

05

TOLERANCES

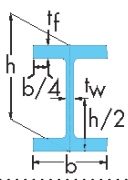
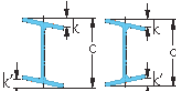
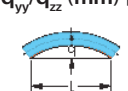
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Overview

Dimensional tolerance refers to the permissible variation of steel from the specified dimensions of the product. The degree of accuracy expected depend upon a number of factors - whether the product is hot or cold rolled, the type of mill equipment used, unavoidable operating contingencies, the specified size or edge condition, and in some cases the steel composition. The table below list some of the common product wise standards that define the acceptable tolerances or limits on variation in dimensions.

Product	Section	Standard
Long Products		
Beams	IPE, HE, UB, UC	EN 10034
	IPN	EN 10024
	W	ASTM A6
	JIS	JIS G3192
Channels	UPN, UPE, U, PFC, CH	EN 10279
	C, MC	ASTM A6
	JIS	JIS G3192
Merchant bars	Angles	EN 10056-2, ASTM A6, JIS G 3192
	Flats	EN 10058, ASTM A6, JIS G3194
	Square	EN 10059, ASTM A6, JIS G3191
	Round	EN 10060, ASTM A6, JIS G3191
	Hexagonal	EN 10061, ASTM A6, JIS G3191
Flat Products		
Hot rolled plate		EN 10029, ASTM A6, JIS G3193
Hot rolled coil		EN 10111, EN 10051, ASTM A568, A635, JIS G3193
Cold rolled sheets		EN 10131, ASTM A6, JIS G3141
Galvanised coil and sheets		ASTM A924, JIS G3302
Tubes and Pipes		
Structural tubing	SHS, CHS	EN 10210-2, EN 10219-2, ASTM A500, A501
Ordinary piping		EN10255, ASTM A53, A135, A795
Line pipe		API 5L, ASTM A106

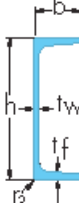
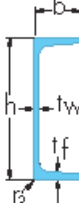
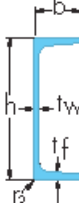
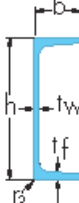
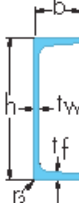
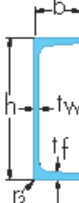
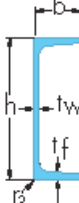
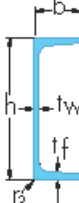
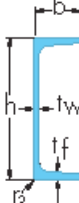
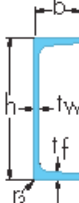
Rolling Tolerances for Beams

