PDM®
Steel Service Centers, Inc.

Service Center Locations

PDM Spanish Fork
1100 N. 300 W.
P.O. Box 280
Spanish Fork, UT 84660
(801) 798-8676 / (800) 444-7361
Fax (801) 798-3605

PDM Santa Clara
3500 Bassett Street
P.O. Box 329
Santa Clara, CA 95052
(408) 988-3000 / (800) 672-8801
Fax (408) 988-6966

PDM Fresno
4005 E. Church Street
P.O. Box 11188
Fresno, CA 93772
(559) 442-1410 / (800) 222-3235
Fax (559) 442-1409

PDM Stockton
3535 E. Myrtle Street
P.O. Box 310
Stockton, CA 95201
(209) 943-0513 / (800) 800-4736
Fax (209) 466-8420

PDM Sparks
1250 Kleppe Lane
P.O. Box 50430
Sparks, NV 89435-0430
(775) 358-1441 / (800) 736-1400
Fax (775) 355-1443

PDM Woodland
1785 Schurman Way
Woodland, WA 98674
(360) 225-1133 / (800) 451-9581
Fax (360) 225-0204

PDM Las Vegas
4910 Donovan Way Suite L
North Las Vegas NV 89031
(702) 413-0067 Sales
(702) 413-0003 Admin.
Fax (702) 413-0006

PDM Seattle Sales Office
22659 Pacific Highway South,
Suite 302
Des Moines, WA 98198
(206) 824-4041 / (888) 467-5800
Fax (206) 824-8110

http://www.pdmsteel.com

Mission Statement

To Serve our customer above all.

To help our people reach their full potential.

To provide leadership and integrity within our industry and the markets we serve.

To achieve the financial results needed to perpetuate the company and to fuel continued growth for our stakeholders.

To simply be

By any standard

The very best.

A Brief History Of PDM

PDM entered the steel service center industry in California with the 1954 acquisition of the Proctor-James Steel Company in San Jose. In 1955 Kyle & Company, with facilities in Fresno, Stockton and Sacramento was purchased. With four service centers, PDM was able to provide outstanding service throughout central and northern California.

In 1962 new facilities were constructed at Fresno, California to improve service in the central California area. Recognizing the great potential for its products and services, the Company established a fifth service center in Sparks, Nevada in 1963.

In 1968 the existing service centers were greatly augmented by the completion of the large, state-of-the-art center at Stockton, California. The best material handling fixtures and equipment available at the time were used in the Stockton facility. Steel can be stacked up to 24 feet high on specially constructed racks. Stacker Cranes are used to move material into and out of the racks. The Stockton Service Center has seen, as have all PDM Service Centers, a constant stream of improvements and upgrades to insure that it remains a modern and efficient operation.

A new service center was established in Spanish Fork, Utah, south of Salt Lake City, in 1977.

To provide the greatest possible service and selection for our customers, the "Common Inventory Concept" was adopted. This gives customers in one area access to the inventory of PDM Service Centers in other areas. Under the Common Inventory Concept, Stockton is the geographical hub of the Service Wheel with spokes running east to Reno and Spanish Fork, north to Portland, south to Fresno, and west to Santa Clara. The "Interplant Transfer System" moves this Common Inventory from one location to another, allowing short lead-time delivery of most items regardless of the inventory source.

As customer demands for "pre-production processing" grew, new processing equipment was installed at all facilities. Shears, automatic saws and shape burning equipment that can burn in steel virtually anything that can be drawn in two dimensions, are available at each center. Plasma cutting equipment allows shapes to be cut at high speed and in

material which is too thin to be cut with conventional flame cutting equipment. Computer aided design and numerical control have made possible the burning of shapes too large to fit on paper and too complex to be easily laid out on a drafting table, while at the same time allowing for the efficient "nesting" of burned parts for reduced scrap loss.

In 1989 PDM Steel Service Centers established a "Cut to Length" facility at the Fresno service center. This facility (PDM - CTL) processes coiled steel to 72 inches in width and in thicknesses from 16 gauge through $^{1}/_{4}$ inch. The coils are made into sheet products whose maximum length can exceed 40 feet. CTL gives PDM Steel Service Centers the ability to provide sheet products to non-standard lengths or in unusual quantities with extremely short lead times.

At the end of January 1997, PDM concluded an agreement to purchase a majority interest in General Steel of Vancouver, Washington. General Steel was a full line, carbon steel service center serving the Portland and Seattle marketing areas. In April 1999, this operation relocated to a new, state-of-the-art service center in Woodland, Washington. This large, well equipped facility will provide support to additional operations as they are established in the Pacific Northwest. In May, 2001 PDM Steel Service Centers purchased the remaining minority interest in PDM/General Steel and it now operates as PDM, Woodland.

In July 2001, Reliance Steel & Aluminum of Los Angeles, California purchased PDM Steel Service Centers and operates them as a wholly owned subsidiary: PDM Steel Service Centers, Inc.

In February 2003, PDM established a service center in Las Vegas, Nevada.

Finally . . .

PDM Steel Service Centers is constantly evaluating opportunities to improve service, inventories, and delivery in existing facilities and has an on-going program to explore opportunities for expansion into new markets. Our pledge to you in the future, as in the past, will be to provide you with the finest . .

Service ~ When And Where You Need It!

To The Trade

This catalog is published for your general information. It is not a stock list. Call to confirm the availability of particular sizes and grades. Specific application of the information or products listed herein may require professional assistance or interpretation. Information on product specifications is highly abridged. The latest ASTM (www.astm.org) documents should be consulted for full and accurate information on product specifications. Technical information on any questions as to structural design, weldability, formability, allowable stress, heat treating, material properties or characteristics, etc. should be referred to the appropriate professional consultant.

Quotations

Quotations are in effect for 30 days. All sales are made subject to credit approval; subject to material availability at the time an order is placed; subject to strikes, accidents, or other unavoidable delays. We reserve the right to cancel contracts not fully specified in the time agreed upon. Applicable taxes will be charged. Special-order material is not subject to cancellation without our written consent.

Confirmation Orders

Confirming orders should be plainly marked "CONFIRMATION." Confirming orders not so marked may be treated as original open orders and duplicated — in such cases we will not be responsible for expense and inconvenience incurred.

