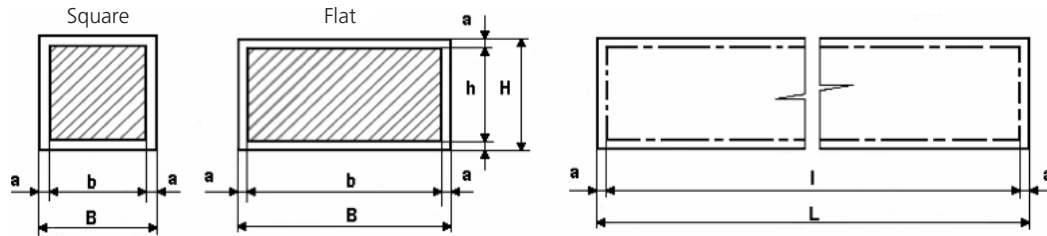


MACHINING ALLOWANCES AND TOLERANCES FOR HOT-ROLLED PRODUCTS

SIZES NOT REPORTED BELOW HAVE TO BE AGREED AT THE TIME OF ORDER PLACEMENT.



a = machining allowance
b, h, l = dimensions after machining
B, H, L = raw material dimensions

(2 a) raw material	(b) mm after machining	LUCEFİN GROUP MIN. mm ALLOWANCE (2 a) AS A FUNCTION OF THICKNESS (h)												
		< 10	> 10 ≤ 25	> 25 ≤ 35	> 35 ≤ 60	> 60 ≤ 80	> 80 ≤ 100	> 100 ≤ 130	> 130 ≤ 150	> 150 ≤ 180	> 180 ≤ 200	> 200 ≤ 220	> 220 ≤ 250	
2,0		≤ 20	2,0	2,5	--	--	--	--	--	--	--	--	--	--
2,5	> 20	≤ 25	2,5	2,5	--	--	--	--	--	--	--	--	--	--
3,0	> 25	≤ 35	3,0	3,0	3,0	--	--	--	--	--	--	--	--	--
3,5	> 35	≤ 60	3,0	3,0	3,0	3,5	--	--	--	--	--	--	--	--
4,5	> 60	≤ 80	3,5	3,5	4,0	4,0	4,5	--	--	--	--	--	--	--
5,0	> 80	≤ 100	4,0	4,0	4,0	4,5	5,0	6,0	7,0	--	--	--	--	--
6,0	> 100	≤ 130	4,5	5,0	5,0	5,5	6,0	7,0	7,0	8,0	--	--	--	--
8,0	> 130	≤ 150	5,0	5,5	6,0	6,0	6,5	8,0	8,0	8,0	--	--	--	--
9,0	> 150	≤ 180	--	6,0	6,0	6,5	7,0	8,0	9,0	9,0	10,0	--	--	--
10,0	> 180	≤ 200	--	6,5	7,0	7,0	8,0	9,0	9,0	9,0	10,0	--	--	--
12,0	> 200	≤ 220	--	8,0	8,5	8,5	9,0	9,5	10,0	10,0	10,0	10,5	10,5	11,0
14,0	> 220	≤ 250	--	9,0	9,0	9,0	10,0	10,0	10,0	10,0	10,5	10,5	11,0	12,0
15,0	> 250	≤ 300	--	9,0	9,0	10,0	10,0	10,0	11,0	11,0	11,0	11,0	11,5	12,0
16,0	> 300	≤ 350	--	9,0	9,0	10,0	10,0	10,0	11,0	11,0	11,0	11,0	12,0	12,0
18,0	> 350	≤ 400	--	9,0	10,0	10,0	10,0	11,0	11,0	11,0	11,0	11,5	--	--
20,0	> 400	≤ 450	--	10,0	10,0	10,0	10,0	11,0	11,0	11,0	11,0	--	--	--
22,0	> 450	≤ 500	--	--	--	10,0	11,0	11,0	11,0	11,5	11,5	--	--	--
24,0	> 500	≤ 550	--	--	--	11,0	11,0	11,0	11,0	11,5	11,5	--	--	--
26,0	> 550	≤ 600	--	--	--	11,0	11,0	11,0	11,5	11,5	11,5	--	--	--
28,0	> 600	≤ 700	--	--	--	11,0	11,0	11,0	11,5	11,5	11,5	--	--	--
30,0	> 700	≤ 805	--	--	--	11,0	11,0	11,0	11,5	11,5	11,5	--	--	--