Profile	IPE, HE, UB, UC		IPN		W		JIS	
Standard	EN 10034:1993		EN 10024:1995		ASTM A6/A6M		JIS G3192:2014	
Depth h (mm) [in.] 	$h \leq 180$ $180 < h \leq 400$ $400 \leq h \leq 700$ $h > 700$	$+3/-2$ $+4/-2$ $+5/-3$ $+5/-5$	$h \leq 200$ $200 < h \leq 400$ $h > 400$	± 2 ± 3 ± 4	$+4/-3$ $[+1/8 / -1/8]$		$h < 800, b \leq 400$ $h < 800, b > 400$ $h \geq 800$	± 2 ± 3 ± 3
Flange width b (mm) [in.]	$b \leq 110$ $110 < b \leq 210$ $210 < b \leq 325$ $b > 325$	$+4/-1$ $+4/-2$ $+4/-4$ $+6/-5$	$b \leq 75$ $75 < b \leq 100$ $100 < b \leq 125$ $b > 125$	$\pm 1,5$ ± 2 $\pm 2,5$ ± 3	$+6/-5$ $[+1/4 / -3/16]$		$b \leq 400$ $b > 400$	± 2 ± 3
Web thickness tw (mm)	$t_w < 7$ $7 \leq t_w < 10$ $10 \leq t_w < 20$ $20 \leq t_w < 40$ $40 \leq t_w < 60$ $t_w \geq 60$	$\pm 0,7$ ± 1 $\pm 1,5$ ± 2 $\pm 2,5$ ± 3	$t_w \leq 7$ $7 < t_w \leq 10$ $t_w > 10$	$+0,5/-1$ $+0,7/-1,5$ $+1/-2$			$t_w < 16$ $16 \leq t_w < 25$ $25 \leq t_w < 40$ $t_w \geq 40$	$\pm 0,7$ ± 1 $\pm 1,5$ ± 2
Flange thickness tf (mm)	$t_f < 6,5$ $6,5 \leq t_f < 10$ $10 \leq t_f < 20$ $20 \leq t_f < 30$ $30 \leq t_f < 40$ $40 \leq t_f < 60$ $t_f \geq 60$	$+1,5/-0,5$ $+2/-1$ $+2,5/-1,5$ $+2,5/-2$ $\pm 2,5$ ± 3 ± 4	$t_f \leq 7$ $7 < t_f \leq 10$ $10 < t_f \leq 20$ $t_f > 20$	$+1,5/-0,5$ $+2/-1$ $+2,5/-1,5$ $+2,5/-2$	limited by mass tolerance		$t_w < 16$ $16 \leq t_w < 25$ $25 \leq t_w < 40$ $t_w \geq 40$	± 1 $\pm 1,5$ $\pm 1,7$ ± 2
Out-of-square k+k' (mm) [in.] 	$b \leq 110$ $b > 110$	$1,5$ $0,02b$ (max. 6,5)	$b \leq 100$ $b > 100$	2 $0,02b$	$h \leq 310$ $h > 310$ $[h \leq 12]$ $[h > 12]$	$k+k' \leq 6$ $k+k' \leq 8$ $[k+k' \leq 1/4]$ $[k+k' \leq 5/16]$ $c \leq h+6$ $[c \leq h+1/4]$	$h \leq 300$ $h > 300$	$k; k' \leq 0,01b$ (min. 1,5) $k; k' \leq 0,012b$ (min. 1,5)
Web off-centre e (mm) [in.] $e = (b_1 - b_2) / 2$ 	$t_f < 40$: $b \leq 110$ $110 < b \leq 325$ $b > 325$	 $2,5$ $3,5$ 5	$b \leq 100$ $b > 100$	2 3	$G \leq 634 \text{ kg/m}$ $G > 634 \text{ kg/m}$ $[G \leq 426 \text{ lbs/ft}]$ $[G > 426 \text{ lbs/ft}]$	5 8 $[3/16]$ $[5/16]$	$h \leq 300$ $b \leq 200$ $h > 300$ $b > 200$	$\pm 2,5$ $\pm 3,5$
Straightness qy/qz (mm) [in.] 	$80 < h \leq 180$ $180 < h \leq 360$ $h > 360$	$0,0030 L$ $0,0015 L$ $0,0010 L$	$80 < h \leq 180$ $180 < h \leq 360$ $h > 360$	$0,0030 L$ $0,0015 L$ $0,0010 L$	$b < 150$ $b \geq 150$ $[b < 6]$ $[b \geq 6]$	$0,002 L$ $0,001 L$ $[1/8 \times L (\text{ft}) / 5]$ $[1/8 \times L (\text{ft}) / 10]$	$h \leq 300$ $h > 300$	$\leq 0,0015 L$ $\leq 0,0010 L$

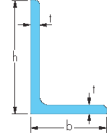
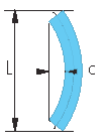
Rolling Tolerances for Beams

Profile	IPE, HE, UB, UC	IPN	W	JIS	
Standard	EN 10034:1993	EN 10024:1995	ASTM A6/A6M	JIS G3192:2014	
Length L (mm) [in.]	-0/+100	-0/+100	-0/+100	L ≤ 7m	+40/-0
	±50	±50	[-0/+4]	L > 7m	+(40+0.005 x (L-7))/-0
Concavity of web W (mm)				b < 400	2
				400 ≤ b < 600	2.5
				b ≥ 600	3
Sectional square- ness e (mm)				0.016 b or 0.016 h	
Mass G (%)	±4	±4	G < 100lbs/ft: +3.0/-2.5	t _f < 10	±5
			G ≥ 100lbs/ft: +2.5/-2.5	t _f ≥ 10	±4

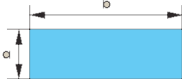
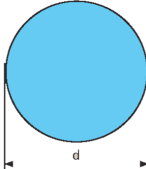
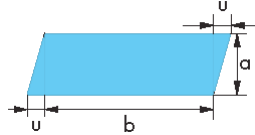
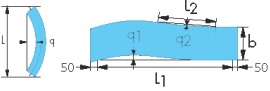
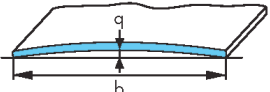
Rolling Tolerances for Channels

