Common Strengths

Metric Units (MPa)	Standard Units (ksi)
140	20.304
160	23.205
180	26.105
200	29.006
220	31.907
240	34.807
260	37.708
280	40.608
300	43.509
320	46.410
340	49.310
360	52.211
380	55.111
400	58.012
420	60.9126
440	63.8132
460	66.7138
480	69.6144
500	72.515
520	75.4156
540	78.3162
560	81.2168
580	84.1174
600	87.018
620	89.9186
640	92.8192
660	95.7198

Gauge Reference Table

	Hot Rolled, HR P&O, Cold Rolled				Galvanized		
Gauge No.	Dec. Equiv. NOM	Tolerance Range HR, P&O	Tolerance Range CR	lbs. / sq. ft.	Dec. Equiv. NOM	Tolerance Range	lbs. / sq. ft.
4	0.2242	0.2332 0.2152		9.375			
5	0.2092	0.2182 0.2002		8.750			
6	0.1943	0.2033 0.1853		8.125			
7	0.1793	0.1873 0.1713	0.1873 0.1713	7.500			
8	0.1644	0.1724 0.1564	0.1724 0.1564	6.875	0.1681	0.1771 0.1591	7.031
9	0.1495	0.1575 0.1415	0.1575 0.1415	6.250	0.1532	0.1622 0.1442	6.406
10	0.1345	0.1425 0.1265	0.1405 0.1285	5.625	0.1382	0.1472 0.1292	5.781
11	0.1196	0.1276 0.1116	0.1256 0.1136	5.000	0.1233	0.1323 0.1143	5.156
12	0.1046	0.1126 0.0966	0.1106 0.0986	4.375	0.1084	0.1174 0.0994	4.531
13	0.0897	0.0967 0.0827	0.0947 0.0847	3.750	0.0934	0.1014 0.0854	3.906
14	0.0747	0.0817 0.0677	0.0797 0.0697	3.125	0.0785	0.0865 0.0705	3.281
15	0.0673	0.0733 0.0613	0.0723 0.0623	2.813	0.0710	0.0770 0.0650	2.969
16	0.0598	0.0658 0.0538	0.0648 0.0548	2.500	0.0635	0.0695 0.0575	2.656
17	0.0538	0.0598 0.0478	0.0578 0.0498	2.250	0.0575	0.0625 0.0525	2.406
18	0.0478	0.0528 0.0428	0.0518 0.0438	2.000	0.0516	0.0566 0.0466	2.156
19	0.0418		0.0458 0.0378	1.750	0.0456	0.0506 0.0406	1.906
20	0.0359		0.0389 0.0329	1.500	0.0396	0.0436 0.0356	1.656
21	0.0329		0.0359 0.0299	1.375	0.0366	0.0406 0.0326	1.531
22	0.0299		0.0329 0.0269	1.250	0.0336	0.0376 0.0296	1.406
23	0.0269		0.0299 0.0239	1.125	0.0306	0.0346 0.0266	1.281
24	0.0239		0.0269 0.0209	1.000	0.0276	0.0316 0.0236	1.156
25	0.0209		0.0239 0.0179	0.875	0.0247	0.0287 0.0207	1.031
26	0.0179		0.0199 0.0159	0.750	0.0217	0.0247 0.0187	0.906
27	0.0164		0.0184 0.0144	0.688	0.0202	0.0232 0.0172	0.844
28	0.0149		0.0169 0.0129	0.625	0.0187	0.0217 0.0157	0.781
29					0.0172	0.0202 0.0142	0.719
30					0.0157	0.0187 0.0127	0.656