e.g. for a finished flat of 110x70 mm, order 116x76 mm; if it is not included in the product range, order 120x80 mm raw material.

TOLERANCES FOR HOT-ROLLED FLAT BARS WITH HOT-WROUGHT SQUARE EDGE AND ROUND EDGE

ASTM A 29 - 04 • TAB. A 2.3

WIDTH mm		THICKNESS mm						WIDTH TOLERANCE ± mm	
		> 5 ≤ 6	> 6 ≤ 12	> 12 ≤ 25	> 25 ≤ 50	> 50 ≤ 75	> 75		
		THICKNESS TOLERANCE ± mm						>	≤
	≤ 25	0,18	0,20	0,25	0,50	0,50
> 25	≤ 50	0,18	0,30	0,40	0,80	1,00	1,00
> 50	≤ 100	0,20	0,40	0,50	0,80	1,20	1,20	1,50	1,00
> 100	≤ 150	0,25	0,40	0,50	0,80	1,20	1,20	2,50	1,50
> 150	≤ 200	a)	0,40	0,65	0,80	1,20	1,60	3,00	2,50
a) from bars of 150 to 200 mm of width and thickness lower than 6 mm are not available.									
Max perpendicularity: 3° or 5% of the thickness.									

EN 10017

ROUNDS	nominal diameter		tolerance on diameter mm	ovality 80% of the tolerance
	da mm	a mm		
	5	9,5	± 0,3	
	10	15,5	± 0,4	
	16	25	± 0,5	
	26	39	± 0,6	
	40	50	± 0,8	

SQUARES	nominal side		tolerance on the section mm	difference between max and min side 80% of the tolerance
	da mm	a mm		
	16	25	± 0,5	
	26	32	± 0,6	

FLATS	nominal section width x thickness		tolerance on	
	over mm	to mm	width mm	thickness mm
		16 x 11	16 x 12	± 0,5
	17 x 11	17 x 12	± 0,5	± 0,4
	18 x 10	18 x 12	± 0,5	± 0,4
	19 x 10	19 x 13	± 0,5	± 0,4
	20 x 9	20 x 16	± 0,5	± 0,4
	22 x 8	22 x 17	± 0,6	± 0,4
	25 x 7		± 0,6	± 0,3
	25 x 8	25 x 17	± 0,6	± 0,4
	26 x 7		± 0,6	± 0,3
	26 x 8	26 x 20	± 0,6	± 0,4
	28 x 6,5	28 x 7	± 0,6	± 0,3
	28 x 8	28 x 15	± 0,6	± 0,3
	30 x 6	30 x 7	± 0,6	± 0,3
	30 x 8	30 x 20	± 0,6	± 0,4

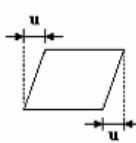
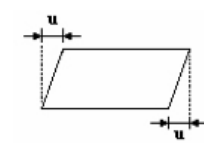
HEXAGONS	nominal wrench opening		tolerance on wrench opening mm	difference between max and min wrench 80% of the tolerance
	over mm	to mm		
	8	15	± 0,4	
	16	25	± 0,5	
	26	32	± 0,6	
	33	40	± 0,8	


