom flange b_b mm	Thickness of web t_w mm	Thickness of flange t_f mm	Root radius r mm	Depth between fillets d mm	End clearance C mm	Notch Top Nt mm	Notch Bottom Nb mm	n mm	Exposed surface area per metre m²	
300ASB	249*	249	342	203	313	40.0	40.0	27.0	208	22	92	148	68	0.393
	196	196	342	183	293	20.0	40.0	27.0	208	12	92	148	68	0.373
	185*	185	320	195	305	32.0	29.0	27.0	208	18	92	148	58	0.363
	155	155	326	179	289	16.0	32.0	27.0	208	10	92	148	60	0.353
	153*	153	310	190	300	27.0	24.0	27.0	208	16	92	148	52	0.348
280ASB	136*	136	288	190	300	25.0	22.0	24.0	196	15	94	148	48	0.344
	124	124	296	178	288	13.0	26.0	24.0	196	9	94	148	52	0.340
	105	105	288	176	286	11.0	22.0	24.0	196	8	94	148	48	0.330
	100*	100	276	184	294	19.0	16.0	24.0	196	12	94	148	42	0.326
	74	73.6	272	175	285	10.0	14.0	24.0	196	7	94	148	40	0.313

"C" is the dimension from the web centre line to the end of the incoming beam plus tolerance.

C = 2 + (t_w / 2) To the nearest mm.

"N" is the horizontal distance to the remaining flange of the incoming beam plus tolerance from the face of the web.

N = 10 + (b - t_w) / 2 To the nearest even number above.

"n" is the vertical notch required to the incoming beam to miss the supporting flange and root.

n = (h - d) / 2 To the nearest even number above.

In service, ASBs are normally encased in concrete with only the underside of the lower flange exposed to fire.

The surface area figures quoted above are for the exposed part of the section equal to b_b + 2t_r.

Advance® UK Angles

Equal Angles

Designation		Surface area		A/V ratio (m^{-1})					
Serial size		per metre m^2	per tonne m^2	Profile 3 sides	Profile 3 sides	Profile 4 sides	Box 3 sides	Box 3 sides	Box 4 sides
200x200	24	0.78	11.03	65	85	85	65	65	90
	20	0.78	13.09	75	100	105	80	80	105
	18	0.78	14.46	85	110	115	85	85	115
	16	0.78	16.18	95	125	125	95	95	130
► 150x150	18	0.59	14.63	85	115	115	90	90	120
	15	0.59	17.36	100	135	135	105	105	140
	12	0.59	21.44	125	165	170	130	130	170
	10	0.59	25.51	150	200	200	155	155	205
► 120x120	15	0.47	17.60	105	135	140	105	105	140
	12	0.47	21.69	125	170	170	130	130	175
	10	0.47	25.76	150	200	200	155	155	205
► 8	0.47	31.87	185	250	250	250	190	190	255
► 100x100	15	0.39	17.79	105	135	140	110	110	145
	12	0.39	21.86	130	170	170	130	130	175
	10	0.39	25.92	150	200	205	155	155	210
	8	0.39	32.00	185	250	250	195	195	260
► 90x90	12	0.35	22.01	130	170	175	135	135	175
	10	0.35	26.07	150	200	205	160	160	210
	8	0.35	32.15	190	250	250	195	195	260
	7	0.35	36.48	215	285	285	220	220	295

► These sizes are in addition to our standard range to the BS EN 10056-1 specification.