Deliveries

Orders by telephone are accepted at the risk of the customer, as shipments made before receipt of written confirmation of the order are for the convenience of the customer. Estimated delivery dates for special work or for material incoming from a mill are as closely estimated as possible and we use our best efforts to ship on the estimated date, but cannot guarantee to do so.

Claims / PDM Delivered Material

As with receipts from common carriers, it is important that you note shortages and damage on the driver's paperwork and notify the salesperson who took your order so that steps may be taken to rectify the problem. (See "Defective Material/Warranty" below.)

Claims / Common Carrier

A clear receipt from the carrier when material is shipped places the responsibility for shortage or damage at the time of delivery with the carrier. If there is a shortage or goods are damaged, a receipt noting the problem should be given to the carrier and the agent should be requested to insert the proper

notation on the freight bill. This will enable you to recover damages from the carrier without any controversy.

Shortages accruing on carload consignments should be reported immediately to the agent at the destination. Carload shipments arriving in damaged condition should not be unloaded from the car until the carrier's representative has inspected the damage.

When, by request, goods are forwarded via carriers whose charges do not cover the insuring of the goods, we will not insure shipment unless specifically instructed to do so.

Claims must be made in writing to the carrier within six months, express claims within four months. Transportation companies cannot legally pay claims unless filed within the periods specified.

Defective Material/Warranty

Claims for defective material should be made immediately upon the receipt of goods. All our materials are carefully inspected before shipment, but in spite of the greatest care it is sometimes impossible to detect all imperfections.

"Seller warrants that the product(s) furnished is free from defects in material and workmanship and shall replace, at the delivery point specified herein, any product found to be defective within one year, or at Seller's option refund the price paid for such product, plus any transportation charges paid by the Buyer; damages are limited to the purchase price plus transportation. This constitutes Buyer's sole remedy and in no event shall the Seller be liable for labor, loss of use or profits, or for any other special, indirect, incidental or consequential damages. THE WARRANTIES SET FORTH IN THIS PROVISION ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER STATUTORY, EXPRESS OR IMPLIED (INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE AND/OR WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OF TRADE). THE REMEDIES PROVIDED ABOVE ARE THE PURCHASER'S SOLE REMEDIES FOR ANY FAILURE OF SELLER TO COMPLY WITH ITS OBLIGATIONS.

"Correction of any non-conformity in the manner and period of time provided above shall constitute complete fulfillment of all the liabilities of Seller whether the claims of the Buyer are based in contract, in tort (including negligence and strict liability), in warranty or otherwise with respect to or arising out of the products furnished hereunder." All information in this book has been gathered from reliable sources and is believed to be theoretically correct, but we do not assume responsibility for errors.

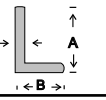
Contents

Laying Down A Sheet For The Shear

Bar Sized Shapes

Bar Sized Shapes are those whose greatest dimension is less than three inches, not including length. Most bar sized shapes are made to ASTM A-36. (For information on ASTM A-36, see the section on Structural Shapes.)

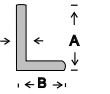
Bar Sized Angles



Size					*Weight*	*Weight*
A		*B*		*T*	*Per Foot*	*Per 20' Bar*
1/2	X	1/2	X	1/8	.380	7.60
5/8	X	5/8	X	1/8	.480	9.60
3/4	X	3/4	X	1/8	.591	11.82
7/8	X	7/8	X	1/8	.701	14.02
1	X	1	X	1/8	.801	16.02
				3/16	1.161	23.22
				1/4	1.491	29.82
1 1/4	X	1 1/4	X	1/8	1.011	20.22
				3/16	1.481	29.62
				1/4	1.922	38.44
1 1/2	X	1 1/2	X	1/8	1.231	24.62
				3/16	1.802	36.04
				1/4	2.342	46.84
				5/16	2.863	57.26
				3/8	3.353	67.06
1 3/4	X	1 3/4	X	1/8	1.441	28.82
				3/16	2.122	42.44
				1/4	2.773	55.46
2	X	1 1/2	X	1/8	1.441	28.82
				3/16	2.122	42.44
				1/4	2.773	55.46
2	X	2	X	1/8	1.652	33.04
				3/16	2.442	48.84
				1/4	3.193	63.86
				5/16	3.924	78.48
				3/8	4.704	94.08
2 1/2	X	1 1/2	X	3/16	2.442	48.84
				1/4	3.193	63.86

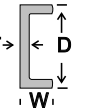
Many bar sized shapes are also available in 30' and 40' lengths.

Bar Sized Angles (Continued)



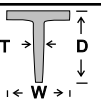
Size					Weight	Weight
A		*B*		*T*	*Per Foot*	*Per 20' Bar*
2 1/2	X	2	X	3/16	2.753	55.06
				1/4	3.623	72.46
				5/16	4.504	90.08
				3/8	5.305	106.10
2 1/2	X	2 1/2	X	3/16	3.073	61.46
				1/4	4.104	82.08
				5/16	5.005	100.10
				3/8	5.906	118.12
				1/2	7.707	154.14

Bar Sized Channels



Size					Weight	Weight
D		*W*		*T*	*Per Foot*	*Per 20' Bar*
3/4	X	3/8	X	1/8	.56	11.20
1	X	3/8	X	1/8	.68	13.60
1	X	1/2	X	1/8	.82	16.40
1 1/4	X	1/2	X	1/8	1.01	20.20
1 1/2	X	1/2	X	1/8	1.12	22.40
1 1/2	X	9/16	X	3/16	1.44	28.80
1 1/2	X	3/4	X	1/8	1.17	23.40
2	X	1/2	X	1/8	1.43	28.60
2	X	9/16	X	3/16	1.86	37.20
2	X	1	X	1/8	1.59	31.80
2	X	1	X	3/16	2.32	46.40
2 1/2	X	5/8	X	3/16	2.27	45.40

Bar Sized Tees



Size					*Weight*	*Weight*
D		*W*		*T*	*Per Foot*	*Per 20' Bar*
3/4	X	3/4	X	1/8	.620	12.24
1	X	1	X	1/8	.851	17.02
1 1/4	X	1 1/4	X	1/8	1.091	21.82
				3/16	1.551	31.02
1 1/2	X	1 1/2	X	3/16	1.902	38.04
				1/4	2.432	48.64
1 3/4	X	1 3/4	X	3/16	2.262	45.24
2	X	2	X	1/4	3.563	71.26
				5/16	4.304	86.08
2 1/2	X	2 1/2	X	1/4	4.604	92.08
				5/16	5.505	110.10
				3/8	6.406	128.12

Structural Shapes

Structural shapes are those whose greatest dimension, not including length, is three inches or greater.

