GRUPPO LUCEFIN Lovin' Steel

TOLERANCES FOR COLD-FINISHED BARS

ASTM A 108-03 • TAB. A 1.1

STEEL BARS	INCHES / MILLIMETERS				MAX CARBON CONTENT 0,28 %		CARBON CONTENT OVER 0,28 % AND UP TO 0,55%	
	SIZE				TOLERANCES		TOLERANCES	
	inches		mm		inches	mm	inches	mm
FLATS		≤ 3/4		≤ 19,05	- 0,003	- 0,076	- 0,004	- 0,102
	> 3/4	≤ 1-1/2	> 19,05	≤ 38,10	- 0,004	- 0,102	- 0,005	- 0,127
	> 1-1/2	≤ 3	> 38,10	≤ 76,20	- 0,005	- 0,127	- 0,006	- 0,152
	> 3	≤ 4	> 76,20	≤ 101,6	- 0,006	- 0,152	- 0,008	- 0,203
	> 4	≤ 6	> 101,6	≤ 152,4	- 0,008	- 0,203	- 0,010	- 0,254
	> 6		> 152,4		- 0,013	- 0,330	- 0,015	- 0,381
SQUARES	inches		mm		inches	mm	inches	mm
		≤ 3/4		≤ 19,05	- 0,002	- 0,051	- 0,004	- 0,102
	> 3/4	≤ 1-1/2	> 19,05	≤ 38,10	- 0,003	- 0,076	- 0,005	- 0,127
	> 1-1/2	≤ 2-1/2	> 38,10	≤ 63,50	- 0,004	- 0,102	- 0,006	- 0,152
	> 2-1/2	≤ 4	> 63,50	≤ 101,6	- 0,006	- 0,152	- 0,008	- 0,203
	> 4	≤ 5	> 101,6	≤ 127,0	- 0,010	- 0,254	\	\
	> 5	≤ 6	> 127,0	≤ 152,4	- 0,014	- 0,356	\	\
HEXAGONS	inches		mm		inches	mm	inches	mm
		≤ 3/4		≤ 19,05	- 0,002	- 0,051	- 0,003	- 0,076
	> 3/4	≤ 1-1/2	> 19,05	≤ 38,10	- 0,003	- 0,076	- 0,004	- 0,102
	> 1-1/2	≤ 2-1/2	> 38,10	≤ 63,50	- 0,004	- 0,102	- 0,005	- 0,127
	> 2-1/2	≤ 3-1/8	> 63,50	≤ 79,375	- 0,005	- 0,127	- 0,006	- 0,152
	> 3-1/8	≤ 4	> 79,375	≤ 101,60	- 0,005	- 0,127	- 0,006	- 0,152
ROUNDS	inches		mm		inches	mm	inches	mm
		≤ 1-1/2		≤ 38,10	- 0,002	- 0,051	- 0,003	- 0,076
	> 1-1/2	≤ 2-1/2	> 38,10	≤ 63,50	- 0,003	- 0,076	- 0,004	- 0,102
	> 2-1/2	≤ 4	> 63,50	≤ 101,6	- 0,004	- 0,102	- 0,005	- 0,127
	> 4	≤ 6	> 101,6	≤ 152,4	- 0,005	- 0,127	- 0,006	- 0,152
	> 6	≤ 8	> 152,4	≤ 203,2	- 0,006	- 0,152	- 0,007	- 0,178
	> 8 ≤ 9	≤ 9	> 203,2	≤ 228,6	- 0,007	- 0,178	- 0,008	- 0,203

Usually tolerances are requested in (-), when ordered in (+ -) the sum must be equal to what agreed (e.g. + 0,10 or ± 0,05 mm)

Width governs the tolerances for both width and thickness of flats. For example, when carbon content is max 0.28%, a flat 2 inches wide (50.80 mm) and 1 inch thick (25.40 mm), has a width tolerance of 0.005 inches (127 mm); its thickness tolerance remains the same (0.005 inches or 127 mm).