Designation			Surface area				A/V ratio (m^{-1})					
Serial size	per metre m^2	per tonne m^2	Profile 3 sides	Profile 3 sides	Profile 3 sides	Profile 3 sides	Profile 4 sides	Box 3 sides	Box 3 sides	Box 3 sides	Box 3 sides	Box 4 sides
	18	0.69	14.59	115	115	90	80	115	90	85	90	85
200x150	15	0.69	17.34	135	135	105	95	135	110	100	110	100
	12	0.69	21.45	165	165	130	120	170	135	125	135	125
	10	0.59	25.58	200	200	165	130	200	170	135	170	135
200x100	15	0.59	17.40	135	135	115	90	135	115	95	115	95
	12	0.59	21.49	165	165	140	110	170	145	115	145	115
	10	0.59	25.58	200	200	165	130	200	170	135	170	135
150x90	15	0.47	17.65	135	135	110	95	140	115	95	115	95
	12	0.47	21.75	170	170	140	115	170	140	120	140	120
	10	0.47	25.84	200	200	165	140	205	170	145	170	145
150x75	15	0.44	17.69	135	135	115	90	140	120	95	120	95
	12	0.44	21.78	170	170	140	115	170	145	115	145	115
	10	0.44	25.87	200	200	170	135	205	175	140	175	140
125x75	12	0.39	21.93	170	170	140	115	170	145	120	145	120
	10	0.39	26.01	200	200	165	140	205	170	145	170	145
	8	0.39	32.12	250	250	205	170	250	210	180	210	180
100x75	12	0.34	22.11	170	170	135	125	175	140	125	140	125
	10	0.34	26.19	205	205	160	145	205	165	150	165	150
	8	0.34	32.29	250	250	200	180	255	205	185	205	185
100x65	10	0.32	26.23	205	205	165	140	205	170	145	170	145
	8	0.32	32.32	250	250	200	175	255	210	180	210	180
	7	0.32	36.66	285	285	230	200	290	235	205	235	205

► These sizes are in addition to our standard range to the BS EN 10056-1 specification.

Structural Tees

split from Advance® UK Beams

Designation

		A/V ratio (m^{-1})					
Serial size	Profile 3 sides	Profile 3 sides	Profile 4 sides	Box 3 sides	Box 3 sides	Box 4 sides	
254x343	63	115	145	145	115	115	150
305x305	119	60	80	80	60	60	85
	90	80	105	105	80	80	110
	75	95	125	125	95	95	130
229x305	70	95	120	120	95	95	120
	63	105	130	135	105	105	135
	57	115	145	145	115	115	150
	51	125	160	160	130	130	165
178x305	50	120	150	150	125	125	150
	46	130	160	160	135	135	165
	41	145	180	180	150	150	185
312x267	137	50	70	70	50	50	70
	110	60	85	85	65	65	85
	91	75	100	100	75	75	100
	75	90	120	120	90	90	120
210x267	69	85	110	110	85	85	110
	61	95	120	125	95	95	125
	55	105	135	135	110	110	140
	51	115	145	145	115	115	150
	46	125	160	160	125	125	160
	41	140	175	180	140	140	180
165x267	43	130	155	160	130	130	160
	37	145	175	180	145	145	180
	33	160	200	200	165	165	205
191x229	81	65	85	85	65	65	85
	67	80	100	100	80	80	105
	53	95	125	125	100	100	125
	49	105	135	135	105	105	135
	45	115	145	145	115	115	150
	41	125	160	160	125	125	160
	37	135	175	175	135	135	175
	34	150	190	195	150	150	195
152x229	41	115	145	145	120	120	150
	37	130	160	160	130	130	165
	34	140	175	175	145	145	180
	30	155	195	195	160	160	200
	26	180	220	225	180	180	225

Please consult with Tata Steel for availability – see page 59.

Designation

		A/V ratio (m^{-1})					
Serial size	Profile 3 sides	Profile 3 sides	Profile 4 sides	Box 3 sides	Box 3 sides	Box 4 sides	
178x203	43	110	140	140	110	110	145
	37	125	160	160	125	125	165
	34	135	175	175	140	140	180
	30	150	195	195	155	155	200
	27	165	215	215	170	170	220
140x203	27	160	200	200	160	160	205
	23	185	230	230	185	185	235
	20	215	270	270	215	215	275
171x178	34	125	160	165	125	125	165
	29	145	190	190	145	145	195
	26	160	210	210	160	160	215
	23	180	235	240	180	180	240
127x178	20	190	235	240	195	195	245
	17	220	280	280	225	225	285
165x152	27	135	185	185	140	140	185
	23	160	210	215	160	160	215
	20	180	240	245	185	185	245
127x152	24	140	180	180	140	140	185
	21	160	200	205	160	160	210
	19	180	225	230	180	180	235
102x152	17	195	240	245	200	200	245
	14	225	280	280	230	230	285
	13	255	315	320	255	255	320
146x127	22	145	195	200	150	150	200
	19	170	225	230	170	170	235
	16	195	270	270	200	200	275
102x127	14	195	250	255	200	200	260
	13	220	280	285	225	225	290
	11	250	320	320	255	255	325
133x102	15	175	240	245	180	180	250
	13	205	285	290	210	210	295

Please consult with Tata Steel for availability – see page 59.