Applications

ASTM A36 is utilized in riveted, bolted or welded construction in a wide variety of products such as bridges and buildings.

ASTM A572 Grade 50 (high strength, low alloy) structurals are intended for use in riveted or welded fabrication of bridges, buildings and other critical structures where greater strength is required. High Strength, Low Alloy shapes provide excellent strength to weight ratios and in some cases, improved resistance to atmospheric corrosion.

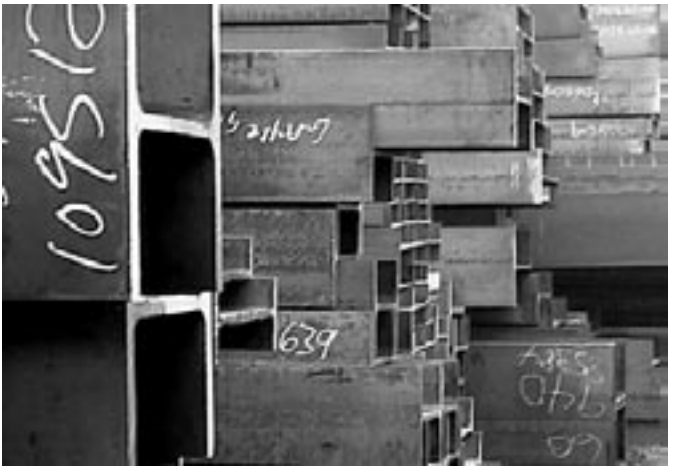
ASTM A992 wide flange beams are dual specification, meeting the requirements of ASTM A36 and of ASTM A572 Grade 50.

Weldability

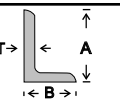
When any grade of steel is used in welded construction, welding procedures must be suitable for the steel and the intended service.

ASTM A36 steel presents no welding problems when using all welding processes. The quality of the welds is generally extremely high for both welds and joints. Welding rod specifications are dependent on welding conditions such as the thickness of the sections to be welded, service requirements and design.

High Strength, Low Alloy grades such as A572 Grade 50 are weldable with welding techniques suitable for the grade and intended service application.

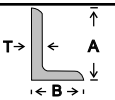


Structural Angles



Size					Weight	Weight
A		*B*		*T*	*Per Foot*	*Per 40' Bar*
3	X	2	X	3/16	3.073	122.92
				1/4	4.104	164.16
				5/16	5.005	200.20
				3/8	5.906	236.24
				1/2	7.707	308.28
3	X	2 1/2	X	3/16	3.393	135.72
				1/4	4.504	180.16
				5/16	5.605	224.20
				3/8	6.606	264.24
				1/2	8.508	340.32
3	X	3	X	3/16	3.714	148.56
				1/4	4.905	196.20
				5/16	6.106	244.24
				3/8	7.207	288.28
				1/2	9.409	376.36
3 1/2	X	2 1/2	X	3/16	3.393	135.72
				1/4	4.905	196.20
				5/16	6.106	244.24
				3/8	7.207	288.28
				1/2	9.409	376.36
3 1/2	X	3	X	1/4	5.405	216.20
				5/16	6.606	264.24
				3/8	7.907	316.28
				1/2	10.210	408.40
3 1/2	X	3 1/2	X	1/4	5.805	232.20
				5/16	7.207	288.28
				3/8	8.508	340.32
				1/2	11.110	444.40
4	X	3	X	1/4	5.805	232.20
				5/16	7.207	288.28
				3/8	8.508	340.32
				1/2	11.110	444.40
				5/8	13.613	544.52
4	X	3 1/2	X	1/4	6.206	248.24
				5/16	7.707	308.28

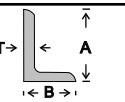
Structural Angles (Continued)



Size					*Weight*	*Weight*
D		*W*		*T*	*Per Foot*	*Per 40' Bar*
4	X	3 1/2	X	3/8	9.109	364.36
				1/2	11.911	476.44
4	X	4	X	1/4	6.606	264.24
				5/16	8.208	328.32
				3/8	9.809	392.36
				1/2	12.812	512.48
				5/8	15.715	628.60
				3/4	18.517	740.68
5	X	3	X	1/4	6.606	264.24
				5/16	8.208	328.32
				3/8	9.809	392.36
				1/2	12.812	512.48
				5/8	15.715	628.60
5	X	3 1/2	X	1/4	7.007	280.28
				5/16	8.708	348.32
				3/8	10.410	416.40
				1/2	13.613	544.52
				5/8	16.816	672.64
				3/4	19.810	792.76
5	X	5	X	5/16	10.310	412.40
				3/8	12.312	492.48
				7/16	14.313	572.52
				1/2	16.215	648.60
				5/8	20.019	800.76
				3/4	23.622	944.88
6	X	3 1/2	X	1/4	7.907	316.28
				5/16	9.809	392.36
				3/8	11.711	468.44
				1/2	15.314	612.56
				5/8	19.018	760.72
6	X	4	X	5/16	10.310	412.40
				3/8	12.312	492.48
				7/16	14.313	572.52

Please Note: Most Structural Angles are stocked in 20', 30', and 40' lengths.

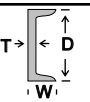
Structural Angles (Continued)



Size					Weight	Weight
D		*W*		*T*	*Per Foot*	*Per 40' Bar*
6	X	4	X	1/2	16.215	648.60
				5/8	20.019	800.76
				3/4	23.622	944.88
6	X	6	X	1/4	9.989	399.56
				5/16	12.512	500.48
				3/8	14.914	596.56
				7/16	17.216	688.64
				1/2	19.618	784.72
				5/8	24.223	968.92
				3/4	28.727	1149.08
				1	37.435	1497.40
7	X	4	X	3/8	13.613	544.52
				7/16	15.815	632.60
				1/2	17.917	716.68
				5/8	22.121	884.84
				3/4	26.225	1049.00
8	X	4	X	1/2	19.618	784.72
				3/4	28.727	1149.08
				1	37.435	1497.40
8	X	6	X	1/2	23.022	920.88
				5/8	28.527	1141.08
				3/4	33.832	1353.28
				1	44.242	1769.68
8	X	8	X	1/2	26.425	1057.00
				5/8	32.731	1309.24
				3/4	38.937	1557.48
				1	51.048	2041.92
9	X	4	X	1/2	21.320	852.80
				3/4	31.300	1252.00

Please Note: Most Structural Angles are stocked in 20', 30', and 40' lengths.

