

## INDUCTION HARDENED CHROME PLATED BARS

Chemistry	Size Range (In.)	Yield Strength (PSI)
1045/1050 hot rolled properties	1/2' to 10'	50,000 PSI Approx Min.
1045/1050 micro-alloy	1/2' to 5-1/2'	75,000 PSI Min. Yield
*1045/1050 high strength properties	5/8' to 4-1/2'	100,000 PSI Min. Yield

\*1045 standard in sizes to 2-1/2'; 1050 standard in sizes over 2-1/2'.

### Surface Hardness

Rc 50 minimum (other specifications on inquiry).

### Case Depth:

.050" minimum (1.27 mm) effective case depth unless otherwise specified. (On full length bars, maximum of 1-1/2" [38.10 mm] from either end is neither hardened nor plated.)

### Effective Case Depth:

Effective case depth is the perpendicular distance from the surface of a hardened case to the furthest point where a specified level of hardness is maintained. The hardness criterion is Rc 50, except where otherwise specified. Effective case depth should always be determined on the part itself, or on samples or specimens having a heat treated condition representative of the part under consideration. (SAE recommended practice – METHODS OF MEASURING CASE DEPTH – SAE J 423 a.)

### Plate Thickness:

.0005" minimum (0.127 mm) hard chrome-plated unless otherwise specified.

### Hardness of Chrome Plate:

Rc 68-72

### Surface Finish:

RMS – 12 maximum (.305 mm)

### Salt Spray Test:

48 hours minimum in accordance with ASTM B-117.

### Selective Hardening:

12" (304.80 mm) minimum hardened length, 3/4" (19.05 mm) minimum unhardened length, ± 1/4" (6.35 mm) tolerance for induction hardened transition zone.

### Length:

Any specified length as required up to 24'.

### Packaging:

Collared and boxed or individually fiber-tubed.

### Identification:

Ends can be color-coded to customer requirements or industry standards.

### Tolerances:

Tolerances, in decimals of an inch, provide for undersize variation only:

To 2-1/4"	(57 mm) inclusive	.0015" (0.0381 mm)
2-1/2"–3"	(63.50mm) to 3" (76.20 mm) inclusive	.002" (0.05 mm)
Over 3"	(76.20 mm) to 4" (101.60 mm) inclusive	.003" (0.0762 mm)
Over 4"	(101.60 mm)	.005" (0.127 mm)

## ASTM A-311

### Classification

The bars are furnished in the following classes and grades.

*Class A* – Normal-draft cold-drawn and stress-relieved rounds, squares, hexagons, and flats in the following grades:<sup>5</sup>

Grades	UNS Designations <sup>5</sup>
1018	G10180
1035	G10350
1045	G10450
1050	G10500
1541	G15410
1117	G11170
1137	G11370
1141	G11410
1144	G11440

*Class B* – Heavy-draft cold-drawn and stress-relieved rounds and hexagons in the following grades:

Grade	UNS Designations <sup>5</sup>
1045	G10450
1050	G10500
1541	G15410
1141	G11410
1144	G11440

<sup>5</sup> New designation established in accordance with Practice E 527 and SAE J 1086.