GRUPPO LUCEFIN Lovin' Steel

SURFACE DEFECTS TOLERANCES FOR COLD-FINISHED BARS

ASTM A 108 - 03 • TAB. A 1.8

TOLERANCE LEVEL	MAX DEPTH ADMITTED FOR SURFACE DEFECTS TOLERANCES					
	CARBON AND ALLOYED STEEL, NON-RESULFURIZED		CARBON AND ALLOYED STEELS, RESULFURIZED (SULPHUR 0,08 - 0,19 %)		CARBON AND ALLOYED STEELS, RESULFURIZED (SULPHUR 0,20 - 0,35 %)	
dimensions (mm)	from 6,35 to 15,88	from 15,88 to 152,40	from 6,35 to 15,88	from 15,88 to 152,40	from 6,35 to 15,88	from 6,35 to 15,88
	max depth mm	max depth %	max depth mm	max depth %	max depth mm	max depth %
Level 1	0,20	1,6%	0,25	2,0%	0,30	2,4%
Level 2	0,15	1,0%	0,20	1,3%	0,25	1,6%
Level 3	0,15	0,75%	0,15	1,0%	0,20	1,3%
Level 4 (a)	nil	nil	nil	nil	nil	nil
Values intended for max depth obtained with good manufacturing pratice. Occasionally, bars that have surface discontinuity that exceed these limits are accepted. For critical applications, customer may require specific tests before shipment (e.g. eddy current test).						
(a) level 4 requires metal removal by turning or multiple grinding steps.						

STRAIGHTNESS TOLERANCES FOR COLD-FINISHED BARS

ASTM A 108 - 03 • TAB. A 1.4

STRAIGHTNESS TOLERANCES (MM MAX DEVIANCE) IN ANY PART OF A 3048 mm BAR					
DIMENSION	LENGTH	MAX CARBON CONTENT 0,28%		CARBON CONTENT OVER 0,28% AND ALL OTHER STEEL GRADES	
mm	mm	ROUNDS	SQUARES, HEXAGONS	ROUNDS	SQUARES, HEXAGONS
less than 15,88	inferiore a 4572	3,17	4,76	4,76	6,35
less than 15,88	4572 e oltre	3,17	7,94	7,94	9,53
15,88 and over	inferiore a 4572	1,59	3,17	3,17	4,76
15,88 and over	4572 e oltre	3,17	4,76	4,76	6,35
The values are applicable to all quenched and tempered or normalized and tempered steel grades at max HB 302 before cold finishing; furthermore, to all stress relieved or annealed steel grades after cold finishing. Straightness tolerances are not applicable to bars with HB over 302.					
Straightness tolerance is determined as follows: a bar is placed on a horizontal base and the arc is measured by thickness gauges.					
It is well known that straightness can deteriorate in case of ill treatment. To mantain it, extreme care is due in every successive stage. Sometimes specific tolerances are requested for carbon or alloyed steels; in this case, the customer informs the suppliers of the requested tolerances.					

GRUPPO LUCEFIN Lovin' Steel

TOLERANCES

BS 970 • PART 3:1991

TOLERANCES FOR COLD-FINISHED BARS IN CARBON STEELS			
SIZE	mm		mm DEVIATION
FLATS WIDTH	≤ 18		- 0,11
	> 18	≤ 30	- 0,13
	> 30	≤ 50	- 0,16
	> 50	≤ 80	- 0,19
	> 80	≤ 100	- 0,22
	> 100	≤ 130	- 0,35
	> 130	≤ 160	- 1,00
	> 160	≤ 320	- 2,00
FLATS THICKNESS	≤ 18		- 0,11
	> 18	≤ 30	- 0,13
	> 30	≤ 50	- 0,25
	> 50	≤ 80	- 0,35
SQUARES	≥ 6	≤ 18	- 0,09
	> 18	≤ 30	- 0,11
	> 30	≤ 50	- 0,13
	> 50	≤ 80	- 0,16
	> 80	≤ 105	- 0,25
HEXAGONS	≥ 6	≤ 18	- 0,09
	> 18	≤ 30	- 0,11
	> 30	≤ 50	- 0,13
	> 50	≤ 80	- 0,16
	> 80	≤ 105	- 0,25
ROUNDS	≥ 6	≤ 18	- 0,070
	> 18	≤ 30	- 0,085
	> 30	≤ 50	- 0,100
	> 50	≤ 80	- 0,120
	> 80	≤ 100	- 0,140

Tolerances are usually specified as (-)
Thickness should be measured at a distance of 12 mm from bar extremity.
Cross-section should be measured at a distance of 25 mm from bar extremity.
Round bars diameter should be measured at a distance of 150 mm from bar extremity except for tailor made bars, whose dicumeter should be measured at a distance of 10 mm from bar extremity.