Profile		UPE, UPN, PFC, CH		C, MC		JIS	
Standard		EN 10279:2000		ASTM A6/A6M		JIS G3192:2014	
Depth h (mm) [in.]		h ≤ 65	±1.5	75 ≤ h ≤ 180 [3 ≤ h ≤ 7]	+3/-2 [+3/32 / -1/16]	h < 100	±1.5
		65 < h ≤ 200	±2	180 < h ≤ 360 [7 < h ≤ 14]	+3/-3 [+1/8 / -3/32]	65 ≤ h < 200	±2
		200 < h ≤ 400	±3	h > 360 [h > 14]	+5/-4 [+3/16 / -1/8]	200 ≤ h < 400	±3
		h > 400	±4			h ≥ 400	±4
Flange width b (mm) [in.]		b ≤ 50	±1.5	75 ≤ h ≤ 180 [3 ≤ h ≤ 7]	+3/-3 [+1/8 / -1/8]	b < 50	±1.5
		50 < b ≤ 100	±2	180 < h ≤ 360 [7 < h ≤ 14]	+3/-4 [+1/8 / -5/32]	50 ≤ b < 100	±2
		100 < b ≤ 125	±2.5	h > 360 [h > 14]	+3/-5 [+1/8 / -3/16]	100 ≤ b < 200	±3
		b > 125	±3			≥ 200	±4
Web thickness t _w (mm)		t _w ≤ 10	±0.5			h < 130	
		10 < t _w ≤ 15	±0.7			t < 6.3	±0.6
		15 < t _w	±1.0			6.3 ≤ t < 10	±0.7
						10 ≤ t < 16	±0.8
Flange thick- ness t _f (mm)		t _f ≤ 10	±0.5			h ≥ 130	
		10 < t _f ≤ 15	±1			t < 6.3	±0.7
		15 < t _f	±1.5			6.3 ≤ t < 10	±0.8
						10 ≤ t < 16	±1.0
Heel radius r ₃ (mm)			≤ 0.3 t _f			16 ≤ t < 25	±1.2
						t ≥ 25	±1.5
Out-of-square k (k') (mm) [in.]		b ≤ 100	k + k' ≤ 2	k + k' ≤ 0.03 b [k + k' ≤ 1/32 b]		≤ 0.025 b	
		b > 100	k + k' ≤ 0.025 b				
Web deform- ation f (mm)		h ≤ 100	±0.5				
		100 < h ≤ 200	±1				
		200 < h ≤ 400	±1.5				
		400 < h	±1.5				
Straightness q _{yy} /q _{zz} (mm) [in.]		q _{zz}		q _{yy} ≤ 0.002 L [q _{yy} ≤ 1/8 x L (ft)/5]		≤ 0.030 L	
		h ≤ 150	±0.0030 L				
		150 < h ≤ 300	±0.0020 L				
		300 < h	±0.0015 L				
		q _{yy}					
		h ≤ 150	±0.0050 L				
Length L (mm) [in.]		-0/+100		-0/+100		L ≤ 7m	+40/-0
		±50		[-0/+4]		L > 7m	+(40+0.005 x (L-7))/-0
Mass G (%)		h ≤ 125	±6	±2.5		t _f < 10	±5
		h > 125	±4			t _f ≥ 10	±4