## ASTM A-311 Class A – Normal Draft Cold Drawn and Stress Relief Annealed

UNS No.	Grade Designation	Diameter, Thickness, or Distance Between Parallel Faces, in. (mm)	Tensile Strength, min, ksi (MPa)	Yield Strength, min, ksi (MPa)	Elongation in 2 in. (50 mm), min, %	Reduction of Area min, %
G10180	1018	Up to 7/8 (20), incl.	70 (485)	60 (415)	18	40
		Over 7/8 (20) to 1-1/4 (30), incl.	65 (450)	55 (380)	16	40
		Over 1-1/4 (30) to 2 (50), incl.	60 (415)	50 (345)	15	35
		Over 2 (50) to 3 (75), incl.	55 (380)	45 (310)	15	35
G10350	1035	Up to 7/8 (20), incl.	85 (590)	75 (520)	13	35
		Over 7/8 (20) to 1-1/4 (30), incl.	80 (550)	70 (485)	12	35
		Over 1-1/4 (30) to 2 (50), incl.	75 (520)	65 (450)	12	35
		Over 2 (50) to 3 (75), incl.	70 (485)	60 (415)	10	30
G10450	1045	Up to 7/8 (20), incl.	95 (655)	85 (585)	12	35
		Over 7/8 (20) to 1-1/4 (30), incl.	90 (620)	80 (550)	11	30
		Over 1-1/4 (30) to 2 (50), incl.	85 (585)	75 (520)	10	30
		Over 2 (50) to 3 (75), incl.	80 (550)	70 (485)	10	30
G1050 and G15410	1050 and G1541	Up to 7/8 (20), incl.	100 (690)	90 (620)	11	35
		Over 7/8 (20) to 1-1/4 (30), incl.	95 (655)	85 (585)	11	30
		Over 1-1/4 (30) to 2 (50), incl.	90 (620)	80 (550)	10	30
		Over 2 (50) to 3 (75), incl.	85 (585)	75 (520)	10	30
G11170	1117	Up to 7/8 (20), incl.	75 (520)	65 (450)	15	40
		Over 7/8 (20) to 1-1/4 (30), incl.	70 (485)	60 (415)	15	40
		Over 1-1/4 (30) to 2 (50), incl.	65 (450)	55 (380)	13	35
		Over 2 (50) to 3 (75), incl.	60 (415)	50 (345)	12	30
G11370 and G11410	11370 and 1141	Up to 7/8 (20), incl.	95 (655)	90 (620)	11	35
		Over 7/8 (20) to 1-1/4 (30), incl.	90 (620)	85 (585)	11	30
		Over 1-1/4 (30) to 2 (50), incl.	85 (585)	80 (550)	10	30
		Over 2 (50) to 3 (75), incl.	80 (550)	75 (520)	10	30
G11440	1144	Up to 7/8 (20), incl.	105 (725)	95 (655)	10	30
		Over 7/8 (20) to 1-1/4 (30), incl.	100 (690)	90 (620)	10	30
		Over 1-1/4 (30) to 2 (50), incl.	95 (655)	85 (585)	10	25
		Over 2 (50) to 3 (75), incl.	90 (620)	80 (550)	10	20
		Over 3 (75) to 4-1/2 (115), incl.	85 (585)	75 (520)	10	20

Go to "Forward" to the next frame for Class B

**ASTM A-311****Class B – Heavy Draft Cold Drawn and Stress Relieved Annealed**

UNS No.	Grade Designation	In. (mm), Round or Hexagon <sup>A</sup>	Tensile Strength, min, ksi (MPa)	Yield Strength, min, ksi (MPa)	Elongation in 2 in. (50 mm), min, %	Reduction of Area min, %
G10450	1045	Up to 7/8 (20), incl.	115 (795)	100 (690)	10	25
		Over 7/8 (20) to 1-1/4 (30), incl.	115 (795)	100 (690)	10	25
		Over 1-1/4 (30) to 2 (50), incl.	115 (795)	100 (690)	10	25
		Over 2 (50) to 3 (75), incl.	115 (795)	100 (690)	9	25
		Over 3 (75) to 4-1/2 (115), incl.	105 (725)	90 (620)	7	20
G10500	1050	Up to 7/8 (20), incl.	115 (795)	100 (690)	8	25
G15410	1541	Over 7/8 (20) to 1-1/4 (30), incl.	115 (795)	100 (690)	8	25
G11410	1141	Over 1-1/4 (30) to 2 (50), incl.	115 (795)	100 (690)	8	25
and	and	Over 2 (50) to 3 (75), incl.	115 (795)	100 (690)	8	20
G11440	1144	Over 3 (75) to 4-1/2 (115), incl.	115 (795)	100 (690)	7	20

<sup>A</sup> Maximum size for hexagons is 1-1/2 in. (40 mm).

**TABLE 1 Chemical Requirements (Cast or Heat Analysis) <sup>A</sup>**

UNS Designation	Grade	Carbon, %	Manganese, %	Phosphorus, max %	Sulfur, %
G10180	1018	0.15-0.20	0.60-0.90	0.040	0.050 max
G10350	1035	0.32-0.38	0.60-0.90	0.040	0.050 max
G10450	1045	0.43-0.50	0.60-0.90	0.040	0.050 max
G10500	1050	0.48-0.55	0.60-0.90	0.040	0.050 max
G15410	1541	0.36-0.44	1.35-1.65	0.040	0.050 max
G11170	1117	0.14-0.20	1.00-1.30	0.040	0.08-0.13
G11370	1137	0.32-0.39	1.35-1.65	0.040	0.08-0.13
G11410	1141	0.37-0.45	1.35-1.65	0.040	0.08-0.13
G11440	1144	0.40-0.48	1.35-1.65	0.040	0.24-0.33

<sup>A</sup> When lead is required as an added element to a standard steel, a range from 0.15 to 0.35 % inclusive, is specified. Such a steel is identified by inserting the letter "L" between the second and third numerals of the grade designation, for example, 10L45. A cast or heat analysis is not determinable when lead is added to the ladle stream.