STRAIGHTNESS TOLERANCES FOR COLD-FINISHED BARS		
SECTION	STEEL GRADE	ADMITTED DEVIANCE (mm)
ROUNDS	< 0,25 % carbonio ≥ 0,25 % carbonio, legati e tutti i tipi trattati	1 / 1000 1 / 500
SQUARES AND HEXAGONS	< 0,25 % cabonio ≤ 75 mm > 75 mm ≥ 0,25 % carbonio, legati e tutti i tipi trattati	1 / 750 1 / 500 1 / 375
FLATS	< 0,25 % carbonio ≥ 0,25 % carbonio, legati e tutti i tipi trattati	1 / 500 1 / 375

Drawn and turned bars are supplied with tolerances measured as max straightness deviance in any part of a 3000 mm bar.

GRUPPO LUCEFIN Lovin' Steel

SURFACE QUALITY CLASSES FOR COLD-FINISHED PRODUCTS

EN 10277-1 • TAB. 1

CONDITION	CLASS			
	1	2	3	4
Admitted defect depth	max 0,3 mm for d ≤ 15 mm; max 0,02 x d for 15 < d ≤ 100 mm.	max 0,3 mm for d ≤ 15 mm; max 0,02 x d for 15 < d ≤ 75 mm; max 1,5 mm for d > 75 mm.	max 0,2 mm for d ≤ 20 mm; max 0,01 x d for 20 < d ≤ 75 mm; max 0,75 mm for d > 75 mm.	technically crack free
Max percentage of delivered products with defects over the specified level	4%	1%	1%	0,20%
Product section [1]				
Rounds	+	+	+	+
Squares	+	+ (for d < 20 mm)	-	-
Hexagons	+	+ (for d < 50 mm)	-	-
Flats	+ [2]	-	-	-

NOTES

d = bar nominal diameter; squares and hexagons width.

[1] + product available; - product not available.

[2] max defect depth refers to the width or thickness.

GRUPPO LUCEFIN Lovin' Steel

DIMENSIONS AND TOLERANCES FOR COLD-FINISHED BARS

EN 10278

DIMENSIONAL TOLERANCES FOR FLATS		MAX CARBON CONTENT 0,20% AND LOW CARBON FREE-CUTTING STEELS		DIMENSIONAL TOLERANCES FOR FLATS		MAX CARBON CONTENT 0,20% AND LOW CARBON FREE-CUTTING STEELS		CARBON CONTENT > 0,20% AND ALL OTHER STEEL GRADES	
width (mm)		admitted deviance (mm)		thickness (mm)		admitted deviance (mm)		admitted deviance (mm)	
…	≤ 18	+ 0	- 0,11	> 3	≤ 6	+ 0	- 0,075	+ 0	- 0,11
> 18	≤ 30	+ 0	- 0,13	> 6	≤ 10	+ 0	- 0,090	+ 0	- 0,13
> 30	≤ 50	+ 0	- 0,16	> 10	≤ 18	+ 0	- 0,11	+ 0	- 0,16
> 50	≤ 80	+ 0	- 0,19	> 18	≤ 30	+ 0	- 0,13	+ 0	- 0,19
> 80	≤ 100	+ 0	- 0,22	> 30	≤ 50	+ 0	- 0,16	+ 0	- 0,24
> 100	≤ 150	+ 0,50	- 0,50	> 50	≤ 60	+ 0	- 0,19	+ 0	- 0,28
> 150	≤ 200	+ 1,00	- 1,00	> 60	≤ 80	+ 0	- 0,30	+ 0	- 0,45
> 200	≤ 300	+ 2,00	- 2,00	> 80	≤ 100	+ 0	- 0,35	+ 0	- 0,52
> 300	≤ 400	+ 2,50	- 2,50						

STRAIGHTNESS TOLERANCES - FLATS

width (mm)	STEELS			max deviance for width (w) and thickness (t)
	C% < 0,25 (mm/m)	C% ≥ 0,25 quenched and tempered (mm/m)	stainless, bearings, tools (mm/m)	
< 120	1,5	1,5	1,5	w
	1,5	2,0	2,0	t
≥ 120 w / t < 10	1,5	2,0	2,0	w
	2,0	2,5	2,5	t
≥ 120 w / t ≥ 10	2,0	2,5	2,5	w
	2,5	3,0	3,0	t