Rolling Tolerances for Angles

Profile		L		L		JIS	
Standard		EN 10056-2:1993		ASTM A6/A6M		JIS G3192:2014	
Width h, b (mm) [in.]		Equal legs:		h, b ≤ 25	+1/-1	h, b < 50	±1.5
		h, b ≤ 50	±1	25 < h, b ≤ 51	+1/-1	50 ≤ h, b < 100	±2
		50 < h, b ≤ 100	±2	51 < h, b ≤ 64	+2/-2	100 ≤ h, b < 200	±3
		100 < h, b ≤ 150	±3	64 < h, b ≤ 102	+3/-2	≥ 200	±4
		150 < h, b ≤ 200	±4	102 < h, b ≤ 152	+3/-3		
		h, b > 200	+6 / -4	152 < h, b ≤ 203	+5/-3		
				203 < h, b ≤ 254	+6/-6		
				h, b > 254	+6/-10		
		Unequal legs:		[h, b ≤ 1]	[+1/32 / -1/32]		
		h ≤ 50	±1	[1 < h, b ≤ 2]	[+3/64 / -3/64]		
		50 < h ≤ 100	±2	[2 < h, b ≤ 2.5]	[+1/16 / -1/16]		
		100 < h ≤ 150	±3	[2.5 < h, b ≤ 4]	[+1/8 / -3/32]		
		150 < h ≤ 200	±4	[4 < h, b ≤ 6]	[+1/8 / -1/8]		
		h > 200	+6 / -4	[6 < h, b ≤ 8]	[+3/16 / -1/8]		
				[8 < h, b ≤ 10]	[+1/4 / -1/4]		
				[h, b > 10]	[+1/4 / -3/8]		
Thickness t (mm)		≤ 5	±0.5	h, b ≤ 25	t ≤ 10; ±0.2	h < 130	
		5 < t ≤ 10	±0.75	25 < h, b ≤ 51	t ≤ 10; ±0.2; t > 10; ±0.3	t < 6.3	±0.6
		10 < t ≤ 15	±1.0	51 < h, b ≤ 64	t ≤ 5; ±0.3; t > 5; ±0.4	6.3 ≤ t < 10	±0.7
		t > 15	±1.2			10 ≤ t < 16	±0.8
				[h, b ≤ 1]	[t ≤ 3/16; ±0.008; 3/16 < t ≤ 3/8; ±0.010]	t ≥ 16	±1.0
				[1 < h, b ≤ 2]	[t ≤ 3/8; ±0.010; t > 3/8; ±0.012]	h ≥ 130	
				[2 < h, b ≤ 2.5]	[t ≤ 3/16; ±0.012; t > 3/16; ±0.015]	t < 6.3	±0.7
						6.3 ≤ t < 10	±0.8
						10 ≤ t < 16	±1.0
						16 ≤ t < 25	±1.2
						t ≥ 25	±1.5
Out-of-square k (mm) [in.]		h ≤ 100	1		0.026 h	≤ 0.025 b	
		100 < h ≤ 150	1.5		[3/128 h]		
		150 < h ≤ 200	2				
		h > 200	3				
Straightness q _{yy} /q _{zz} (mm) [in.]		h ≤ 150	0.004 L	h < 75	q _{yy} ≤ 0.004 L	≤ 0.030 L	
		150 < h ≤ 200	0.002 L	[h < 3]	[q _{yy} ≤ 1/4 inch per any 5ft or 1/4 x L (ft)/5]		
		h > 200	0.001 L	h ≥ 75	q _{yy} ≤ 0.002 L		
Length L (mm) [in.]		-0/+100			-0/+100	L ≤ 7m	+40/-0
		±50			[-0/+4]	L > 7m	+(40+0.005 x (L-7))/-0
Mass G (%)		t ≤ 4	±6	h ≥ 75	G < 100 lbs/ft : +3.0/-2.5	t _c < 10	±5
		t > 4	±4	[h ≥ 3]	G ≥ 100 lbs/ft : +2.5/-2.5	t _c ≥ 10	±4

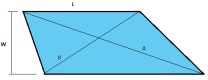
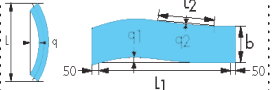
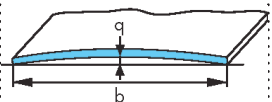
Rolling Tolerances for Merchant Bars

Profile		Flat					
Standard		EN 10058:2003		ASTM A6/A6M		JIS G3194:1998	
Width b (mm) [in.]		10 ≤ b ≤ 40	±0.75	≤ 25	±0.5	b < 50	±0.8
		40 < b ≤ 80	±1	25 < b ≤ 50	±1.0	b ≥ 50	±1.6%
		80 < b ≤ 100	±1.5	50 < b ≤ 100	+1.5/-1.0		(max.
		100 < b ≤ 120	±2	100 < b ≤ 150	+2.5/-1.5		3.5mm)
		120 < b ≤ 150	±2.5	150 < b ≤ 200	+3.0/-2.5		
Thickness/ Diameter a, d (mm) [in.]		a ≤ 20	±0.5			t < 6	±0.3
		20 < a ≤ 40	±1			6 ≤ t < 12	±0.4
		40 < a ≤ 80	±1.5			12 ≤ t < 15	±0.5
						15 ≤ t < 20	±0.6
						20 ≤ t < 25	±0.8
Heel radius r ₃ (mm)						25 ≤ t < 40	±1.0
Out-of-square u (mm) [in.]		10 ≤ a ≤ 25	±0.5				
		25 < a ≤ 40	±1				
		40 < a ≤ 80	±1.5				
Straightness q (mm) [in.]		bxa < 1000mm ²	q ≤ 0.0040L			0.003 L	
		bxa ≥ 1000mm ²	q ≤ 0.0025L			(max. 10mm)	
Flatness q (mm)						b ≥ 150, d ≤ 50	0.003 b
Length L (mm) [in.]		±100		-0/+100 [-0/+4]		+100/-0	
Mass G (%)							

