

MACHINING ALLOWANCE

When regular quality alloy or special quality carbon hot rolled steel bars are to be machined, experience has shown that it is advisable for the purchaser to make adequate allowances for surface finishing and specify hot rolled or thermally treated sizes accordingly. Such allowances require consideration of the manufacturing practice utilized to remove the surface metal, as well as the bar size, length, straightness, size tolerance, and out-of-round tolerance. Bars should be straightened before machining.

Table 5-1
RECOMMENDED MINIMUM MACHINING
ALLOWANCE PER SIDE,
PERCENT OF SPECIFIED SIZE
Regular Quality Alloy and Special Quality
Carbon Steel Bars

	Non-Resulfurized		Resulfurized	
	2' & Under	Over 2'	2' & Under	Over 2'
Centerless Turned or Ground	2.6%	1.6%	3.4%	2.4%

NOTE 1: Based on bars with special straightness tolerance.

NOTE 2: Bars turned on centers. Since this operation is dependent upon length and straightness consideration, each item should be negotiated between consumer and supplier.

The accompanying Table 5-1 contains recommended minimum machining allowance, per side, for steel bars.

Using Table 5-1, the following example can be made:

When machined by centerless turning or grinding, a 2 inch non-resulfurized hot rolled steel bar would require 0.052 inch [$2" \times 2.6\% (.026) = .052"$] removal from the radius.

When regular quality alloy steel and special quality carbon steel hot rolled bars, such as squares and flats, are machined by methods other than shown in Table 5-1, the recommended minimum surface removal is 1.6 per cent of the specified dimension for nonresulfurized steel and 2.4 per cent for resulfurized steel. For sizes under 5/8 in. (15.88 mm) diameter, hexagon, square or thickness, the minimum surface removal should be 0.010 in. (0.254 mm) for non-resulfurized steel and 0.015 in. (0.381 mm) for resulfurized steel.

Resulfurized grades are typified by a poorer surface and the increased surface removal shown above and in Table 5-1 is recommended. Conversely, steels made to higher qualities may permit lesser amounts of surface removal depending on size, grade and quality specified.

Straightness Tolerances for Cold Finished Bars*†

NOTE 1: 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.

Straightness Tolerances, in. (Maximum Deviation) from Straightness in any 10-ft Portion of the Bar					
		Maximum of Carbon Range, 0.28 % or Less		Maximum of Carbon Range Over 0.28 % and All Grades Thermally Treated	
Size, in.	Length, ft	Squares, Hexagons, and Octagons		Squares, Hexagons, and Octagons	
		Rounds	Rounds	Rounds	Rounds
Less than 5/8	less than 15	1/8	3/16	3/16	1/4
Less than 5/8	15 and over	1/8	5/16	5/16	3/8
5/8 and over	less than 15	1/16	1/8	1/8	3/16
5/8 and over	15 and over	1/16	3/16	3/16	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.

† It should be recognized that 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.