Structural Tees

split from Advance® UK Columns

Designation**A/V ratio (m^{-1})**

Serial size	Profile 3 sides	Profile 3 sides	Profile 4 sides	Box 3 sides	Box 3 sides	Box 4 sides	
305x152	79	60	90	95	65	65	95
	69	70	105	105	70	70	110
	59	80	120	120	85	85	125
	49	95	145	145	100	100	150
254x127	84	50	75	75	50	50	75
	66	65	90	95	65	65	95
	54	75	110	115	75	75	115
	45	90	135	135	90	90	135
	37	105	160	160	110	110	165
203x102	64	55	80	80	55	55	80
	57	60	90	90	60	60	90
	50	70	100	100	70	70	100
	43	75	115	115	80	80	115
	36	90	135	135	95	95	140
	30	105	160	160	110	110	165
	26	120	180	185	125	125	185
	23	135	200	205	140	140	210
152x76	26	100	145	145	100	100	150
	22	110	165	170	115	115	170
	19	130	195	195	135	135	200
	15	160	235	240	160	160	240
	12	205	305	310	210	210	310

Please consult with Tata Steel for availability – see page 59.

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Product specifications/tolerances

Note: The nomenclature used in this section is from the referenced standard.

The dimensions and mass of the following hot-rolled structural steel sections currently produced by Tata Steel – UKB, UKC, UKBP, UKPFC - are specified in BS4-1:2005.

Rolling tolerances – BS EN 10034:1993

This European Standard specifies tolerances on shape, dimensions and mass of structural steel universal beams, columns and bearing piles.

Section height (*h*)

The deviation from nominal on section height measured at the centre line of web thickness shall be within the tolerance given in Table 1(a).

Table 1 (a) Tolerance on height and cross-section

Section height <i>h</i> mm	Tolerance mm
Up to and including 180	+3.0
	-2.0
Greater than 180 up to and including 400	+4.0
	-2.0
Greater than 400 up to and including 700	+5.0
	-3.0
Greater than 700	± 5.0

Flange width (*b*)

The deviation from nominal on flange width shall be within the tolerance given in Table 1(b).

Table 1 (b) Tolerance on flange widths

Flange width <i>b</i> mm	Tolerance mm
Up to and including 110	+4.0
	-1.0
Greater than 110 up to and including 210	+4.0
	-2.0
Greater than 210 up to and including 325	± 4.0
Greater than 325	+6.0
	-5.0



Web thickness (s)

The deviation from nominal on web thickness measured at the mid-point of dimension (h) shall be within the tolerance given in Table 1(c)

Table 1 (c) Tolerances on web thickness

Web thickness s mm	Tolerance mm
Less than 7	± 0.7
7 up to but excluding 10	± 1.0
10 up to but excluding 20	± 1.5
20 up to but excluding 40	± 2.0
40 up to but excluding 60	± 2.5
60 and over	± 3.0

Flange thickness (t)

The deviation from nominal on flange thickness measured at the quarter flange width point shall be within the tolerance given in Table 1(d)

Table 1 (d) Tolerances on flange thickness

Flange thickness t mm	Tolerance mm
Less than 6.5	+1.5 -0.5
6.5 up to but excluding 10	+2.0 -1.0
10 up to but excluding 20	+2.5 -1.5
20 up to but excluding 30	+2.5 -2.0
30 up to but excluding 40	± 2.5
40 up to but excluding 60	± 3.0
60 and over	± 4.0

Rolling tolerances – BS EN 10034:1993

Out-of-squareness ($k + k'$)

The out-of-squareness of the section shall not exceed the maximum given in Table 2(a).