Alloy % Composition Limits

SAE No.	% Carbon	% Manganese
1002[1]	0.02-0.04	0.35 Max
1003[1]	0.02-0.06	0.35 Max
1004[1]	0.02-0.08	0.35 Max
1005[2]	0.06 Max	0.35 Max
1006[2]	0.08 Max	0.45 Max
1007[1]	0.02-0.10	0.50 Max
1008[2]	0.10 Max	0.50 Max
1009[2]	0.15 Max	0.60 Max
1010	0.08-0.13	0.30-0.60
1012	0.10-0.15	0.30-0.60
1013	0.11-0.16	0.30-0.60
1015	0.13-0.18	0.30-0.60
1016	0.13-0.18	0.60-0.90
1017	0.15-0.20	0.30-0.60
1018	0.15-0.20	0.60-0.90
1019	0.15-0.20	0.70-1.00
1020	0.18-0.23	0.30-0.60
1021	0.18-0.23	0.60-0.90
1022	0.18-0.23	0.70-1.00
1023	0.20-0.25	0.30-0.60
1025	0.22-0.28	0.30-0.60
1026	0.22-0.28	0.60-0.90
1029	0.25-0.31	0.60-0.90
1030	0.28-0.34	0.60-0.90
1033	0.30-0.36	0.70-1.00
1035	0.32-0.38	0.60-0.90
1037	0.32-0.38	0.70-1.00
1038	0.35-0.42	0.60-0.90
1039	0.37-0.44	0.70-1.00
1040	0.37-0.44	0.60-0.90
1042	0.40-0.47	0.60-0.90
1043	0.40-0.47	0.70-1.00
1044	0.43-0.50	0.30-0.60
1045	0.43-0.50	0.60-0.90
1046	0.43-0.50	0.70-1.00
1049	0.46-0.53	0.60-0.90
1050	0.48-0.55	0.60-0.90
1053	0.48-0.55	0.70-1.00
1055	0.50-0.60	0.60-0.90
1060	0.55-0.65	0.60-0.90
1065	0.60-0.70	0.60-0.90
1070	0.65-0.75	0.60-0.90
1074	0.70-0.80	0.50-0.80
1075	0.70-0.80	0.40-0.70
1078	0.72-0.85	0.30-0.60
1080	0.75-0.88	0.60-0.90

Phosphorus:

Typical values for Flat Roll products: P = 0.030 max. Alternate levels shall be agreed upon between purchaser and supplier.

Sulfur:

Typical values for Flat Roll products: S = 0.035 max. Alternate levels shall be agreed upon between purchaser and supplier.

Residual Elements:

Copper, nickel, chromium, and molybdenum values for specific applications shall be agreed upon between purchaser and supplier.

Boron:

Standard killed carbon steels, which are fine grain, may be produced with a boron addition to improve hardenability. Such steels are produced to a range of 0.0005 - 0.003% boron. These steels are identified by inserting the letter "B" between the second and third numerals of the grade number, for example, 10B46.

Copper:

When copper is required, 0.200% minimum is generally stated.

Notes:

1. Ultra low carbon, interstitial free stabilized and nonstabilized steel shall NOT be supplied for these grades.
2. Ultra low carbon, interstitial free stabilized and nonstabilized steel may be supplied for these grades.

Expected Hardness Aims

	Label	Hardness (Rb)
Cold Roll Sheet	CS	55-70
	DS	45-60
	DDS	40-55
	EDDS	30-50
Hot Roll	1006 BorDS	60 max
	1006 DS	65 max
	1006 TiDS	50-75
	1006 CS	55-70
	1010	70 max
	1010	75 max
	1018	80 max
	1018	85 max

HSLA Grade Matrix

Yield Strength MPa (ksi) min.	US Grades		European Grades	German Grades	Japanese Grades
240 MPa (35)		SAE J1392 035XLF		SEW 092 QStE 260 TM	
280 MPa (40)		SAE J1392 040XLF			
310 MPa (45)	ASTM A1011 HSLAS 45 Class 1 or 2	SAE J1392 045XLF SAE J2340 300XF	EN10149-2/2009 S315MC		JIS G3113 - SAPH 400**
340 MPa (50)	ASTM A1011 HSLAS 50 Class 1 or 2 HSLAS-F 50	SAE J1392 050XLF SAE J2340 340XF	EN10149-2/2009 S355MC	SEW 092 QStE 340 TM	JIS G3113 - SAPH 440**
380 MPa (55)	ASTM A1011 HSLAS 55 Class 1 or 2	SAE J2340 380XF		SEW 092 QStE 380 TM	JIS G3134 - SPFH 490
410 MPa (60)	ASTM A1011 HSLAS 60 Class 1 or 2 HSLAS-F 60	SAE J1392 060XLF SAE J2340 420XF	EN10149-2/2009 S420MC	SEW 092 QStE 420 TM	JIS G3134 - SPFH 540
460 MPa (65)	ASTM A1011 HSLAS 65 Class 1 or 2		EN10149-2/2009 S460MC	SEW 092 QStE 460 TM	
480 MPa (70)	ASTM A1011 HSLAS 70 Class 1 or 2 HSLAS-F 70	SAE J1392 070XLF SAE J2340 490XF	EN10149-2/2009 S500MC	SEW 092 QStE 500 TM	JIS G3134 - SPFH590
550 MPa (80)	ASTM A1011 HSLAS-F 80	SAE J1392 080XLF SAE J2340 550XF	EN10149-2/2009 S550MC	SEW 092 QStE 550 TM	

