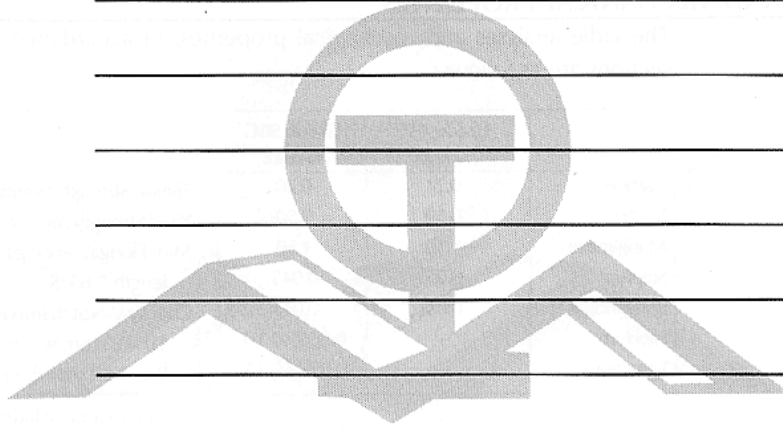

HOT FORMED HOLLOW SECTIONS

- SQUARE

- RECTANGULAR

- CIRCULAR



OVERSEAS SPECIFICATIONS

Overseas specifications are given below:

USA	AISC
UK	BS
EUROPE	EN
INDIA	IS
AFRICA	SA
AUSTRALIA	AS/NZS
NEW ZEALAND	AS/NZS
SOUTH AFRICA	SABS
SINGAPORE	SS
HONG KONG	CS
INDONESIA	SNI
THAILAND	TIS
PHILIPPINES	PS
VIETNAM	TCVN
CHINA	GB
JAPAN	JIS
KOREA	KS
INDONESIA	SNI
THAILAND	TIS
PHILIPPINES	PS
VIETNAM	TCVN
CHINA	GB
JAPAN	JIS
KOREA	KS

TENSILE TEST

HOT FORMED HOLLOW SECTIONS

(excerpts from BRITISH STEEL TUBES)

The size range of Structural Hollow Sections manufactured by British Steel Tubes, is in accordance with BS 4848 Hot Rolled Structural Steel Sections: Part 2, Hollow Sections.

The Structural Hollow Section size range published in BS 4848: Part 2 relates generally to ISO 657 Hot Rolled Steel Sections: Part 14, Hot Finished Structural Hollow Sections, Dimensional and Sectional Properties.

STEEL

The steel is made by the basic oxygen or electric furnace process in accordance with BS 4360. For SHS there are three basic grades, 43, 50 and 55, each with sub-grades giving improved impact properties. For economic reasons, production has been standardised on grades 43C and 50C. Other grades and sub-grades can be supplied against mill orders and subject to minimum mill quantities.

CHEMICAL COMPOSITION AND MECHANICAL PROPERTIES

The ladle analyses and mechanical properties, in accordance with BS 4360 for hot finished sections are as follows:

	Grade 43C % max	Grade 50C % max		Grade 43C	Grade 50C
Carbon	0.21	0.20	Tensile Strength N/mm ²	430/580	490/640
Silicon	0.50	0.50	Yield Strength min. N/mm ²	275 [†]	355 [†]
Manganese	1.30	1.50	Min. Elongation on gauge length $5.65\sqrt{S_0}$	22%	20%
Sulphur	0.05	0.045	Charpy V-Notch Impact Value 10 x 10 mm specimen at 0°C. Min. Ave Energy Joules	27*	27
Phosphorus	0.05	0.045			
Niobium	-	0.003/0.10			
Vanadium	-	0.003/0.15			

† up to and including 16mm thick
* only by special arrangement

OVERSEAS SPECIFICATIONS

Other specifications, comparable to BS 4360 can be supplied; those most frequently used are as follows:

Ordinary Yield	High Yield
DIN 17100 St 44-2	DIN 17100 St 52-3
Euronorm 25 - 72 Fe 430C	Euronorm 25 - 72 Fe 510C
NBN A21-101 AE 255C	NBN A21-101 AE 355C
Onorm M3116 St 430C	Onorm M3116 St 510C
SS 14 14 12	SS 14 21 34
ASTM A36	UNI 7806 Fe 510C
UNI 7806 Fe 430C	

Other sub-grades are available

TENSILE TEST

The tensile strength, yield strength and elongation are determined from standard test pieces cut longitudinally from the sections, excluding the weld areas and away from the corners. The test pieces and testing comply with BS 18. Method for Tensile Testing of Metals.

IMPACT TEST

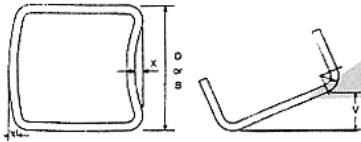
Standard impact specimens are cut longitudinally from the sections and machined on each face to 10mm x 10mm in cross section and a V notch, 2 mm deep, is cut into one face. The specimen is then tested at the appropriate temperature in accordance with BS 131: Part 2, The Charpy V-Notch Impact Test. Due to the machining, standard specimens can only be taken from material 11 mm thick, or thicker. For thinner material, tests are made on the next subsidiary standard test piece with average values in accordance with Table 15 of BS 4360.

Average value for standard test piece	Equivalent average value for subsidiary standard test piece	
	10mm x 10mm	10mm x 7.5mm
J	J	J
27	22	19

Unless agreed otherwise, impact tests are not carried out on Grade 43C material or where the section is less than 6 mm thick.

DIMENSIONAL TOLERANCES

The dimensional tolerances are in accordance with BS 4848, Part 2, as follows:



(a) Circular Hollow Sections	
Outside diameter	$\pm 0.5\text{mm}$ or $\pm 1\%$ whichever is the greater
(b) Rectangular Hollow Sections	
(i) Outside dimensions of sides	$\pm 0.5\text{mm}$ or $\pm 1\%$ whichever is the greater
(ii) Squareness of side	$90^\circ \pm 1^\circ$
(iii) Radii of corners	Outside - between the limits of $0.5t$ and $2.0t$ Inside - between the limits of $0.5t$ and $1.5t$ where t equals the specified thickness of section
(iv) Concavity/Convexity (x)	$\pm 1\%$ of the length of the side, (this tolerance measured independently of the tolerance on outside dimension.)
(v) Angular twist (v)	2 mm plus 0.5 mm per metre maximum. Twist is measured by laying the section, as produced, on a horizontal surface with the face at one end pressed flat. The difference in height above the surface between the two corners at the opposite end is measured.

MASS TOLERANCE

The rolling tolerance in accordance with BS 4848, Part 2 is $\pm 6\%$ on individual lengths; $+6\% - 4\%$ on lots of 10 tonnes and over.

STRAIGHTNESS TOLERANCE

Unless otherwise arranged, the hollow section shall not deviate from straightness by more than 0.2% of the total length as produced, measured at the centre of the length.

LENGTH TOLERANCE

Mill and Random lengths are supplied as in the following tables. Exacts may be supplied at our option, with a tolerance of $+6\text{ mm} - 0$. Lengths above 12 m in length are subject to an extra for transportation.