Table 2 (a) Tolerance on out-of-squareness of universal beams, columns and bearing piles

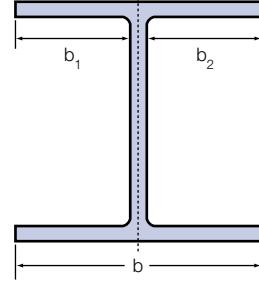
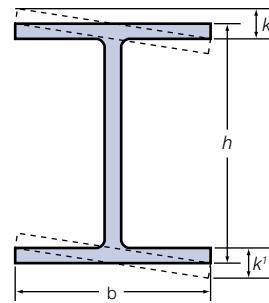
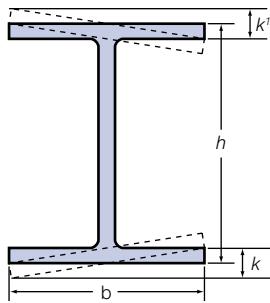
Flange width b mm	Tolerance mm
Up to and including 110	1.5
Greater than 110	2% of b (maximum 6.5mm)

Web off-centre (e)

The mid-thickness of the web shall not deviate from the mid-width position on the flange by more than the distance (e) given in Table 2(b).

Table 2 (b) Tolerance on web off-centre of universal beams, columns and bearing piles

Flange thickness t mm	Flange width b mm	Web off-centre where $e = \frac{b_1 - b_2}{2}$ mm
$t < 40$	Up to and including 110	2.5
	Greater than 110 up to and including 325	3.5
	Greater than 325	5.0
$t \geq 40$	Greater than 110 up to and including 325	5.0
	Greater than 325	8.0



Straightness (q_{xx} or q_{yy})

The straightness shall comply with the requirements given in Table 3.

Table 3 Tolerance on straightness of universal beams, columns and bearing piles

Section height h mm	Tolerance q_{xx} and q_{yy} on length L %
Greater than 80 up to and including 180	0.30 L
Greater than 180 up to and including 360	0.15 L
Greater than 360	0.1 L

Tolerance on mass

The deviation from the nominal mass of a batch or a piece shall not exceed $\pm 4.0\%$.

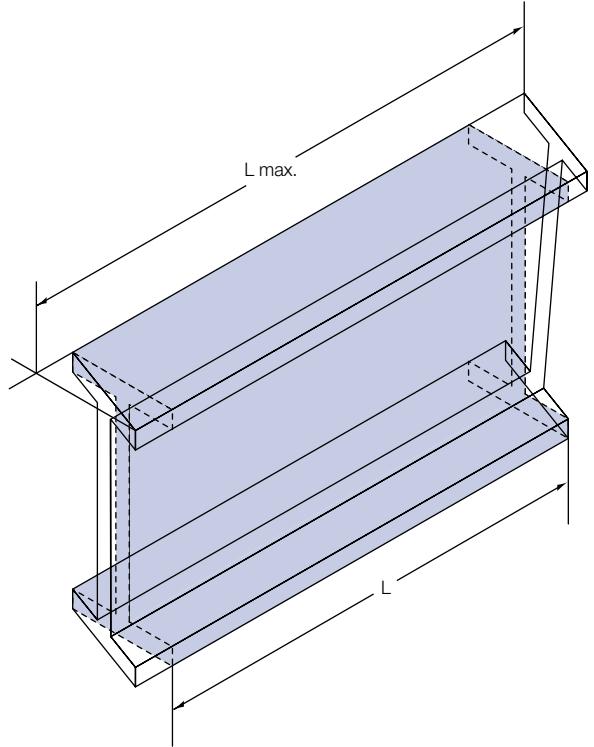
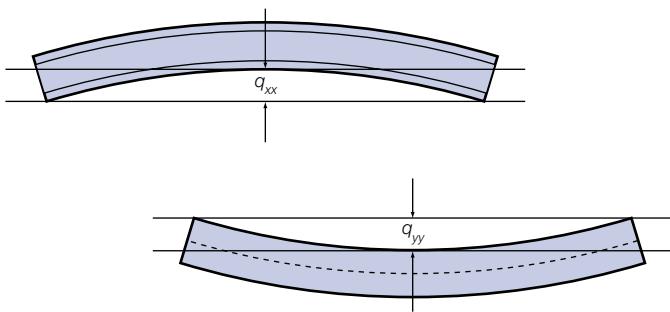
The mass deviation is the difference between the actual mass of the batch or piece and the calculated mass. The calculated mass shall be determined using a density of 7850kg/m^3 .