DIMENSIONS AND TOLERANCES FOR HOT-ROLLED PRODUCTS

HOT-ROLLED SQUARE BARS		HOT-ROLLED FLAT BARS	
DIMENSIONAL TOLERANCES EN 10059: 2004		DIMENSIONAL TOLERANCES EN 10058: 2004	
NOMINAL SECTION	ADMITTED DEVIANCE (a)	NOMINAL WIDTH (b) mm	mm ADMITTED DEVIANCE (a)
mm	mm	> 10 ≤ 40	± 0,75
8 - 14	± 0,4	> 40 ≤ 80	± 1,0
15 - 25	± 0,5	> 80 ≤ 100	± 1,5
26 - 35	± 0,6	> 100 ≤ 120	± 2,0
40 - 50	± 0,8	> 120 ≤ 150	± 2,5
55 - 90	± 1,0	NOMINAL THICKNESS (a) mm	mm ADMITTED DEVIANCE (a)
100	± 1,3	≤ 20	± 0,5
110 - 120	± 1,5	> 20 ≤ 40	± 1,0
130 - 150	± 1,8	> 40 ≤ 80	± 1,5

a) when placing the order, total deviance may be agreed in (+)

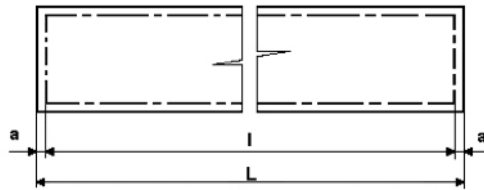
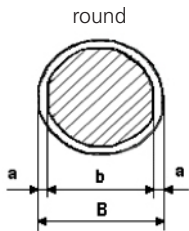
TWIST - SQUARE BARS		r = corner radius	
> 8 ≤ 14	4°/m up to max 24°	> 8 ≤ 12	≤ 1,0
> 14 ≤ 50	3°/m up to max 18°	> 12 ≤ 20	≤ 1,5
> 50	3°/m up to max 15°	> 20 ≤ 30	≤ 2,0
		> 30 ≤ 50	≤ 2,5
		> 50 ≤ 100	≤ 3,0
		> 100 ≤ 150	≤ 4,0

OUT-OF-SQUARENESS "U" - SQUARE BARS				OUT-OF-SECTION "U" - FLAT BARS	
				NOMINAL THICKNESS	TOLERANCE
≤ 50	1,50	square	flat	>10 ≤ 25	0,5
> 25 ≤ 75	2,25			>25 ≤ 40	1,0
> 75 ≤ 100	3,00			>40 ≤ 80	1,5
> 100 ≤ 150	4,50				

STRAIGHTNESS - SQUARE BARS			STRAIGHTNESS - FLAT BARS	
			NOMINAL SECTION	TOLERANCE ON THE PLANE (b)
≤ 25	non fissato			< 1000 mmq
> 25 ≤ 80	q ≤ 0,40% di L		≥ 1000 mmq	q ≤ 0,25% di L
> 80	q ≤ 0,25% di L			

EN 10060

The reported allowances are valid for lengths up to 1000 mm; for higher lengths, consider also straightness deviation according to standards.



a = thickness allowance
 b, l = dimensions after machining
 B, L = raw material dimensions

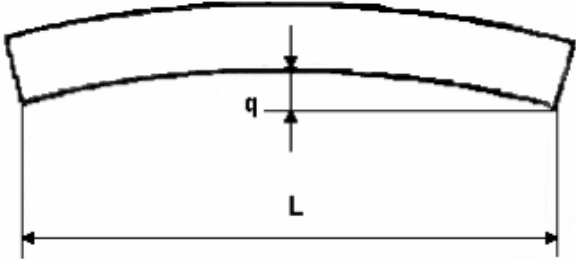
MIN. MACHINING ALLOWANCES SUGGESTED BY LUCEFIN GROUP FOR HOT-ROLLED ROUNDS

(b) mm after machining	≤ 10	> 10 ≤ 30	> 30 ≤ 40	> 40 ≤ 60	> 60 ≤ 80	> 80 ≤ 100	> 100 ≤ 140	> 140 ≤ 150
allowance (2 a)	2,0	2,5	3,0	3,5	4,0	5,0	6,0	7,0
(b) mm after machining	> 150 ≤ 220	> 220 ≤ 250	> 250 ≤ 280	> 280 ≤ 300	> 300 ≤ 320	> 320 ≤ 360	-	-
allowances (2 a)	10,0	13,0	18,0	20,0	22,0	24,0	-	-