STRAIGHTNESS TOLERANCES - SQUARES - HEXAGONS

dimensions (mm)	STEELS			DIMENSIONAL TOLERANCES
	C% < 0,25 (mm/m)	C% > 0,25 (mm/m)	stainless (mm/m)	
≤ 75	1,0	2,0	1,0	h11 - h12
> 75	1,5	2,5	1,5	

STRAIGHTNESS TOLERANCES - ROUNDS

dimensions (mm)	STEELS			DIMENSIONAL TOLERANCES
	C% < 0,25 (mm/m)	C% > 0,25 (mm/m)	stainless (mm/m)	
all dimensions	1,0	1,5	1,0	h9 - h10 - h11 - h12

DIMENSION CHECKING:

- round bars: distance > 150 mm from bar extremity
- tailor made round bars: distance > 10 mm from bar extremity
- non-round shaped bars: distance > 25 mm from bar extremity

DIMENSIONS AND TOLERANCES FOR COLD-FINISHED PRODUCTS

EN 10278

DIMENSION CHECKING ON ROUNDS - SQUARES - HEXAGONS	FINISHING CONDITIONS	h6	h7	h9	h11	h12
a) round bars: distance > 150 mm from bar extremity	Cold-drawn	..	..	R	R - S - H	R - S - H
b) tailor made round bars: distance > 10 mm from bar extremity	Peeled	..	..	R	R	R
c) non-round shape bars: distance > 25 mm from bar extremity	Ground	R	R	R	..	..

dimensions (mm)	f6 (mm)		f7 (mm)		g6 (mm)		g7 (mm)		h6 (mm)		h7 (mm)		h9 (mm)		h11 (mm)		h12 (mm)	
≤ 3	-0,006	-0,012	-0,006	-0,016	-0,002	-0,008	-0,002	-0,012	+0	-0,006	+0	-0,010	+0	-0,025	+0	-0,060	+0	-0,100
> 3 ≤ 6	-0,010	-0,018	-0,010	-0,022	-0,004	-0,012	-0,004	-0,016	+0	-0,008	+0	-0,012	+0	-0,030	+0	-0,075	+0	-0,120
> 6 ≤ 10	-0,013	-0,022	-0,013	-0,028	-0,005	-0,014	-0,005	-0,020	+0	-0,009	+0	-0,015	+0	-0,036	+0	-0,090	+0	-0,150
> 10 ≤ 18	-0,016	-0,027	-0,016	-0,034	-0,006	-0,017	-0,006	-0,024	+0	-0,011	+0	-0,018	+0	-0,043	+0	-0,110	+0	-0,180
> 18 ≤ 30	-0,020	-0,033	-0,020	-0,041	-0,007	-0,020	-0,007	-0,028	+0	-0,013	+0	-0,021	+0	-0,052	+0	-0,130	+0	-0,210
> 30 ≤ 50	-0,025	-0,041	-0,025	-0,050	-0,009	-0,025	-0,009	-0,034	+0	-0,016	+0	-0,025	+0	-0,062	+0	-0,160	+0	-0,250
> 50 ≤ 80	-0,030	-0,049	-0,030	-0,060	-0,010	-0,029	-0,010	-0,040	+0	-0,019	+0	-0,030	+0	-0,074	+0	-0,190	+0	-0,300
> 80 ≤ 120	-0,036	-0,058	-0,036	-0,071	-0,012	-0,034	-0,012	-0,047	+0	-0,022	+0	-0,035	+0	-0,087	+0	-0,220	+0	-0,350
> 120 ≤ 180	-0,043	-0,068	-0,043	-0,083	-0,014	-0,039	-0,014	-0,054	+0	-0,025	+0	-0,040	+0	-0,100	+0	-0,250	+0	-0,400
> 180 ≤ 250	-0,050	-0,079	-0,050	-0,096	-0,015	-0,044	-0,015	-0,061	+0	-0,029	+0	-0,046	+0	-0,115	+0	-0,290	+0	-0,460
> 250 ≤ 315	-0,056	-0,088	-0,056	-0,108	-0,017	-0,049	-0,017	-0,069	+0	-0,032	+0	-0,052	+0	-0,130	+0	-0,320	+0	-0,520
> 315 ≤ 400	-0,062	-0,098	-0,062	-0,119	-0,018	-0,054	-0,018	-0,075	+0	-0,036	+0	-0,057	+0	-0,140	+0	-0,360	+0	-0,570