Rectangular Hollow Sections - Length Ranges & Tolerances

Size		Welded			Seamless	
Squares mm	Rectangles mm	Standard Mill Lengths m	Special Mill Lengths m	Tolerance mm	Standard Random Lengths m	Special Random Lengths m
20 x 20	--	6.4	5.4 - 7.5	+ 150 - 0		
25 x 25 & 30 x 30	--	6.4 & 7.5	5.4 - 7.5	+ 150 - 0		
--	50 x 25	7.5	5.4 - 7.5	+ 150 - 0		
40 x 40 uti	50 x 30 uti	7.5, 10 & 12	5.4 - 13.7	+ 150 - 0		
100 x 100 x 8	120 x 80 x 8					
100 x 100 x 10 uti	120 x 80 x 10 uti	7.5, 10 & 12	6.1 - 14.6	+ 150 - 0		
150 x 150 x 12.5	200 x 100 x 12.5					
150 x 150 x 16	200 x 100 x 16				10 - 11.2	5.6 - 11.2
180 x 180 to	250 x 150 to	10 & 12	9 - 14.8	+ 300 - 0		
400 x 400	500 x 300					
400 x 400 x 20	--	6 - 9 randoms	--	--		

Minimum quantities supplied from our works in one size, thickness, length and quality.

Welded- Standard Mill lengths uti 150 x 150 x 12.5 and 200 x 100 x 12.5, 2 bundles, above these sizes 10 tonnes or less at works discretion.

Special Mill lengths - 10 tonnes.

Seamless - Standard Random lengths, 2.5 tonnes.

Special Random lengths, 10 tonnes.

Circular Hollow Sections - Length Ranges & Tolerances

Outside Diameter mm	Welded				Seamless		
	Thickness mm	Standard Mill Lengths m	Special Mill Lengths m	Tolerance mm	Thickness mm	Standard Mill Lengths m	Tolerances mm
21.3 & 26.9	all	6.0 & 6.4	5.4 - 7.5	+150 - 0	--		
33.7 - 48.3	all	6.0, 6.4 & 7.5	5.4 - 7.5	+150 - 0	--		
60.3 - 114.3	all	6.0, 6.4, 7.5 & 10	5.4 - 12	+150 - 0	--		
139.7 - 168.3	all	7.5, 10 & 12	6.1 - 14.6	+150 - 0	--		
193.7	uti 12.5	7.5, 10 & 12	6.1 - 14.6	+150 - 0	16	8, 10 & 12	+300 - 0
219.1	uti 12.5	10 & 12	9 - 14.8	+300 - 0	16	8, 10 & 12	+300 - 0
					20	6, 8 & 10	+300 - 0
244.5	6.3 - 16	10 & 12	9 - 14.8	+300 - 0	20	6, 8 & 10	+300 - 0
273.0	6.3 - 16	10 & 12	9 - 14.8	+300 - 0	20	6, 8 & 10	+300 - 0
					25	4, 6 & 8	+300 - 0
323.9	6.3 - 16	10 & 12	9 - 14.8	+300 - 0	20	6, 8 & 10	+300 - 0
					25	4, 6 & 8	+300 - 0
355.6	8.0 - 16	10 & 12	9 - 14.8	+300 - 0	20	6, 8 & 10	+300 - 0
					25	4, 6 & 8	+300 - 0
406.4	10 - 16	10 & 12	9 - 14.8	+300 - 0	20	8, 10 & 12	+300 - 0
					25	4, 6 & 8	+300 - 0
					32	2, 4 & 6	+300 - 0
457.0	10 - 16	10 & 12	9 - 14.8	+300 - 0	20	8, 10 & 12	+300 - 0
					25	6, 8 & 10	+300 - 0
					32	4, 6 & 8	+300 - 0
					40	2, 4 & 6	+300 - 0
508.0	10 - 16	10 & 12	9 - 14.8	+300 - 0	20	6, 8 & 10	+300 - 0
					25	6, 8 & 10	+300 - 0
					32	4, 6 & 8	+300 - 0
					40	2, 4 & 6	+300 - 0
					50	3, 4 & 5	+300 - 0

Minimum quantities supplied from our works in one size, thickness, length and quality.

Welded- Standard Mill lengths uti 193.7 - 4/5 tonnes. Over 193.7 - 10 tonnes or less at works discretion.

Special Mill lengths - 10 tonnes.

Seamless - Standard Mill lengths - 10 tonnes, or less at works discretion.