** Structural grades common with no microalloy

WORTHINGTON STEEL 800-944-3733

Galvanized Product

ASTM A653	Hot Dip and Galvanneal Zinc coatings	
	Available in CS, FS, DDS, HSLA	
	Coating weight is for BOTH sides (oz / sq. ft²)	
	Product triple spot tested for minimum coating amount (no max limit), except G01 and A01	
	Galvanize: G30–G60	Galvanneal: A25–A60
ASTM A879, A917	Electrogalvanize	
	Spangle -	Aesthetic feature of visible crystallites on the steel surface; most mills only produce minimum spangle (zero spangle)
	Flaking -	Defect caused by either too much Zinc coating or dirty surface prior to coating
	Chemtreat -	Chromate treatment designed to prevent Zinc oxidation
	Oil -	Primarily for lubrication (further processing)
	Acrylic -	Protects Zinc and acts as lubricant in forming

Zinc Coating Weight Conversion Guide

Weight (oz/ft²)	Weight (lbs/ft²)	Mass (g/m²)	Thickness (mm)	Thickness (μ)
0.010	0.000625	3.051506	0.016825	0.427382
0.020	0.001250	6.103012	0.033651	0.854764
0.030	0.001875	9.154518	0.050476	1.282145
0.040	0.002500	12.20602	0.067302	1.709527
0.050	0.003125	15.25753	0.084127	2.136909
0.060	0.003750	18.30903	0.100953	2.564291
0.070	0.004375	21.36054	0.117778	2.991673
0.080	0.005000	24.41204	0.134604	3.419055
0.090	0.005625	27.46355	0.151429	3.846436
0.100	0.006250	30.51506	0.168255	4.273818
0.150	0.009375	45.77259	0.252382	6.410727
0.200	0.012500	61.03012	0.336510	8.547636
0.250	0.015625	76.28765	0.420637	10.684545
0.300	0.018750	91.54518	0.504764	12.821455
0.350	0.021875	106.8027	0.588892	14.958364
0.400	0.025000	122.0602	0.673019	17.095273
0.450	0.028125	137.3177	0.757147	19.232182
0.500	0.031250	152.5753	0.841274	21.369091
0.550	0.034375	167.8328	0.925401	23.506000
0.600	0.037500	183.0903	1.009529	25.642909
0.650	0.040625	198.3479	1.093656	27.779818
0.700	0.043750	213.6054	1.177784	29.916727
0.750	0.046876	228.8629	1.261911	32.053636
0.800	0.050000	244.1204	1.346038	34.190546
0.850	0.053125	259.3780	1.430166	36.327455
0.900	0.056250	274.6355	1.514293	38.464364
0.950	0.059375	289.8930	1.598421	40.601273
1.000	0.062500	305.1506	1.682548	42.738182

Handy Coil Formulas (Standard Units)

Coil Linear Footage = coil weight / (gauge * width * 3.3996)

Piece Weight = (0.2833 * gauge * width * length)