Rolling Tolerances for Merchant Bars

Square		Round		Square and Round			
EN 10059:2003		EN 10060:2003		JIS G3191:2012		ASTM A6/A6M	
35<a≤50	±0.8						
50<a≤90	±1.0						
90<a≤100	±1.3						
100<a≤120	±1.5						
120<a≤150	±1.8						
		10≤d≤15	±0.4	d<16	±0.4	d≤7	±0.13
		15<d≤25	±0.5	16≤d<28	±0.5	7<d≤11	±0.15
		25<d≤35	±0.6	d≥28	±1.8%	11<d≤15	±0.18
		35<d≤50	±0.8			15<d≤19	±0.20
		50<d≤80	±1.0			19<d≤250	±1%
		80<d≤100	±1.3				
		100<d≤120	±1.5				
30<a≤50	≤2.5						
50<a≤100	≤3						
a>100	≤4						
a≤50	±1.5			Not more than 70% of tolerance range of diameter		d≤7	±0.20
50<a≤75	±2.25					7<d≤11	±0.22
75<a≤100	±3.0					11<d≤15	±0.27
100<a≤150	±4.5					15<d≤19	±0.30
						19<d≤250	±1.5%
25<a≤80	0.0040 L	25<d≤80	q≤0.0040L				
80<a	0.0025 L	80<d≤250	q≤0.0025L				
		±100		L≤7m	+40/-0	-0/+100	
				L>7m	+(40+0.005 x (L-7))/-0	[-0/+4]	
±4				t<10	±7		
				10≤t<16	±5		
				16≤t<28	±4		
				b≥28	±3.5		

Rolling Tolerances for Plates

Standard		EN 10029:2010				
Thickness t (mm) [in.]			Class A	Class B	Class C	Class D
		3 ≤ t < 5	+0.8/ -0.4	+0.9/ -0.3	+1.2/ -0	±0.6
		5 ≤ t < 8	+1.1/ -0.4	+1.2/ -0.3	+1.5/ -0	±0.75
		8 ≤ t < 15	+1.2/ -0.5	+1.4/ -0.3	+1.7/ -0	±0.85
		15 ≤ t < 25	+1.3/ -0.6	+1.6/ -0.3	+1.9/ -0	±0.92
		25 ≤ t < 40	+1.4/ -0.8	+1.9/ -0.3	+2.2/ -0	±1.1
		40 ≤ t < 80	+1.8/ -1.0	+2.5/ -0.3	+2.8/ -0	±1.4
		80 ≤ t < 150	+2.2/ -1.0	+2.9/ -0.3	+3.2/ -0	±1.6
		150 ≤ t < 250	+2.4/ -1.2	+3.3/ -0.3	+3.6/ -0	±1.8
Width b (mm) [in.]		600 ≤ b < 2000		+20/ -0		
		2000 ≤ b < 3000		+25/ -0		
		b ≥ 3000		+30/ -0		
Out-of-square u (mm) [in.]		$L - [(A-B)/2] \geq L$				
Straightness q (mm) [in.]		$q \leq 0.0025 L$ $q \leq 0.004 L$ for cut lengths				
Flatness (Class N, Type L) q (mm)			1000		2000	
		3 ≤ t < 5	9		14	
		5 ≤ t < 8	8		12	
		8 ≤ t < 15	7		11	
		15 ≤ t < 25	7		10	
		25 ≤ t < 40	6		9	
		40 ≤ t < 250	5		8	
		40 ≤ t < 80				
Length L (mm) [in.]		L < 4000		+20/ -0		
		4000 ≤ L < 6000		+30/ -0		
		6000 ≤ L < 8000		+40/ -0		
		8000 ≤ L < 10000		+50/ -0		
		10000 ≤ L < 15000		+75/ -0		
		15000 ≤ L ≤ 20000		+100/ -0		
Mass G (%)						