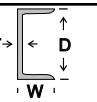
Structural Channels



Size				*Weight*
D	*Lbs. / Foot*	*W*	*T*	*Per 40' Bar*
3	3.5	1.375	.135	140
	4.1	1.410	.170	164
	5.0	1.498	.258	200
	6.0	1.596	.356	240
4	4.5	1.560	.140	180
	5.4	1.580	.180	216
	6.25	1.647	.247	250
	7.25	1.720	.320	290
5	6.7	1.750	.190	268
	9.0	1.885	.325	360
6	8.2	1.920	.200	328
	10.5	2.034	.314	420
	13.0	2.157	.437	520
7	9.8	2.090	.210	392
	12.25	2.194	.314	490
	14.75	2.299	.419	590
8	11.50	2.260	.220	460
	13.75	2.343	.303	550
	18.75	2.527	.487	750
9	13.4	2.430	.230	536
	15.0	2.485	.285	600
	20.0	2.648	.448	800
10	15.3	2.600	.240	612
	20.0	2.739	.379	800
	25.0	2.886	.526	1000
	30.0	3.033	.673	1200
12	20.7	2.940	.280	828
	25.0	3.047	.387	1000
	30.0	3.170	.510	1200
15	33.9	3.400	.400	1356
	40.0	3.520	.520	1600
	50.0	3.716	.716	2000

Please Note: Most Structural Channels are available in 20', 30', 40', 50', and 60' lengths.

Misc. Structural Channels



	Size			*Weight*
D	*Lbs. / Foot*	*W*	*T*	*Per 40' Bar*
3	7.1	1.938	.312	284
4	13.8	2.500	.500	552
6	6.5	1.875	.125	260
	7.0	1.875	.188	280
	12.0	2.500	.313	480
	15.1	2.940	.313	604
	15.3	3.500	.340	612
	16.3	3.000	.375	652
	18.0	3.500	.375	720
7	19.1	3.450	.350	764
	22.7	3.603	.503	908
8	6.6	1.750	.125	264
	8.5	1.875	.188	340
	18.7	2.978	.353	748
	20.0	3.025	.400	800
	21.4	3.450	.375	856
	22.8	3.500	.425	912
10	6.5	1.125	.150	260
	8.4	1.500	.170	336
	22.0	3.315	.290	880
	25.0	3.405	.380	1000
	28.5	3.950	.425	1140
	33.6	4.100	.575	1244
	41.1	4.321	.796	1644
12	10.6	1.500	.190	424
	31.0	3.670	.370	1240
	35.0	3.767	.467	1400
	40.0	3.890	.590	1600
	45.0	4.012	.712	1800
	50.0	4.135	.835	2000
13	31.8	4.000	.375	1272
	50.0	4.412	.787	2000
18	42.7	3.950	.450	1708
	45.8	4.000	.500	1832
	51.9	4.100	.600	2076
	58.0	4.200	.700	2320

Wide Flange Beams

Size						*Size*					
		Lbs/Ft	*D*	*W*	*T*			*Lbs/Ft*	*D*	*W*	*T*
4	x	13	4.16	4.060	.280	10	x	112	11.36	10.415	.755
5	x	16	5.01	5.000	.240	12	x	14	11.91	3.970	.200
		19	5.15	5.030	.270			16	11.99	3.990	.220
6	x	9	5.90	3.940	.170			19	12.16	4.005	.235
		12	6.03	4.000	.230			22	12.31	4.030	.260
		16	6.28	4.030	.260	12	x	26	12.22	6.490	.230
6	x	15	5.99	5.990	.230			30	12.34	6.520	.260
		20	6.20	6.020	.260			35	12.50	6.560	.300
		25	6.38	6.080	.320	12	x	40	11.94	8.005	.295
8	x	10	7.89	3.940	.180			45	12.06	8.045	.335
		13	7.99	4.000	.240			50	12.19	8.080	.370
		15	8.12	4.015	.250	12	x	53	12.06	9.995	.345
8	x	18	8.14	5.250	.230			58	12.19	10.010	.360
		21	8.28	5.270	.250	12	x	65	12.12	12.000	.390
8	x	24	7.93	6.495	.245			72	12.25	12.040	.430
		28	8.06	6.535	.285			79	12.38	12.080	.470
8	x	31	8.00	7.995	.285			87	12.53	12.125	.515
		35	8.12	8.020	.310			96	12.71	12.160	.550
		40	8.25	8.070	.360			106	12.89	12.220	.610
		48	8.50	8.110	.400			120	13.12	12.320	.710
		58	8.75	8.220	.510			136	13.41	12.400	.790
		67	9.00	8.280	.570			152	13.71	12.480	.870
10	x	12	9.87	3.960	.190			170	14.03	12.570	.960
		15	9.99	4.000	.230			190	14.38	12.670	1.060
		17	10.11	4.010	.240			210	14.71	12.790	1.180
		19	10.24	4.020	.250			230	15.05	12.895	1.285
10	x	22	10.17	5.750	.240	12	x	252	15.41	13.005	1.395
		26	10.33	5.770	.260			279	15.85	13.140	1.530
		30	10.47	5.810	.300			305	16.32	13.235	1.625
10	x	33	9.73	7.960	.290			336	16.82	13.385	1.775
		39	9.92	7.985	.315	14	x	22	13.74	5.000	.230
		45	10.10	8.020	.350			26	13.91	5.025	.255
10	x	49	9.98	10.000	.340	14	x	30	13.84	6.730	.270
		54	10.09	10.030	.370			34	13.98	6.745	.285
		60	10.22	10.080	.420			38	14.10	6.770	.310
		68	10.40	10.130	.470	14	x	43	13.66	7.995	.305
		77	10.60	10.190	.530			48	13.79	8.030	.340
		88	10.84	10.265	.605			53	13.92	8.060	.370
		100	11.10	10.340	.680	14	x	61	13.89	9.995	.375