e.g. for finished rounds of 75 mm, order 79 mm; if the size is not included in the product range, order 80 mm raw material.

Dimensional tolerances according to UNI EN 10060: 2004

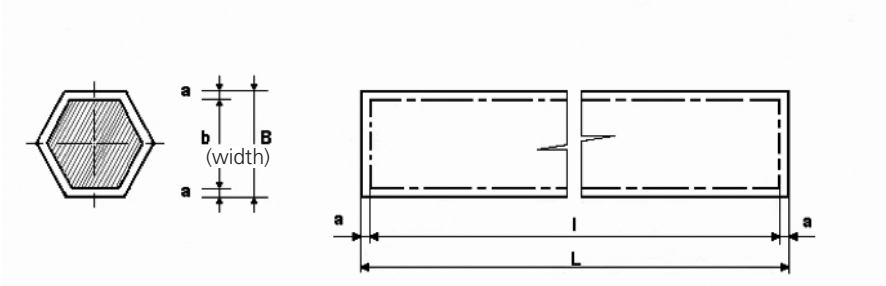
STRAIGHTNESS TOLERANCES ACCORDING TO UNI EN 10060: 2004

diameter mm	Normal deviance mm	Precision deviance mm				
10 - 12	± 0,4	± 0,15				
13 - 15	± 0,4	± 0,20				
16 - 22	± 0,5	± 0,20				
24 - 25	± 0,5	± 0,25				
26 - 30	± 0,6	± 0,25				
32 - 35	± 0,6	± 0,30				
36 - 40	± 0,8	± 0,30				
42 - 50	± 0,8	± 0,40				
52	± 1,0	± 0,40				
55 - 75	± 1,0	± 0,50				
80	± 1,0	not applicable			nominal diameter (mm)	tolerance
85 - 100	± 1,3				≤ 25	not fixed
105 - 120	± 1,5				≥ 25 ≤ 80	q ≤ 0,40 % di L
125 - 160	± 2,0				≥ 80 ≤ 250	q ≤ 0,25 % di L
165 - 200	± 2,5				As for bars intended for peeling, Lucefin Group requires max straightness deviation of 2% on the entire length.	
220	± 3,0					
250	± 4,0					
≥ 250	± 6,0					

Ovality should not exceed 75% of the admitted deviance.

DIMENSIONAL TOLERANCES FOR HOT-ROLLED HEXAGONS

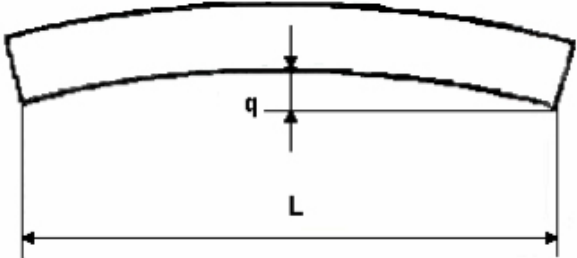
EN 10061: 2004



a = thickness allowance
 b, l = dimensions after machining
 B, L = raw material dimensions

MIN MACHINING ALLOWANCE SUGGESTED BY LUCEFIN GROUP FOR HOT-ROLLED HEXAGONS							
(b) mm after machining	> 13 ≤ 15	> 15 ≤ 20	> 20 ≤ 35	> 35 ≤ 50	> 50 ≤ 80	> 80 ≤ 103	> 103 ≤ 140
allowances (2 a)	3,0	3,5	4,0	4,5	5,5	6,0	8,0

e.g. for finished hexagons of 70 mm, order 75,5 mm; if the size is not included in the product range, order 78 mm raw material.