Pounds / Inch Width = coil weight / coil width

Rolled Steel Terminology & Designations

Terms	CS -	Commercial Steel (formerly CQ)
	DS -	Drawing Steel (formerly DQ)
	FS -	Forming Steel (similar to DS)
	DDS -	Deep Drawing Steel (more formable version of DS; can replace DQSK, DQAK)
	EDDS -	Extra Deep Drawing Steel; Interstitial Free Steel (formerly IF)
	DQSK, DQAK NOT equivalent to DQ Silicon Killed or DQ Aluminum Killed	
Hot Roll	CS	DS
	Generally for nonexposed applications	May be used on CS applications
	Simple bends and forming	Higher n-value and % Elongation than CS
	Examples: Brackets, Plates	Lower Rb than CS
Cold Roll	DS / DDS	EDDS
	Can NOT be used on EDDS applications	Can be used on DDS applications
	< 0.05% Carbon	< 0.005% Carbon
	Interstitial space between elements	Interstitial Free - TiC, NbC, and TiN fill space between elements
	n-values (stretchability): 0.17 - 0.22	*n*-values (stretchability): 0.24+
	r-value (drawability): 1.6	*r*-value (drawability): 1.7+
	Low work hardening rates - OK for progressive dies	High work hardening rates - not good for progressive dies
	Severe Deformation Parts - Automotive Body Sides, Hoods	Complex Deep Drawn Parts - Automotive Dash Panels, Oil Pans
	Note: EDDS is often used as substrate in HR HD galv to meet 60 max Rb	
Temper Pass	Improves shape, gauge, and prevents luder lines (discontinous yielding), 0.25-5.0% reduction, noncritical surface finish applications - good for painted products	
One Pass	Gauge corrected HR that holds CR or CRST gauge tolerance (depending on gauge, width), 5.0-15.0% reduction, ensures uniform thickness, surface critical exposed applications	
Cold Roll Sheet	30.0-70.0% reduction, surface critical exposed and unexposed applications, primarily matte finish	
Cold Roll Strip	20.0-60.0% reduction, highly engineered product with consistent dimensional and internal characteristics, necessary for highly surface critical applications	

High Strength Steel Sheet

YS, TS, and Elongation are mins. only, no Rb spec

Label	Description
XLK / F	10 points between YS and TS
YLK / F	15 KSI spread between YS and TS
ZLK / F	20 KSI spread between YS and TS
F vs. K	Ca added for inclusion control - extra formability
45 HSLA	
J1392	Discontinued SAE spec. - tighter chemistry for automotive only
J2340	New version SAE J1392 with max limit for YS
ASTM HSLA's	Reffered to as Grade 50, 60, etc. "F" means formable

Standard AISI Edges

No. 1 Square Edge

No. 1 Round Edge

No. 2 Natural Mill Edge

No. 3 Slit Edge

No. 4 Round Edge

No. 5 De-burred Edge

No. 6 Square Edge

ASTM, SAE Specifications

ASTM 1008	Cold Roll	
	Available in CS, DS, DDS, EDDS, SS, HSLA, HSLA-F	
	CS type A tighter Carbon chemistry requirements than type B	
	Type B has 0.02 min Carbon for EDDS restriction	
	Pertinent ASTM Documents - A568, A109, A620	
	Rb dependant on the temper designation	
	CS => EDDS increasing drawability (n-value)	
ASTM 1011	Hot Roll	
	Available in CS, DS, SS, HSLA, HSLA-F	
	Type B has 0.02 min Carbon for EDDS restriction	
	Pertinent ASTM Documents - A568, A569, A622, A635, A74	
	CS -	YS: 28-43 ksi TS: 45-55 ksi E: 32-47% Rb: 55-70
	DS -	YS: 25-40 ksi TS: 43-53 ksi E: 37-49% Rb: 45-60
	EDDS -	Can be used on HR (Rb: 35-50) however, softness may result in blanking problems
ASTM A815, A612	Heavy gauge HR General Requirements, Heavy gauge CS, DS, SS, HSLAS	
ASTM A36	Plain Carbon Structural Steel	
ASTM A606	HR Steel with Corrosion Resistance	
ASTM A109	CR Strip	
ASTM A815, A612	Pressure Vessles	
ASTM A568	HR & CR Sheet General Requirements (Plain Carbon, HSLA)	
SAE J2329	LC Auto Sheet Steel, Categorization and properties	
SAE J403	Plain Carbon Steel Chemistries	
SAE J404	Alloy Steel Chemistries	