Wide Flange Beams (Continued)

Size				
	Lbs/Ft	*D*	*W*	*T*
14 x	68	14.04	10.035	.415
	74	14.17	10.070	.450
	82	14.31	10.130	.510
14 x	90	14.02	14.520	.440
	99	14.16	14.565	.485
	109	14.32	14.605	.525
	120	14.48	14.670	.590
	132	14.66	14.725	.645
14 x	145	14.78	15.500	.680
	159	14.98	15.565	.745
	176	15.22	15.650	.830
	193	15.48	15.710	.890
	211	15.72	15.800	.980
14 x	233	16.04	15.890	1.070
	257	16.38	15.995	1.175
	283	16.74	16.110	1.290
	311	17.12	16.230	1.410
	342	17.54	16.360	1.540
	370	17.92	16.475	1.655
	398	18.29	16.590	1.770
	426	18.67	16.695	1.875
	455	19.02	16.835	2.015
14 x	500	19.60	17.010	2.190
	550	20.24	17.200	2.380
	605	20.92	17.415	2.595
	665	21.64	17.650	2.830
	730	22.42	17.890	3.070
16 x	26	15.69	5.525	.275
	31	15.88	5.500	.250
16 x	36	15.86	6.985	.295
	40	16.01	6.995	.305
	45	16.13	7.035	.345
	50	16.26	7.070	.380
	57	16.43	7.120	.430
16 x	67	16.35	10.235	.395
	77	16.52	10.295	.455
	89	16.75	10.365	.525
	100	16.97	10.425	.585
18 x	35	17.70	6.000	.300

Size				
	Lbs/Ft	*D*	*W*	*T*
18 x	40	17.90	6.015	.315
	46	18.06	6.060	.360
18 x	50	17.99	7.495	.355
	55	18.11	7.530	.390
	60	18.24	7.555	.415
	65	18.35	7.590	.450
	71	18.47	7.635	.495
18 x	76	18.21	11.035	.425
	86	18.39	11.090	.480
	97	18.59	11.145	.535
	106	18.73	11.200	.590
	119	18.97	11.265	.655
	130	19.25	11.160	.670
	143	19.49	11.220	.730
	158	19.72	11.300	.810
	175	20.04	11.375	.890
	192	20.35	11.455	.960
	211	20.67	11.555	1.060
	234	21.06	11.650	1.160
	258	21.46	11.770	1.280
	283	21.85	11.890	1.400
	311	22.32	12.005	1.520
21 x	44	20.66	6.500	.405
	50	20.83	6.530	.380
	57	21.06	6.555	.350
21 x	62	20.99	8.240	.400
	68	21.13	8.270	.430
	73	21.24	8.295	.455
	83	21.43	8.355	.515
	93	21.62	8.420	.580
21 x	101	21.36	12.290	.500
	111	21.51	12.340	.550
	122	21.68	12.390	.600
	132	21.85	12.440	.650
	147	22.06	12.510	.720
	166	22.48	12.420	.750
	182	22.72	12.500	.830
	201	23.03	12.575	.910
	223	23.35	12.675	1.000

Wide Flange Beams (Continued)

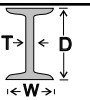
Size				
	Lbs/Ft	D	W	T
21 x	248	23.74	12.775	1.100
	275	24.13	12.890	1.220
	300	24.53	12.990	1.320
	333	25.00	13.130	1.460
	364	25.47	13.265	1.590
	402	26.02	13.405	1.730
24 x	55	23.57	7.005	.395
	62	23.74	7.040	.430
24 x	68	23.73	8.965	.415
	76	23.92	8.990	.440
	84	24.10	9.020	.470
	94	24.31	9.065	.515
	103	24.53	9.000	.550
24 x	104	24.06	12.750	.500
	117	24.26	12.800	.550
	131	24.48	12.855	.605
	146	24.74	12.900	.650
	162	25.00	12.955	.705
	176	25.24	12.890	.750
24 x	192	25.47	12.950	.810
	207	25.71	13.010	.870
	229	26.02	13.110	.960
	250	26.34	13.185	1.040
	279	26.73	13.305	1.160
	306	27.13	13.405	1.260
	335	27.52	13.520	1.380
	370	27.99	13.660	1.520
	408	28.54	13.800	1.650
	450	29.09	13.955	1.810
	492	29.65	14.115	1.970
27 x	84	26.71	9.960	.460
	94	26.92	9.990	.490
	102	27.09	10.015	.515
	114	27.29	10.070	.570
	129	27.63	10.010	.610
27 x	146	27.38	13.965	.605
	161	27.59	14.020	.660
	178	27.81	14.085	.725
	194	28.11	14.035	.750

Size				
	Lbs/Ft	D	W	T
27 x	217	28.43	14.115	.830
	235	28.66	14.190	.910
	258	28.96	14.270	.980
	281	29.29	14.350	1.060
	307	29.61	14.445	1.160
	336	30.00	14.545	1.260
	368	30.39	14.665	1.380
	407	30.87	14.800	1.520
	448	31.42	14.940	1.650
	494	31.97	15.095	1.810
	539	32.52	15.260	1.970
30 x	90	29.53	10.400	.470
	99	29.65	10.450	.520
	108	29.83	10.475	.545
	116	30.01	10.495	.565
	124	30.17	10.515	.585
	132	30.31	10.545	.615
	148	30.67	10.480	.650
30 x	173	30.44	14.985	.655
	191	30.68	15.040	.710
	211	30.94	15.105	.755
	235	31.30	15.055	.830
	261	31.61	15.155	.930
	292	32.01	15.255	1.020
	326	32.40	15.370	1.140
	357	32.80	15.470	1.240
	391	33.19	15.590	1.360
	433	33.66	15.725	1.500
	477	34.21	15.865	1.630
	526	34.76	16.020	1.790
	581	35.39	16.200	1.970
33 x	118	32.86	11.480	.550
	130	33.09	11.510	.580
	141	33.30	11.535	.605
	152	33.49	11.565	.635
	169	33.82	11.500	.670
33 x	201	33.68	15.745	.715
	221	33.96	15.805	.775
	241	34.18	15.860	.830