Tolerance on length

The sections shall be cut to ordered lengths to tolerances of:

- a) $\pm 50\text{mm}$
- or
- b) $-0, +100\text{mm}$ where minimum lengths are required.

L represents the longest useable length of the section assuming that the ends of the section have been cut square.

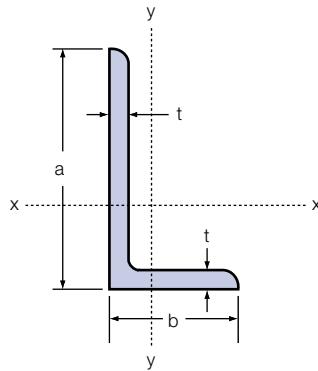


Rolling tolerances – BS EN 10056-2:1993

This European Standard specifies tolerances on shape, dimensions and mass of hot-rolled structural steel equal and unequal leg angles.

Leg length (a or b)

The deviation from nominal on leg length shall be within the tolerance given in Table 1(a). For unequal leg angles the longer leg length (a) shall be used to determine the tolerance band.



Web out-of-square (k)

Out-of-squareness of the section shall not exceed the maximum given in Table 1(c). For unequal leg angles, the longer leg length (a) shall be used to determine the tolerance band.

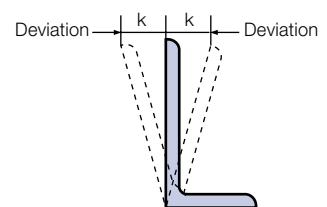


Table 1 (c) Squareness tolerances

Out of square – Leg length mm	Tolerance mm
Up to and including 100	1.0
Greater than 100 up to and including 150	1.5
Greater than 150 up to and including 200	2.0
Greater than 200	3.0

Straightness (q)

The deviation from straightness shall not exceed the tolerances given in Table 1(d). For unequal leg angles, the longer leg length (a) shall be used to determine the tolerance band.

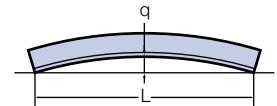


Table 1 (d) Straightness tolerances

Leg length a mm	Tolerance over full bar length		Tolerance over any part bar length	
	Deviation q mm	Length considered mm	Deviation q mm	
Up to and including 150	0.4% L	1,500	6.0	
Greater than 150 up to and including 200	0.2% L	2,000	3.0	
Greater than 200	0.1% L	3,000	3.0	

Table 1 (a) Dimensional tolerances

Leg length a mm	Tolerance mm
Up to and including 50	±1.0
Greater than 50 up to and including 100	±2.0
Greater than 100 up to and including 150	±3.0
Greater than 150 up to and including 200	±4.0
Greater than 200	+6.0 -4.0

Section thickness (t)

The deviation from nominal on thickness shall be within the tolerances given in Table 1(b).

Table 1 (b) Thickness tolerances

Section thickness t mm	Tolerance mm
Up to and including 5	±0.50
Greater than 5 up to and including 10	±0.75
Greater than 10 up to and including 15	±1.0
Greater than 15	±1.20

Tolerance on mass

The deviation from the nominal mass of any individual piece shall not exceed:

- a) ±6% for thickness for $t \leq 4\text{mm}$ or
- b) ±4% for thickness for $t > 4\text{mm}$.

The deviation from the nominal mass is the difference between the actual mass of the piece and the calculated mass. The calculated mass shall be determined using a density of 7850kg/m^3 .

Tolerance on length

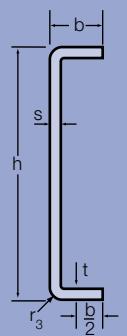
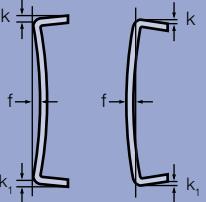
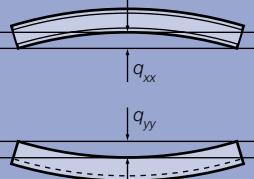
The tolerance on ordered length shall be either:

- a) ±50mm; or
- b) -0, +100mm where minimum lengths are required.