Common Coil Imperfections

Description		Possible Cause(s)
Burrs	An edge condition inherent to the metal slitting process.	A dull knife. The horizontal knife clearance is too tight or too loose. The vertical knife clearance is set too deep.
Camber	Deviation of a side edge from a straight edge. Measurement is taken by placing a straight edge on the concave side of a sheet and measuring the distance between the sheet edge and the straight edge in the center of the arc. Narrow slits are more likely to display camber.	A defect in the master coil. Too much or too little tension in the slitter.
Coil Set	Metal strip exhibits a curvature in the direction of its length.	A defect in the master coil. Fibers on one of the surfaces of the strip have been stretched longer than the opposite surface. The strip curves towards the side having shorter fibers and the difference in fiber length is caused by winding the coil too tight.
Cross Bow	Curvature across the width of the strip.	A defect in the master coil. Too much overlap (vertical clearance) in the slitter. Stripper rings are the wrong size - male rings too big or female rings too small.
Edge Waves	Wavy vertical edges.	A defect in the master coil. Poor stripper ring practices. If the stripper ring ODs are too small, the knives must be lowered to overcome slippage. If the rings are too big, the metal will become stretched at the edges. The rings not being parallel will also contribute to edge wave.
Inclusions	Impurities inherent to the steel making process.	Impurities are trapped in the solidifying steel.
Knife Marks	Marks on the surface of the strip.	Poor stripper ring practices. Propper stripper ring practices include utilizing male and female rings of different sizes, colors, and hardnesses. Size and hardness are not absolute constraints and may vary from machine to machine. The size should vary from one metal and thickness to another.
Rollmarks	Indentations or depressions on the surface of the coil.	Foreign materials on the work rolls.
Scale	Oxide of iron that forms on the surface of steel after heating.	Inadequate descaling or pickling.
Scratches	Shiny - damage occured after pickling. Dull - damage occured prior to pickling.	Can be caused in hot rolling mill, annealing and pickling line, cold rolling mill, or skin pass line.
Skin Lamination	Cracks, folds, and tears in the coil surface.	Occurs in the mold when cooling of the steel is insufficient. Lamination can also occur due to misalignment of the supporting rolls around the caster mold, causing mechanical damage and/or compression of the shell, entrapping inclusions in the underlying steel structure. These mechanical causes can result in voids of segreation that will eventually become surface imperfections.