Wide Flange Beams (Continued)

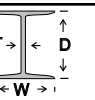
Size				*Size*			
Lbs/Ft	*D*	*W*	*T*	*Lbs/Ft*	*D*	*W*	*T*
33 x 263	34.53	15.805	.870	40 x 183	38.98	11.81	0.650
291	34.84	15.905	.960	211	39.37	11.81	0.750
318	35.16	15.985	1.040	235	39.69	11.89	0.830
354	35.55	16.100	1.160	40 x 264	40.00	11.93	0.960
387	35.95	16.200	1.260	294	40.39	12.025	1.06
424	36.34	16.315	1.380	327	40.79	12.145	1.18
468	36.81	16.455	1.520	359	41.18	12.260	1.30
515	37.36	16.590	1.650	396	41.65	12.380	1.42
567	37.91	16.750	1.810	437	42.13	12.520	1.56
619	38.47	16.910	1.970	475	42.60	12.660	1.69
36 x 135	35.55	11.950	.600	40 x 520	43.15	12.790	1.83
150	35.85	11.975	.625	561	43.62	12.930	1.97
160	36.01	12.000	.650	40 x 174	38.20	15.750	0.650
170	36.17	12.030	.680	199	38.67	15.750	0.650
182	36.33	12.075	.725	215	38.98	15.750	0.650
194	36.49	12.115	.765	249	39.38	15.750	0.750
210	36.69	12.180	.830	277	39.69	15.830	0.830
232	37.12	12.120	.870	297	39.84	15.825	0.930
256	37.43	12.215	.960	40 x 324	40.16	15.905	1.00
36 x 230	35.90	16.470	.760	362	40.55	16.020	1.12
245	36.08	16.510	.800	397	40.95	16.120	1.22
260	36.26	16.550	.840	436	41.34	16.24	1.34
280	36.52	16.595	.885	480	41.81	16.36	1.46
300	36.74	16.655	.945	40 x 531	42.34	16.51	1.61
328	37.09	16.630	1.020	593	42.99	16.69	1.79
359	37.40	16.730	1.120	655	43.62	16.87	1.97
393	37.80	16.830	1.220	40 x 192	38.20	17.71	0.710
439	38.26	16.965	1.360	221	38.67	17.71	0.710
485	38.74	17.105	1.500	244	39.06	17.71	0.710
527	39.21	17.220	1.610	268	39.37	17.75	0.750
588	39.84	17.400	1.790	298	39.69	17.83	0.830
650	40.47	17.575	1.970	326	40.00	17.91	0.910
720	41.19	17.775	2.165	44 x 198	42.91	11.81	0.710
798	41.97	17.990	2.36	224	43.31	11.81	0.785
848	42.45	18.130	2.52	248	43.62	11.81	0.865
40 x 149	38.20	11.81	0.630	285	44.02	11.81	1.025
167	38.59	11.81	0.650				

Standard (I) Beams



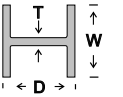
Size				*Weight*
D	*Lbs. / Foot*	*W*	*T*	*Per 40' Bar*
3	5.70	2.330	.170	228
	7.50	2.509	.349	300
4	7.70	2.660	.190	308
	9.50	2.796	.326	380
5	10.00	3.000	.210	400
	14.75	3.284	.494	590
6	12.50	3.330	.230	500
	17.25	3.565	.465	690
7	15.30	3.660	.250	612
	20.00	3.860	.450	800
8	18.40	4.000	.270	736
	23.00	4.171	.441	920
10	25.40	4.660	.310	1016
	35.00	4.944	.594	1400
12	31.80	5.000	.350	1272
	35.00	5.078	.428	1400
	40.80	5.250	.460	1632
	50.00	5.477	.687	2000
15	42.90	5.500	.410	1716
	50.00	5.640	.550	2000
18	54.70	6.000	.460	2188
	70.00	6.251	.711	2800
20	66.00	6.255	.505	2640
	75.00	6.391	.635	3000
	86.00	7.060	.660	3440
	96.00	7.200	.800	3840
24	80.00	7.000	.500	3200
	90.00	7.125	.625	3600
	100.00	7.245	.745	4000

Miscellaneous Beams



	Size			*Weight*
D	*Lbs. / Foot*	*W*	*T*	*Per 40' Bar*
4	3.2	2.25	.092	128
4	3.45	2.25	.112	138
4	4.08	2.25	.115	163
5	18.9	5.003	.316	756
6	4.4	1.844	.114	176
8	6.5	2.281	.135	260
10	7.5	2.688	.130	300
10	8.0	2.690	.141	320
10	9.0	2.690	.157	360
12	10.8	3.065	.160	432
12	11.8	3.065	.177	472

H Pilings



	Size			*Weight*
D	*Lbs. / Foot*	*W*	*T*	*Per 40' Bar*
8	36.0	8.155	.445	1440
10	42.0	10.075	.415	1680
10	57.0	10.225	.565	2280
12	53.0	12.045	.435	2120
12	63.0	12.125	.515	2520
13	60.0	12.900	.460	2400
13	73.0	13.005	.565	2920
14	73.0	14.585	.505	2920
14	89.0	14.695	.615	3560

Tubing Products

The steel for hollow square and rectangular structural tubing is made by a basic steelmaking process. The flat strip is cold formed into the final shape and electric resistance welded. Hollow square and rectangular structural tubing is manufactured to the chemical and mechanical requirements of ASTM A-500 Grade A, ASTM A-500 Grade B, or ASTM A-500 Grade C. Some ornamental sizes of square and rectangular tubing are made to the chemical requirements of ASTM A-513.

Analysis (Ladle)

	Carbon	*Phosphorus*	*Sulphur*	*Manganese*
A-500 A/B	.26 Max.	.04 Max.	.05 Max.	-------
A-500 C	.23 Max.	.035 Max.	.035 Max.	1.35 Max.
A-513	.15 -.25	.035 Max.	.035 Max.	.30 - .60

Applications

Hollow Structural Tubing offers maximum strength and compactness with low cost design features for general building construction. These carbon steel square and rectangular sections can be used as columns, posts or spandrel beams, and in complete load bearing panels, window walls, and entry structures.