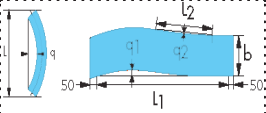
Rolling Tolerances for Plates

Standard	ASTM A6/A6M											
Thickness t (mm) [in.]	b	1200≥b	1500≥b	1800≥b	2100≥b	2400≥b	2700≥b	3000≥b	3300≥b	3600≥b	b	
	<1200	<1500	<1800	<2100	<2400	<2700	<3000	<3300	<3600	<4200	≥4200	
t<6	+0.8	+0.8	+0.8	+0.8	+0.8	+0.8	+0.9	+1.0	+1.1			
6≤t<8	+0.8	+0.8	+0.8	+0.8	+0.8	+0.8	+0.9	+1.0	+1.2	+1.4		
8≤t<10	+0.8	+0.8	+0.8	+0.8	+0.8	+0.8	+1.0	+1.0	+1.3	+1.5	+1.7	
10≤t<12	+0.8	+0.8	+0.8	+0.8	+0.8	+0.9	+1.0	+1.0	+1.3	+1.5	+1.8	
12≤t<16	+0.8	+0.8	+0.8	+0.8	+0.9	+0.9	+1.0	+1.1	+1.3	+1.5	+1.8	
16≤t<20	+0.8	+0.8	+0.8	+0.8	+0.9	+1.0	+1.2	+1.2	+1.4	+1.6	+2.0	
20≤t<25	+0.9	+0.9	+1.0	+1.0	+1.0	+1.2	+1.3	+1.5	+1.5	+1.8	+2.2	
25≤t<50	+1.8	+1.8	+1.8	+2.0	+2.0	+2.3	+2.5	+3.0	+3.0	+3.3	+3.8	
50≤t<100	+3.3	+3.3	+3.3	+3.3	+3.5	+3.8	+3.8	+3.8	+3.8	+4.4	+4.4	
100≤t<150	+4.5	+4.5	+4.5	+4.5	+4.5	+4.5	+4.5	+4.5	+4.5	+5.6	+5.6	
150≤t<250	+5.8	+5.8	+6.0	+6.0	+6.0	+6.0	+6.0	+6.0	+6.0	+7.0	+7.0	
Permitted variation under specified thickness: -0.3mm												
Width b (mm) [in.]	t<10.5	t<16	t<25	t≤50								
b<1500	+14/ -6	+19/ -6	+22/ -6	+25/ -6								
1500≤b<2100	+19/ -6	+22/ -6	+25/ -6	+29/ -6								
2100≤b<2700	+19/ -6	+22/ -6	+25/ -6	+32/ -6								
b≥2700	+25/ -6	+29/ -6	+32/ -6	+35/ -6								
Out-of-square u (mm) [in.]												
Straightness q (mm) [in.]	b≤750	q≤0.0033 L										
750<b≤1500		q≤0.004 L										
Flatness q (mm)	b	900≥b	1200≥b	1500≥b	1800≥b	2100≥b	2400≥b	2700≥b	3000≥b	3600≥b	b	
	<900	<1200	<1500	<1800	<2100	<2400	<2700	<3000	<3600	<4200	≥4200	
t<6	14	19	24	32	35	38	41	44	48			
6≤t<10	13	16	19	24	29	32	35	38	41			
10≤t<12	13	14	16	16	19	22	25	29	32	48	54	
12≤t<20	11	13	14	16	16	19	25	25	29	38	51	
20≤t<25	11	13	14	16	16	16	19	22	25	35	44	
25≤t<50	10	13	13	14	14	16	22	16	18	29	38	
50≤t<100	8	10	11	13	13	13	24	14	16	22	29	
100≤t<150	10	11	13	13	14	14	25	19	22	22	25	
150≤t<200	11	13	11	16	19	19	25	22	25	25	25	
Length L (mm) [in.]	t<10.5	t<16	t<25	t≤50								
L<3000	+22/ -6	+25/ -6	+29/ -6	+32/ -6								
3000≤L<6000	+25/ -6	+29/ -6	+32/ -6	+35/ -6								
6000≤L<9000	+29/ -6	+32/ -6	+35/ -6	+44/ -6								
9000≤L<12000	+35/ -6	+38/ -6	+41/ -6	+48/ -6								
12000≤L<15000	+38/ -6	+41/ -6	+44/ -6	+48/ -6								
15000≤L<18000	+44/ -6	+51/ -6	+57/ -6	+64/ -6								
L≥18000	+51/	+60/ -6	+64/ -6	+76/ -6								
Mass G (%)												