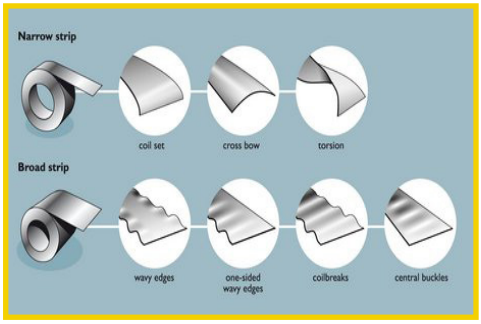
Fractions · Decimals · Millimeters

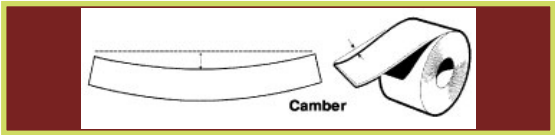
	Decimal	Millimeters
1/64	0.0156	0.397
1/32	0.0313	0.794
3/64	0.0469	1.191
1/16	0.0625	1.588
5/64	0.0781	1.984
3/32	0.0938	2.381
7/64	0.1094	2.778
1/8	0.1250	3.175
9/64	0.1406	3.572
5/32	0.1562	3.969
11/64	0.1719	4.366
3/16	0.1875	4.763
13/64	0.2031	5.159
7/32	0.2188	5.556
15/64	0.2344	5.953
1/4	0.2500	6.350
17/64	0.2656	6.747
9/32	0.2813	7.144
19/64	0.2969	7.541
5/16	0.3125	7.938
21/64	0.3281	8.334
11/32	0.3438	8.731
23/64	0.3594	9.128
3/8	0.3750	9.525
25/64	0.3906	9.922
13/32	0.4063	10.319
27/64	0.4219	10.716
7/16	0.4375	11.113
29/64	0.4531	11.509
15/32	0.4688	11.906
31/64	0.4844	12.303
1/2	0.5000	12.700
33/64	0.5156	13.097
17/32	0.5313	13.494
35/64	0.5469	13.891
9/16	0.5625	14.288
37/64	0.5781	14.684
19/32	0.5938	15.081
39/64	0.6094	15.478
5/8	0.6250	15.875
41/64	0.6406	16.272
21/32	0.6563	16.669
43/64	0.6719	17.066
11/16	0.6875	17.463
45/64	0.7031	17.859
23/32	0.7186	18.256
47/64	0.7344	18.653
3/4	0.7500	19.050
49/64	0.7656	19.447
25/32	0.7813	19.844
51/64	0.7969	20.241
13/16	0.8125	20.638
53/64	0.8281	21.034
27/32	0.8438	21.431
55/64	0.8594	21.828
7/8	0.8750	22.225
57/64	0.8906	22.622
29/32	0.9063	23.019
59/64	0.9219	23.416
15/16	0.9375	23.813
61/64	0.9531	24.209
31/32	0.9688	24.606
63/64	0.9844	25.003
1	1.000	25.400

Surface Roughness Conversion Chart

Ra (µm)	Ra (µin)	RMS	CLA (N)	Rt	N	in	mm
0.025	1	1.1	1	0.3	1	0.003	0.08
0.05	2	2.2	2	0.5	2	0.01	0.25
0.1	4	4.4	4	0.8	3	0.01	0.25
0.2	8	8.8	8	1.2	4	0.01	0.25
0.4	16	17.6	16	2.0	5	0.01	0.25
0.8	32	32.5	32	4.0	6	0.03	0.8
1.6	63	64.3	63	8.0	7	0.03	0.8
3.2	125	137.5	125	13	8	0.1	2.5
6.3	250	275	250	25	9	0.1	2.5
12.5	500	550	500	50	10	0.1	2.5
25.0	1000	1100	1000	100	11	0.3	8.0
50.0	2000	2200	2000	200	12	0.3	8.0

Ra - Roughness Average in micrometers or microinches
RMS - Root Mean Square in microinches
CLA - Center Line Average in microinches
Rt - Roughness Total in microns
N - New ISO (grade) scale numbers
Cut-off Length - Length required for sample





Fraction Length Conversion Table

Fraction	Inches	Millimeters	Fraction	Inches	Millimeters
1/64	0.0156	0.397	3/64	0.0469	1.191
1/32	0.0313	0.794	5/64	0.0781	1.984
1/16	0.0625	1.588	3/32	0.0938	2.381
1/8	0.1250	3.175	5/32	0.1563	3.969
1/4	0.2500	6.350	3/8	0.3750	9.525
1/2	0.5000	12.700	5/8	0.6250	15.875

Camber Calculator

$(D^2 * C) / (d^2) = \text{Camber}$

D = Length unknown camber
C = Camber known length
d = Length known camber

Example

0.125 Camber in 6.0"
How much camber in 8.0"?

$(8^2 * 0.125) / 6^2 = 0.222"$

Cold Roll Strip Temper Designations

Label	Description	Hardness (Rb)	Purpose
No. 1	Full Hard	84 min	Flat working only
No. 2	½ Hard	70-85	90° Bends perpendicular to rolling direction
No. 3	¼ Hard	60-75	180° Bends, Limited Form, Draw
No. 4	Skin Rolled	65 max	Deep Draw, 180° Bends (any direction)
No. 5	Dead Soft	55 max	Nonexposed steel susceptible to stretcher strain

Scan the Worthington QR code to learn more!