Mechanical Properties

	Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation Percent in 2"*
Grade A	45,000 Min.	39,000 Min.	25 Min.
Grade B	58,000 Min.	46,000 Min.	23 Min.
Grade C	62,000 Min.	50,000 Min.	21 Min.
A-513	N.A.	N.A.	N.A.

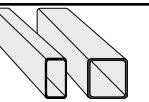
Workability and Weldability

Hollow Structural Tubing can be subjected to the usual fabricating operations. The ductility of tubing products is good. It bends well, flattens, cuts, punches, flares and flanges easily and can be welded by the commonly employed techniques and practices.

Availability of Lengths

Ornamental Tubing is generally available in 20' and 24' lengths. Structural Tubing is generally available in 20', 24', 30', 32', 34', 40', and 48' lengths. Please call us for availability of particular sizes and lengths.

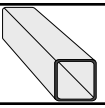
Ornamental Tubing



Outside Dims.		*Wall Thickness*	*Wt. / Foot*
1/2 x 1/2	x	.049	.301
		.065	.385
5/8 x 5/8	x	.049	.367
		.065	.495
3/4 x 3/4	x	.049	.467
		.065	.607
		.075	.690
		.083	.753
		.095	.840
		.120	1.029
1 x 1	x	.049	.630
		.065	.828
		.075	.945
		.083	1.036
		.095	1.170
		.120	1.437
1 1/4 x 1 1/4	x	.049	.793
		.065	1.049
		.075	1.200
		.083	1.318
		.095	1.493
		.120	1.846
1 1/2 x 1 1/2	x	.049	.957
		.065	1.270
		.075	1.455
		.083	1.602
		.095	1.817
		.120	2.254
1 3/4 x 1 3/4	x	.065	1.491
		.083	1.884
		.095	2.140
		.120	2.663
2 x 2	x	.065	1.713
		.075	1.966
		.083	2.166
		.095	2.463
		.120	2.940
1 x 1/2	x	.065	.607
		.075	.679
1 1/2 x 1/2	x	.065	.824

Outside Dims.		*Wall Thickness*	*Wt. / Foot*
1 1/2 x 3/4	x	.065	.938
		.075	1.072
		.083	1.176
		.120	1.640
1 1/2 x 1	x	.049	.793
		.065	1.049
		.075	1.200
		.083	1.318
		.095	1.440
		.120	1.846
2 x 1	x	.065	1.270
		.075	1.455
		.083	1.602
		.095	1.817
		.120	2.254
2 x1 1/2	x	.065	1.491
		.075	1.744
		.095	2.140
		.120	2.663
2 1/2 x 1	x	.120	2.663
2 1/2 x 1 1/2	x	.065	1.692
		.075	1.945
		.095	2.442
		.120	2.940
3 x 1	x	.065	1.711
		.075	1.945
		.083	2.166
		.095	2.442
		.120	2.940
3 x1 1/2	x	.065	1.932
		.083	2.448
		.120	3.479
3 x 2	x	.083	2.756
		.120	3.890
4 x1 1/2	x	.120	4.292
4 x 2	x	.083	3.296
		.095	3.757
		.120	4.700

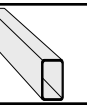
Square Structural Tubing



Outside Dims.	*Wall Thickness*	*Wt. / Foot*
1 1/4 x 1 1/4	x .188	2.40
1 1/2 x 1 1/2	x .188	3.23
	.250	3.70
2 x 2	x .188	4.32
	.250	5.41
	.313	6.32
2 1/2 x 2 1/2	x .095	3.03
	.120	3.89
	.188	5.59
	.250	7.11
	.313	8.45
3 x 3	x .120	4.70
	.188	6.87
	.250	8.81
	.313	10.58
	.375	11.75
3 1/2 x 3 1/2	x .120	5.52
	.188	8.15
	.250	10.51
	.313	12.70
	.375	14.71
4 x 4	x .120	6.34
	.188	9.42
	.250	12.21
	.313	14.83
	.375	17.27
	.500	21.63
4 1/2 x 4 1/2	x .120	7.31
	.188	10.70
	.250	13.91
	.313	16.98
	.375	19.82
5 x 5	x .120	7.84
	.188	11.97
	.250	15.62
	.313	19.08
	.375	22.37
	.500	28.43
6 x 6	x .188	14.53
	.250	19.02

Outside Dims.	*Wall Thickness*	*Wt. / Foot*
6 x 6	x .313	23.34
	.375	27.48
	.500	35.24
	.625	42.30
7 x 7	x .188	17.08
	.250	22.42
	.313	27.59
	.375	32.58
	.500	42.05
	.625	50.76
8 x 8	x .188	19.63
	.250	25.82
	.313	31.84
	.375	37.69
	.500	48.85
	.625	59.32
9 x 9	x .250	29.23
	.313	36.10
	.375	42.79
	.500	55.66
	.625	67.82
10 x 10	x .188	24.75
	.250	32.63
	.313	40.35
	.375	47.90
	.500	62.46
	.625	76.33
12 x 12	x .250	39.43
	.313	48.86
	.375	58.10
	.500	76.07
	.625	93.34
14 x 14	x .313	57.36
	.375	68.31
	.500	89.68
	.625	110.23
16 x 16	x .313	65.87
	.375	78.52
	.500	103.30
	.625	127.34

Rectangular Structural Tubing



Outside Dims.		*Wall Thickness*	*Wt. / Foot*
2 1/2 x 1 1/2	x	.188	4.32
		.250	5.41
3 x 1 1/2	x	.188	4.96
3 x 2	x	.188	5.59
		.250	7.11
		.313	8.45
3 1/2 x 1 1/2	x	.188	5.59
3 1/2 x 2 1/2	x	.188	7.05
		.250	8.81
4 x 1 1/2	x	.188	6.21
4 x 2	x	.188	6.87
		.250	8.81
		.313	10.58
4 x 2 1/2	x	.120	5.11
4 x 3	x	.120	5.52
		.188	8.15
		.250	10.51
		.313	12.70
		.375	14.71
5 x 2	x	.120	5.52
		.188	8.15
		.250	10.51
		.313	12.70
5 x 3	x	.120	6.34
		.188	9.42
		.250	12.21
		.313	14.83
		.375	17.27
		.500	21.63
5 x 4	x	.120	7.15
		.188	10.70
		.250	13.91
		.313	16.96
		.375	19.82
6 x 2	x	.120	6.34
		.188	9.42
		.250	12.21
		.313	14.83
		.375	17.27
6 x 3	x	.120	7.16