R = round S = square H = hexagon

GRUPPO LUCEFIN Lovin' Steel

TOLERANCES • UNI 6388/68 - ISO 286

ADMITTED OVALITY IS EQUAL TO HALF OF THE REPORTED TOLERANCE																													
		µm		50		=		mm		0,05																			
degree	class	tolerances are expressed in µm = 0,001 mm																											
		>1 ≤3		>3 ≤6		>6 ≤10		>10 ≤18		>18 ≤30		>30 ≤50		> 50 ≤80		>80 ≤120		>120 ≤180		>180 ≤250		>250 ≤315		>315 ≤400					
g	5	-2	-6	-4	-9	-5	-11	-6	-14	-7	-16	-9	-20	-10	-23	-12	-27	-14	-32	-15	-35	-17	-40	-18	-43				
h	5	0	-4	0	-5	0	-6	0	-8	0	-9	0	-11	0	-13	0	-15	0	-18	0	-20	0	-23	0	-25				
j	5	+2	-2	+3	-2	+4	-2	+5	-3	+5	-4	+6	-5	+6	-7	+6	-9	+7	-11	+7	-13	+7	-16	+7	-18				
k	5	+4	0	+6	+1	+7	+1	+9	+1	+11	+2	+13	+2	+15	+2	+18	+3	+21	+3	+24	+4	+27	+4	+29	+4				
m	5	+6	+2	+9	+4	+12	+6	+15	+7	+17	+8	+20	+9	+24	+11	+28	+13	+33	+15	+37	+17	+43	+20	+46	+21				
js	5	+2	-2	+2,5	-2,5	+3	-3	+4	-4	+4,5	-4,5	+5,5	-5,5	+6,5	-6,5	+7,5	-7,5	+9	-9	+10	-10	+11,5	-11,5	+12,5	-12,5				
n	5	+8	+4	+13	+8	+16	+10	+20	+12	+24	+15	+28	+17	+33	+20	+38	+23	+45	+27	+51	+31	+57	+34	+62	+37				
g	6	-2	-8	-4	-12	-5	-14	-6	-17	-7	-20	-9	-25	-10	-29	-12	-34	-14	-39	-15	-44	-17	-49	-18	-54				
h	6	0	-6	0	-8	0	-9	0	-11	0	-13	0	-16	0	-19	0	-22	0	-25	0	-29	0	-32	0	-36				
j	6	+4	-2	+6	-2	+7	-2	+8	-3	+9	-4	+11	-5	+12	-7	+13	-9	+14	-11	+16	-13	+16	-16	+18	-18				
k	6	+6	0	+9	+1	+10	+1	+12	+1	+15	+2	+18	+2	+21	+2	+25	+3	+28	+3	+33	+4	+36	+4	+40	+4				
m	6	+8	+2	+12	+4	+15	+6	+18	+7	+21	+8	+25	+9	+30	+11	+35	+13	+40	+15	+46	+17	+52	+20	+57	+21				
n	6	+10	+4	+16	+8	+19	+10	+23	+12	+28	+15	+33	+17	+39	+20	+45	+23	+52	+27	+60	+31	+66	+34	+73	+37				
js	6	+3	-3	+4	-4	+4,5	-4,5	+5,5	-5,5	+6,5	-6,5	+8	-8	+9,5	-9,5	+11	-11	+12,5	-12,5	+14,5	-14,5	+16	-16	+18	-18				
p	6	+12	+6	+20	+12	+24	+15	+29	+18	+35	+22	+42	+26	+51	+32	+59	+37	+68	+43	+79	+50	+88	+56	+98	+62				
g	7	-2	-12	-4	-16	-5	-20	-6	-24	-7	-28	-9	-34	-10	-40	-12	-47	-14	-54	-15	-61	-17	-69	-18	-75				
f	7	-6	-16	-10	-22	-13	-28	-16	-34	-20	-41	-25	-50	-30	-60	-36	-71	-43	-83	-50	-96	-56	-108	-62	-119				
h	7	0	-10	0	-12	0	-15	0	-18	0	-21	0	-25	0	-30	0	-35	0	-40	0	-46	0	-52	0	-57				
j	7	+6	-4	+8	-4	+10	-5	+12	-6	+13	-8	+15	-10	+18	-12	+20	-15	+22	-18	+25	-21	+26	-26	+29	-28				
k	7	+10	0	+13	+1	+16	+1	+19	+1	+23	+2	+27	+2	+32	+2	+38	+3	+43	+3	+50	+4	+56	+4	+61	+4				
m	7	+12	+2	+16	+4	+21	+6	+25	+7	+29	+8	+34	+9	+41	+11	+48	+13	+55	+15	+63	+17	+72	+20	+78	+21				
