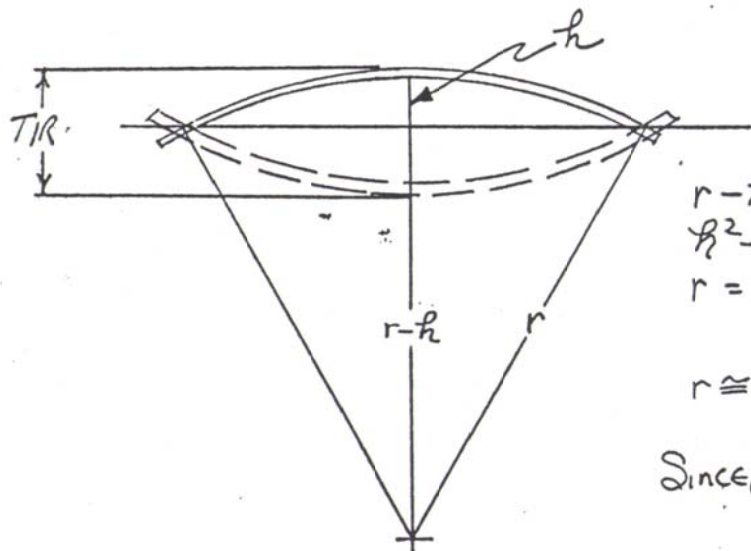


STRAIGHTNESS OF COLD FINISHED BARS

(TABLE B-9 AISI; TABLE A1.24 ASTM A-29).



$$r - h = \sqrt{r^2 - c^2}$$

$$h^2 - 2rh + r^2 = r^2 - c^2$$

$$r = \frac{c^2 + h^2}{2h} = \frac{c^2}{2h} + \frac{h}{2}$$

$$r \approx \frac{c^2}{2h} \rightarrow h = \frac{c^2}{2r}$$

$$\text{Since } c = \frac{L}{2} \quad h = \frac{L^2}{2(4)r}$$

h = CAMBER OF BAR

C = $\frac{1}{2}$ DISTANCE BETWEEN BEARINGS

r = RADIUS OF ARC

TIR = $2h$

L in FEET

	$\frac{L^2}{1600}$		$\frac{L^2}{800}$		$\frac{L^2}{533.33}$		$\frac{L^2}{400}$		$\frac{L^2}{320}$		$\frac{L^2}{266.67}$	
	$\frac{1}{16}$ " in 10 FT		$\frac{1}{8}$ " in 10 FT		$\frac{3}{16}$ " in 10 FT		$\frac{1}{4}$ " in 10 FT		$\frac{5}{16}$ " in 10 FT		$\frac{3}{8}$ " in 10 FT	
	h	TIR	h	TIR	h	TIR	h	TIR	h	TIR	h	TIR
1	.000625	.00125	.00125	.0025	.00187	.00375	.0025	.0050	.003125	.00625	.00375	.0075
2	.0025	.0050	.005	.010	.0075	.0150	.0100	.020	.0125	.025	.01499	.02999
5	.015625	.03125	.03125	.0625	.04688	.09376	.0625	.1250	.078125	.15625	.09376	.18752
10	.0625	.1250	.1250	.2500	.1875	.375	.2500	.5000	.3125	.6250	.3750	.7500
12	.0900	.1800	.1800	.3600	.2700	.5400	.3600	.7200	.4500	.9000	.5400	1.08
15	.140625	.28125	.28125	.5625	.4219	.8438	.5625	1.125	.703125	1.40625	.8438	1.6876

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Table 8-4

STRAIGHTNESS TOLERANCES FOR COLD FINISHED BARS

(Ref. ASTM A29/A29M)^{a,b}

NOTE: All grades quenched and tempered or normalized and tempered to Brinell 302 max *before* cold finishing; and all grades stress relieved or annealed *after* cold finishing. Straightness tolerances are not applicable to bars having Brinell hardness exceeding 302.

Size, in	Length, ft	Straightness Tolerances, in (Maximum Deviation) from Straightness in any 10 ft Portion of the Bar			
		Maximum of Carbon Range 0.28 Percent or Less		Maximum of Carbon Range Over 0.28 Percent and All Grades Thermally Treated	
		Rounds	Squares, Hexagons and Octagons	Rounds	Squares, Hexagons and Octagons
Less than $\frac{5}{8}$	Less than 15	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{4}$
Less than $\frac{5}{8}$	15 and over	$\frac{1}{8}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{3}{8}$
$\frac{5}{8}$ and over	Less than 15	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{16}$
$\frac{5}{8}$ and over	15 and over	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{4}$

*The foregoing tolerances are based on the following method of measuring straightness: Departure from straightness is measured by placing the bar on a level table so that the arc or departure from straightness is horizontal, and the depth of the arc is measured with a feeler gage and a straight edge.

^bIt should be recognized that the straightness is a perishable quality and may be altered by mishandling. The preservation of straightness in cold finished bars requires the utmost care in subsequent handling. Specific straightness tolerances are sometimes required for carbon and alloy steels, in which case the purchaser should inform the manufacturer of the straightness tolerances and the methods to be used in checking the straightness.

Table 8-4M

STRAIGHTNESS TOLERANCES FOR COLD FINISHED BARS (SI UNITS)

(Ref. ASTM A29/A29M)^{a, b}

NOTE: All grades quenched and tempered or normalized and tempered to Brinell 302 maximum *before* cold finishing and all grades stress relieved or annealed *after* cold finishing. Straightness tolerances are not applicable to bars having Brinell hardness exceeding 302.

Size, mm	Length, mm	Straightness Tolerances, mm (Maximum Deviation) from Straightness in any 3,000 mm Portion of the Bar			
		Maximum of Carbon Range 0.28 Percent or Less		Maximum of Carbon Range Over 0.28 Percent and All Grades Thermally Treated	
		Rounds	Squares, Hexagons and Octagons	Rounds	Squares, Hexagons and Octagons
Less than 16	Less than 4,500	3	5	5	6
Less than 16	4,500 and over	3	8	8	10
16 and over	Less than 4,500	2	3	3	5
16 and over	4,500 and over	3	5	5	6

*The foregoing tolerances are based on the following method of measuring straightness: Departure from straightness is measured by placing the bar on a level table so that the arc or departure from straightness is horizontal, and the depth of the arc is measured with a feeler gage and a straight edge.

^bIt should be recognized that the straightness is a perishable quality and may be altered by mishandling. The preservation of straightness in cold finished bars requires the utmost care in subsequent handling. Specific straightness tolerances are sometimes required for carbon and alloy steels, in which case the purchaser should inform the manufacturer of the straightness tolerances and the methods to be used in checking the straightness.