Zinc Additions

Coating Specs:	Single Spot Requirements (in)				Triple Spot Avg. Requirements (in)				Zinc + (in)
	Each Side		Total		Each Side		Total		
	Min	Max	Min	Max	Min	Max	Min	Max	
ASTM 653 Requirements									
G01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.0000
G30	0.07	0.50	0.25	0.75	0.10	0.40	0.30	0.60	0.0005
G40	0.10	0.60	0.30	0.85	0.12	0.50	0.40	0.80	0.0007
G60	0.15	0.80	0.50	1.25	0.20	0.75	0.60	1.15	0.0010
G75	0.20	0.90	0.65	1.40	0.26	0.85	0.75	1.30	0.0013
G90	0.26	0.95	0.80	1.50	0.32	0.90	0.90	1.40	0.0015
G115	0.30	1.10	1.00	1.75	0.40	1.05	1.15	1.65	0.0020
G140	0.35	1.25	1.20	1.95	0.48	1.20	1.40	1.85	0.0024
G165	0.40	1.35	1.40	2.20	0.56	1.30	1.65	2.10	0.0028
G185	0.50	1.60	1.60	2.45	0.64	1.50	1.85	2.35	0.0031
G200	0.50	1.85	1.80	3.00	0.72	1.80	2.00	2.90	0.0034
G210	0.55	2.00	1.80	3.10	0.72	1.90	2.10	3.00	0.0036
G235	0.60	2.20	2.00	3.25	0.80	2.10	2.35	3.35	0.0040
A01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.0000
A25	0.07	0.40	0.20	0.65	0.08	0.35	0.25	0.65	0.0004
A40	0.10	0.60	0.30	0.85	0.12	0.50	0.40	0.80	0.0007
A60	0.15	0.80	0.50	1.25	0.20	0.75	0.60	1.15	0.0010
UL Requirements									
G60UL	0.20	0.70	0.50	1.25	0.24	0.60	0.60	1.15	0.0010
G90UL	0.32	0.80	0.80	1.50	0.36	0.75	0.90	1.40	0.0015
Ordering Substrate **Customer Min Gauge - Zinc Addition = Min Substrate Gauge**									
Example	Customer Order: 0.098” Min, G90 0.098” - 0.0015” = 0.0965” Min Substrate Gauge								

Metric Conversion Chart

	Standard Units	Multiply By → ← Divide By	Metric Units
Length	inches (in)	25.4	millimeters (mm)
	feet (ft)	0.3048	meters (m)
	microinches (µin)	0.0254	microns (µ)
Weight	ounces (oz)	28.3495	grams (g)
	pounds (lbs)	453.59	grams (g)
	ton (T)	0.907	metric tonne (t)
	grams (g)	0.001	kilograms (kg)
Coating Weight	ounces / ft^2	305	grams / $meter^2$
Density	pounds / $inch^3$	27.68	grams / $inch^3$
Stress	kilopound / in^2 (ksi)	0.14503	megapascals (MPa)
	pounds / in^2 (psi)	145.03	megapascals (MPa)
Surface	microinches (µin)	0.0254	micrometers (µm)

Worthington Steel
Customer Claims Policy

Worthington Industries is committed to the highest quality steel processing and to serving our customers to 100% satisfaction while encouraging and maintaining continuous improvement through leadership and employee involvement.

Our goal is to ship product with zero defects to our customers every time. We believe our people, systems, and processes produce quality that is superior to other steel suppliers in the marketplace.

When a problem arises, Worthington will make every effort possible to address the situation in a timely manner in order to resume shipment of high quality product. Worthington expects to receive sufficient evidence (samples, Photographs, etc.) of the defective material so that we can determine the root cause and formulate corrective actions at our plant.

When Worthington agrees that steel supplied is defective, we accept liability for the price of the steel plus applicable inbound freight. We expect customers to work with us to minimize overall cost when a rejection is necessary, just as we work with our suppliers in similar situations.

When defective material is scrapped at a customer’s plant, Worthington expects to receive scrap credit at the prevailing scrap price, less a reasonable handling charge. We are willing to work with the customer to find buyer who will pay a competitive price for our scrap, thereby reducing the overall cost of claims to our supply chain.

Worthington does not accept liability for administrative, downtime, sorting, or other charges that are beyond the value of the steel involved in a claim.

Worthington does not accept claims for obsolete material that is over one year old.

DRIVING STEEL FORWARD