Rolling Tolerances for Plates

Standard		JIS G3193:2005						
Thickness t (mm) [in.]			b <1600 ±0.16	1600≥b <2000 ±0.23	2000≥b <2500 ±0.25	2500≥b <3150 ±0.29	3150≥b <4000 ±0.34	4000≥b <5000 ±0.34
		t<1.25 1.25≤t<1.60 1.60≤t<2.00 2.00≤t<2.50 2.50≤t<3.15 3.15≤t<4.00 4.00≤t<5.00 5.00≤t<6.30 6.30≤t<10.0 10.0≤t<16.0 16.0≤t<25.0 25.0≤t<40.0 40.0≤t<63.0 63.0≤t<100 100≤t<160 160≤t<200 200≤t<250	±0.18 ±0.19 ±0.20 ±0.22 ±0.24 ±0.45 ±0.50 ±0.55 ±0.55 ±0.65 ±0.75 ±0.75 ±0.80 ±0.80 ±0.95 ±0.95 ±1.10 ±1.10 ±1.30 ±1.30 ±1.50 ±1.50 ±1.60 ±1.80					
Width b (mm) [in.]			Mill Edge		Cut Edge			
			As rolled	Coil or sheet	A (Normal)	B (Re-heated)	C (Slit)	
b<160		t<3.15 3.15≤t<6.00 6.00≤t<20.0 t≥20.0		±2	+5/-0 +5/-0 +10/-0 +10/-0	+2.0/-0 +3.0/-0 +4.0/-0	±0.3 ±0.5	
160≤b<250		t<3.15 3.15≤t<6.00 6.00≤t<20.0 t≥20.0		±2	+5/-0 +5/-0 +10/-0 +15/-0	+2.0/-0 +3.0/-0 +4.0/-0	±0.4 ±0.5	
250≤b<400		t<3.15 3.15≤t<6.00 6.00≤t<20.0 t≥20.0	+Not specified/-0	±5	+5/-0 +5/-0 +10/-0 +15/-0	+2.0/-0 +3.0/-0 +4.0/-0	±0.5 ±0.5	
400≤b<630		t<3.15 3.15≤t<6.00 6.00≤t<20.0 t≥20.0	+Not specified/-0	+20/-0	+10/-0 +10/-0 +10/-0 +15/-0	+3.0/-0 +3.0/-0 +5.0/-0	±0.5 ±0.5	
630≤b<1000		t<3.15 3.15≤t<6.00 6.00≤t<20.0 t≥20.0	+Not specified/-0	+25/-0	+10/-0 +10/-0 +10/-0 +15/-0	+4.0/-0 +4.0/-0 +6.0/-0		

Rolling Tolerances for Plates

Standard		JIS G3193:2005					
Width b (mm) [in.]	1000≤b<1250	t<3.15 3.15≤t<6.00 6.00≤t<20.0 t≥20.0	+Not speci- fied/ -0	+30/ -0	+10/ -0 +10/ -0 +15/ -0 +15/ -0	+4.0/ -0 +4.0/ -0 +6.0/ -0	
	1250≤b<1600	t<3.15 3.15≤t<6.00 6.00≤t<20.0 t≥20.0	+Not speci- fied/ -0	+35/ -0	+10/ -0 +10/ -0 +15/ -0 +15/ -0	+4.0/ -0 +4.0/ -0 +6.0/ -0	
	1600≤b<2000	t<3.15 3.15≤t<6.00 6.00≤t<20.0 t≥20.0	+Not speci- fied/ -0	+40/ -0	+10/ -0 +10/ -0 +20/ -0 +20/ -0	+4.0/ -0 +4.0/ -0 +6.0/ -0	
	2000≤b<3000	t<3.15 3.15≤t<6.00 6.00≤t<20.0 t≥20.0	+Not speci- fied/ -0	+40/ -0	+10/ -0 +10/ -0 +20/ -0 +20/ -0	+4.0/ -0 +4.0/ -0 +6.0/ -0	
	3000≤b	t<3.15 3.15≤t<6.00 6.00≤t<20.0 t≥20.0	+Not speci- fied/ -0	+40/ -0	+10/ -0 +10/ -0 +25/ -0 +25/ -0	+4.0/ -0 +4.0/ -0 +6.0/ -0	
Straightness q (mm) [in.]			q≤0.002 L				
Length L (mm) [in.]	600≤L<4000		+20/ -0				
	4000≤L<6000		+30/ -0				
	6000≤L<8000		+40/ -0				
	8000≤L<10000		+50/ -0				
	10000≤L<15000		+75/ -0				
	15000≤L<20000		+100/ -0				
	L≥20000		+0.5%/ -0				