js	7	+5	-5	+6	-6	+7	-7	+9	-9	+10	-10	+12	-12	+15	-15	+17	-17	+20	-20	+23	-23	+26	-26	+28	-28				
n	7	+14	+4	+20	+8	+25	+10	+30	+12	+36	+15	+42	+17	+50	+20	+58	+23	+67	+27	+77	+31	+86	+34	+94	+37				
d	8	-20	-34	-30	-48	-40	-62	-50	-77	-65	-98	-80	-119	-100	-146	-120	-174	-145	-208	-170	-242	-190	-271	-210	-299				
e	8	-14	-28	-20	-38	-25	-47	-32	-59	-40	-73	-50	-89	-60	-106	-72	-126	-85	-148	-100	-172	-110	-191	-125	-214				
f	8	-6	-20	-10	-28	-13	-35	-16	-43	-20	-53	-25	-64	-30	-76	-36	-90	-43	-106	-50	-122	-56	-137	-62	-151				
h	8	0	-14	0	-18	0	-22	0	-27	0	-33	0	-39	0	-46	0	-54	0	-63	0	-72	0	-81	0	-89				
js	8	+7	-7	+9	-9	+11	-11	+13	-13	+16	-16	+19	-19	+23	-23	+27	-27	+31	-31	+36	-36	+40	-40	+44	-44				
k	8	+14	0	+18	0	+22	0	+27	0	+33	0	+39	0	+46	0	+54	0	+63	0	+72	0	+81	0	+89	0				
d	9	-20	-45	-30	-60	-40	-76	-50	-93	-65	-117	-80	-142	-100	-174	-120	-207	-145	-245	-170	-285	-190	-320	-210	-350				
e	9	-14	-39	-20	-50	-25	-61	-32	-75	-40	-92	-50	-112	-60	-134	-72	-159	-85	-185	-100	-215	-110	-240	-125	-265				
h	9	0	-25	0	-30	0	-36	0	-43	0	-52	0	-62	0	-74	0	-87	0	-100	0	-115	0	-130	0	-140				
js	9	+12	-12	+15	-15	+18	-18	+21	-21	+26	-26	+31	-31	+37	-37	+43	-43	+50	-50	+57	-57	+65	-65	+70	-70				
k	9	+25	0	+30	0	+36	0	+43	0	+52	0	+62	0	+74	0	+87	0	+100	0	+115	0	+130	0	+140	0				
h	10	0	-40	0	-48	0	-58	0	-70	0	-84	0	-100	0	-120	0	-140	0	-160	0	-185	0	-210	0	-230				
js	10	+20	-20	+24	-24	+29	-29	+35	-35	+42	-42	+50	-50	+60	-60	+70	-70	+80	-80	+92	-92	+105	-105	+115	-115				
k	10	+40	0	+48	0	+58	0	+70	0	+84	0	+100	0	+120	0	+140	0	+160	0	+185	0	+210	0	+230	0				
h	11	0	-60	0	-75	0	-90	0	-110	0	-130	0	-160	0	-190	0	-220	0	-250	0	-290	0	-320	0	-360				
js	11	+30	-30	+37	-37	+45	-45	+55	-55	+65	-65	+80	-80	+95	-95	+110	-110	+125	-125	+145	-145	+160	-160	+180	-180				
k	11	+60	0	+75	0	+90	0	+110	0	+130	0	+160	0	+190	0	+220	0	+250	0	+290	0	+320	0	+360	0				
js	12	+50	-50	+60	-60	+75	-75	+90	-90	+105	-105	+125	-125	+150	-150	+175	-175	+200	-200	+230	-230	+260	-260	+285	-285				
h	12	0	-100	0	-120	0	-150	0	-180	0	-210	0	-250	0	-300	0	-350	0	-400	0	-460	0	-520	0	-570				
k	12	+100	0	+120	0	+150	0	+180	0	+210	0	+250	0	+300	0	+350	0	+400	0	+460	0	+520	0	+570	0				
js	13	+70	-70	+90	-90	+110	-110	+135	-135	+165	-165	+195	-195	+230	-230	+270	-270	+315	-315	+360	-360	+405	-405	+445	-445				
h	13	0	-140	0	-180	0	-220	0	-270	0	-330	0	-390	0	-460	0	-540	0	-630	0	-720	0	-810	0	-890				
k	13	+140	0	+180	0	+220	0	+270	0	+330	0	+390	0	+460	0	+540	0	+630	0	+720	0	+810	0	+890	0				