Rolling tolerances – BS EN 10279:2000

This European Standard specifies requirements for the tolerances on dimensions, shape and mass of hot-rolled steel channels with parallel flanges.

Table 1: Tolerances for parallel flange channels

Designation	Property mm	Range mm	Tolerance mm
	Height h	$h \leq 65$ $65 < h \leq 200$ $200 < h \leq 400$ $400 < h$	± 1.5 ± 2.0 ± 3.0 ± 4.0
	Flange width b	$b \leq 50$ $50 < b \leq 100$ $100 < b \leq 125$ $125 < b$	± 1.5 ± 2.0 ± 2.5 ± 3.0
	Web thickness s	$s \leq 10$ $10 < s \leq 15$ $15 < s$	± 0.5 ± 0.7 ± 1.0
	Flange thickness t	$t \leq 10$ $10 < t \leq 15$ $15 < t$	-0.5^* -1.0^* -1.5^*
	Heel radius r_3	All sizes	$\leq 0.3t$
	Out of squareness $k+k_1$	$b \leq 100$ $100 < b$	2.0 2.5% of b
	Web flatness f	$h \leq 100$ $100 < h \leq 200$ $200 < h \leq 400$ $400 < h$	± 0.5 ± 1.0 ± 1.5 ± 1.5
	Straightness q_{xx}	$h \leq 150$ $150 < h \leq 300$ $300 < h$	$\pm 0.3\% \text{ of } L$ $\pm 0.2\% \text{ of } L$ $\pm 0.15\% \text{ of } L$
	q_{yy}	$h \leq 150$ $150 < h \leq 300$ $300 < h$	$\pm 0.5\% \text{ of } L$ $\pm 0.3\% \text{ of } L$ $\pm 0.2\% \text{ of } L$
Standard Alternative standard (by agreement)	Length (L)	All	$-0 +100$
	Length (L)	All	± 50
Mass per unit length	kg/m	$h \leq 125$ $125 < h$	$\pm 6\%$ $\pm 4\%$

* Plus tolerances are limited by weight

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Tata Steel in construction

Construction is the single largest market for Tata Steel products, accounting for over 30 per cent of turnover by value. As well as our Advance® section range, Tata Steel manufactures structural plate and Celsius® hollow sections, ComFlor® composite floor decking, a full range of cladding and roofing products including the Colorcoat® and Kalzip® brands, a variety of other building products, including the Catnic® brand, and systems such as light-steel framing.

Market driven development has been key to the ongoing success of structural steel in the UK. Working closely with our customers and designers has led to the development of products and systems such as Slimdek®, Slimflor® and Bi-Steel®. Tata Steel is also committed to improving the effective application of steel in construction. Long-term investment in developments such as plastic design, fire engineering and composite construction has helped position structural steel as the preferred choice for the structural frame of industrial and multi-storey buildings in the UK. Research work into acoustic performance has resulted in Robust Details and meeting the requirements of HTM 2045 makes steel the effective choice for health and residential buildings alike. Significant work on steel's contribution to sustainable development is ongoing along with the production of application guidance to help in the introduction of harmonised European design codes and ensure that construction clients, customers and designers are able to continue to make the most effective use of steel.

Technical support

Tata Steel operates a free technical advisory service to assist with all aspects of the use of our products from initial material selection through to structural design and associated issues including sustainability, fire engineering, durability, acoustic and vibration performance. Our team of qualified engineers have extensive experience and are on hand to give advice on the design and construction of buildings and bridges.

In-house CPD on a wide range of topics of interest to construction professionals can be arranged.

To find out more about the range of construction products and systems we offer, for advice on their application or to organise a CPD talk, contact our Construction hotline on +44 (0) 1724 405060, or visit our website at www.tatasteelconstruction.com. If your enquiry is about other products and systems that Tata Steel manufactures, you will be directed to the relevant business or source of expertise.

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