Rolling Tolerances for Hollow Sections

Profile	Circular		Square and Rectangular		Circular		Square and Rectangular	
Standard	EN 10219:2006				ASTM A500			
Outside Diameter D, B, H (mm) [in.]	±1% (min. ±0.5 mm; max. ±1.0 mm)		H, B<100	±1% (min. ±0.5)	D≤48.3 [1.9]	±0.5%	B, H≤63.5	±0.51
			100≤H,B≤200	±0.8%	D≥50.8 [2.0]	±0.75%	63.5<B, H≤88.9	±0.64
			H, B>200	±0.6%			88.9<B, H≤139.7	±0.76
							B, H≥139.7	±0.01H
							[B, H≤2 1/2]	[0.020]
							[2 1/2<B, H≤3 1/2]	[0.025]
							[3 1/2<B, H≤5 1/2]	[0.030]
							[B, H≥5 1/2]	[0.01H]
Thickness T (mm)	D≤406.4 D>406.4	T≤5; ±10% T>5; ±0.5 ±10% (max. ±2 mm)	T≤5; ±10% T>5; ±0.5		±10%			
Out-of-round O (mm) [in.]	2% for diameter to thickness ratio ≤100							
Concavity/convexity x ₁ , x ₂ (mm)			Max. 0.8% (min.0.5mm)					
Squareness of side U			90° ± 1°				90° ± 2°	
External corner profile C1, C2, R (mm)			T≤6 6<T≤10 T>10	1.6T - 2.4T 2.0T - 3.0T 2.4T - 3.6T			≤3T	
Twist V (mm)			2.0 + 0.5/m		H≤38.1 38.1<H≤63.5 63.5<H≤101.6 101.6<H≤152.4 152.4<H≤203.2 H>203.2		1.39/m 1.72/m 2.09/m 2.42/m 2.78/m 3.11/m	
Straightness e (mm) [in.]	0.002 L L>1m: 3		0.0015 L L>1m: 3		10.4 L (m) [1/8 L (ft)]			
Length L (mm) [in.]	L<6000 6000≤L≤10000 L>10000		+5/-0 +15/-0 +5/-0 +1/m		L≤6700 L>6700 [L≤22 ft] [L>22 ft]		+12.7/-6.4 +19.0/-6.4 [+1/2/-1/4] [+3/4/-1/4]	
Mass G (%)			±6					

Rolling Tolerances for Pipes

Profile								
Standard	EN 10255:2004		ASTM A53		ASTM A106		API 5L	
Outside Diameter D, B, H (mm) [in.]	As per specified range in standard		D≤48.3	±0.4	10.29 ≤D≤48.26	±0.40	D≤273.05	+1.59/ -0.40
			D≥60.33	±1%	48.26 <D≤114.3	±0.79	273.05<D≤508	+2.38/ -0.79
					114.3 <D≤219.0	+1.59/ -0.79	508<D≤1066.8	+2.38/ -0.79
					219.0 <D≤457.2	+2.38/ -0.79	D>1066.8	+2.38/ -0.79
					457.2 <D≤660.4	+3.18/ -0.79		
Thickness T (mm)	M, H, L	±10%	±12.5%		±12.5%		D≤73.03	+20/ -12.5
	L1, L2	±8%					73.03<D<508	+15/ -12.5
	Seamless	±12.5%					D≥508 (Welded)	+17.5/ -12.5
							D≥508 (Seamless)	+15/ -12.5
Out-of-round O (mm) [in.]	Included in diameter tolerance						D>508	±1%
Straightness e (mm) [in.]	D≥33.7	0.002 L						
Length L (mm) [in.]	L<6m	+10/ -0						
	6m≤L≤12m	+15/ -0						
	L>12m	to order						
Mass G (%)	M, H, L	±7.5	±10		+10/ -3.5		+10/ -3.5	
	L1, L2	+10/ -8						