GRUPPO LUCEFIN Lovin' Steel

DEVIANCE - ISO 286 SYSTEM

NOMINAL DIMENSION (mm)		IT1	IT2	IT3	IT4	IT5	IT6	IT7	IT8	IT9	IT10	IT11	IT12	IT13	IT14	IT15	IT16	IT17
	≤ 3	0,8	1,2	2	3	4	6	10	14	25	40	60	100	140	250	400	600	-
> 3	≤ 6	1	1,5	2,5	4	5	8	12	18	30	48	75	120	180	300	480	750	-
> 6	≤ 10	1	1,5	2,5	4	6	9	15	22	36	58	90	150	220	360	580	900	(1500)
> 10	≤ 18	1,2	2	3	5	8	11	18	27	43	70	110	180	270	430	700	1100	(1800)
> 18	≤ 30	1,5	2,5	4	6	9	13	21	33	52	84	130	210	330	520	840	1300	(2100)
> 30	≤ 50	1,5	2,5	4	7	11	16	25	39	62	100	160	250	390	620	1000	1600	(2500)
> 50	≤ 80	2	3	5	8	13	19	30	46	74	120	190	300	460	740	1200	1900	(3000)
> 80	≤ 120	2,5	4	6	10	15	22	35	54	87	140	220	350	540	870	1400	2200	(3500)
> 120	≤ 180	3,5	5	8	12	18	25	40	63	100	160	250	400	630	1000	1600	2500	(4000)
> 180	≤ 250	4,5	7	10	14	20	29	46	72	115	185	290	460	720	1150	1850	2900	(4600)
> 250	≤ 315	6	8	12	16	23	32	52	81	130	210	320	520	810	1300	2100	3200	(5200)
> 315	≤ 400	7	9	13	18	25	36	57	89	140	230	360	570	890	1400	2300	3600	(5700)

The tolerances in µm indicate the permissible difference between the maximum and minimum section.

(.....) values according to UNI 6388

DEGREE OF TOLERANCE - MECHANICAL PROCESSING AND APPLICATIONS

DEGREE OF TOLERANCE	CLASS OF TOLERANCE		RA µm	MECHANICAL PROCESSING		APPLICATIONS
	SHAFTS	HOLES		SHAFTS	HOLES	SHAFTS AND HOLES
IT1 - IT4	-	-	0,05	special purpose machine	special purpose machine	precision machining of measuring instruments, gauges, slip gauges
IT5	extra fine	-	0,25	lapping	special grinding	seals processing
IT6	extra fine	extra fine	0,4	precision grinding	precision grinding	components intended for connection
IT7	accurate	accurate	0,8	extra fine of macchine tool, grinding	extra fine boring, fine of machine tool	components intended for connection
IT8	mean accurate	mean accurate	1,6	fine of machine tool	fine boring, smoot finish machine tool	low-precision components intended for connection
IT9	fine	fine	1,6 3,2	machine finished, peeling-rolling, drawing	fine boring, smoot finish machine tool	low-precision components intended for connection
IT10	coarse	coarse	3,2 2	turning, peeling, drawing	boring-turning, drilling	low-precision components intended for connection
IT11	coarse	coarse	3,2 6,3-12,5	peeling, turning	boring-turning, drilling	components not intended for connection
IT12	very coarse	very coarse	25	press forging, rolling, hot-pressing, casting		components not intended for connection
IT13	very coarse	very coarse	25	press forging, rolling, hot-pressing, casting		components not intended for connection
IT14 - IT17	very coarse	very coarse	25	press forging, rolling, hot-pressing, casting		components not intended for connection