DIMENSIONAL TOLERANCES ACCORDING TO UNI EN 10061:2004				STRAIGHTNESS TOLERANCES ACCORDING TO UNI EN 10061: 2004		
width mm	deviance mm	width mm	deviance mm			
13 - 15	± 0,4	62	± 1,0			
16 - 19	± 0,5	67	± 1,0			
20,5	± 0,5	72	± 1,0			
22,5	± 0,5	78	± 1,0			
23,5	± 0,5	83	± 1,3			
25,5	± 0,6	88	± 1,3			
28,5	± 0,6	93	± 1,3			
31,5	± 0,6	98	± 1,3			
33,5	± 0,6	103	± 1,5			
35,5	± 0,8	max corner radius				
35,5	± 0,8	width mm	r mm			
37,5	± 0,8					
39,5	± 0,8	≤ 20,0	1,5			
42,5	± 0,8	> 20,0 ≤ 28,5	2,0			
47,5	± 0,8	> 28,5 ≤ 48,0	2,5	≤ 39,5	not fixed	
52	± 1,0	> 48,0 ≤ 83,0	3,0	> 39,5	≤ 83,0	$q \leq 0,4\% \times L$
57	± 1,0	> 83,0 ≤ 103	3,5	> 83,0	≤ 103	$q \leq 0,25\% \times L$

SURFACE QUALITY CLASSES FOR HOT-ROLLED PRODUCTS AND WIRE RODS

EN 10221 • TAB. 1

CLASS	NOMINAL DIAMETER dN mm			MAX SURFACE DEVIANCE DEPTH ADMITTED (mm)
		dN		
A	5 ≤	dN	≤ 25	0,50
	25 <	dN	≤ 150	0,02 x dN
B	5 ≤	dN	≤ 12	0,20
	12 <	dN	≤ 18	0,25
	18 <	dN	≤ 30	0,30
	30 <	dN	≤ 150	0,01 x dN
C	5 ≤	dN	≤ 12	0,17
	12 <	dN	≤ 30	0,23
	30 <	dN	≤ 120	0,0075 x dN
D	5 ≤	dN	≤ 12	0,15
	12 <	dN	≤ 40	0,20
	40 <	dN	≤ 60	0,005 x dN
	60 <	dN	≤ 80	0,30
E	5 ≤	dN	≤ 60	^a
^a the value must be higher than D class value; prescriptions and checking method should be agreed.				

If it is not possible to check the total delivery lot, special agreements shall be made with regard to the maximum admissible portion z of defective material;
e.g. z = 2,5%

SEP 1921

Values applicable to forged, hot-rolled, raw or processed steel bars in alloyed or non-alloyed steels, both in their natural state and treated condition.

Internal defects checking is carried out at supplier discretion (instrumentation, 1-4 MHz probes, coupling methods, etc.), as long as it is carried out on the entire volume of products.

Defect recording is based on the F.B.H. (flat-bottom-hole) method.

Values higher than the reported ones should be described according to their position, size, extension, then schematized and sent to Lucefin technical department for evaluation.

ADMISSIBILITY LIMITS - TABLE 1			
Size category	Single defects (mm) FBH ⁽¹⁾	Defects with extension (mm) FBH	Max extension (mm)
A	14	10	80
B	10	7	60
C	7	5	40
D	5	3	30
E	3	2	30

⁽¹⁾ Minimum distance between single defects is 50 mm; where it is lower, consider values "with extension".

DEFECTS ON A SINGLE PIECE - TABLE 2		
Frequency category	Number of defects	Number of defects with extension
a	32	16
b	16	8
c	8	4
d	4	2
e	2	1