Outside Dims.		*Wall Thickness*	*Wt. / Foot*
6 x 3	x	.188	10.70
		.250	13.91
		.313	16.96
		.375	19.82
		.500	25.00
6 x 4	x	.120	7.97
		.188	11.97
		.250	15.62
		.313	19.08
		.375	22.37
		.500	28.43
7 x 3	x	.188	11.97
		.250	15.62
		.313	19.08
		.375	22.37
7 x 4	x	.188	13.25
		.250	17.32
		.313	21.21
		.375	24.93
		.500	31.83
7 x 5	x	.188	14.53
		.250	19.02
		.313	23.34
		.375	27.48
		.500	35.24
8 x 2	x	.188	11.97
		.250	15.62
		.313	19.08
		.375	22.37
8 x 3	x	.188	13.25
		.250	17.32
		.313	21.21
		.375	24.93
		.500	31.84
8 x 4	x	.188	14.53
		.250	19.02
		.313	23.34
		.375	27.48
		.500	35.24
8 x 6	x	.188	17.08

Rectangular Structural Tubing (Continued)

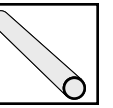
Outside Dims.	*Wall Thickness*	*Wt. / Foot*
8 x 6	x .250	22.42
	.313	27.59
	.375	32.58
	.500	42.05
	.625	50.81
10 x 2	x .188	14.53
	.250	19.02
	.313	23.34
10 x 3	x .188	15.80
	.250	20.72
10 x 4	x .188	17.08
	.250	22.42
	.313	27.59
	.375	32.58
	.500	42.05
	.625	50.77
10 x 5	x .188	18.35
	.250	24.12
	.313	29.72
	.375	35.14
10 x 6	x .188	19.62
	.250	25.82
	.313	31.84
	.375	37.69
	.500	48.85
	.625	59.32
10 x 8	x .188	22.18
	.250	29.23
	.313	36.10
	.375	42.79
	.500	55.66
12 x 2	x .188	17.08
	.250	22.42
12 x 3	x .188	18.35
	.250	24.12
	.313	29.72
12 x 4	x .188	19.63
	.250	25.82
	.313	31.84
	.375	37.69

Outside Dims.	*Wall Thickness*	*Wt. / Foot*
12 x 4	x .500	48.85
	.625	59.32
12 x 6	x .188	22.18
	.250	29.23
	.313	36.10
	.375	42.79
	.500	55.66
12 x 8	x .250	32.63
	.313	40.35
	.375	47.90
	.500	63.97
	.625	76.33
12 x 10	x .250	36.03
	.313	44.60
	.375	53.00
	.500	69.27
14 x 4	x .250	29.23
	.313	36.10
	.375	42.79
	.500	55.66
14 x 6	x .250	32.63
	.313	40.35
	.375	47.90
	.500	62.46
14 x 10	x .313	48.86
	.375	58.10
	.500	76.07
	.625	93.25
16 x 4	x .313	40.35
	.375	47.90
	.500	62.46
16 x 8	x .250	40.84
	.313	48.86
	.375	58.10
	.500	76.07
16 x 12	x .313	57.36
	.375	68.31
	.500	89.68
18 x 6	x .250	39.43
	.313	48.86

Rectangular Structural Tubing (Continued)

Outside Dims.	*Wall Thickness*	*Wt. / Foot*
18 x 6	x .375	58.10
	.500	76.07
20 x 4	x .313	48.86
	.375	58.10
	.500	76.07
20 x 8	x .313	57.36
	.375	68.31
	.500	89.68
20 x 12	x .313	65.87
	.375	78.52
	.500	103.30

Round H.R.E.W. Tubing (A513 T1)



Outside Dims.	*Wt. / Foot*	*Wt. / 20'*
1/2 x.049	.236	4.72
.065	.302	6.04
5/8 x.049	.301	6.02
.065	.389	7.78
.083	.481	9.62
3/4 x.049	.367	7.34
.065	.476	9.52
.083	.591	11.82
.095	.665	13.30
7/8 x.049	.432	8.646
.065	.562	11.24
.083	.702	14.04
1 x.049	.498	9.96
.065	.649	12.98
.075	.741	14.82
.083	.813	16.26
.095	.918	18.36
.120	1.13	22.60
1 1/4 x.049	.629	12.58
.065	.823	16.46
.083	1.03	20.60
1 1/4 x.095	1.17	23.40
.120	1.45	29.00
1 1/2 x.065	.996	19.92
.083	1.26	25.20
.095	1.43	28.60
.120	1.77	35.40
1 3/4 x.065	1.17	23.40
.083	1.48	29.56
.095	1.68	33.60
.120	2.09	41.80
2 x.065	1.34	26.80
.083	1.70	34.00
.095	1.99	39.80
.120	2.41	48.20
2 1/2 x.049	1.28	25.60
.065	1.69	33.80
.083	2.14	42.80
.120	3.05	61.00
3 x.065	2.04	40.80
.095	2.95	59.00
.120	3.69	73.80

Pipe Products

Standard, Continuous Weld, Electric Weld or Seamless

This pipe is generally available with **Plain Ends** which are square cut, **Threaded and Coupled** and with **Beveled Ends**.

Scope

Covers black and hot dipped galvanized, welded and seamless in nominal pipe sizes $^{1}/_{8}$ through 26 inches with average nominal wall thickness as given in the following pages. Pipe ordered to this specification is intended for mechanical and pressure applications and is also acceptable for ordinary uses in steam, water, gas and air lines. It is suitable for welding and suitable for some forming operations.

Manufacture

The weld seam of electric-resistance welded pipe in Grade B shall be heat treated after welding to a minimum of 1000^{O} (540^{O}C) so that no untempered martensite remains, or otherwise processed in such a manner that no untempered martensite remains.

Strength Requirements

Seamless Or Electric Weld	*Tensile Strength (P.S.I.)*	*Yield Strength (P.S.I.)*
A53 Grade A	48,000 Min.	30,000 Min.
A53 Grade B	60,000 Min.	35,000 Min.

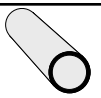
Open Hearth, Basic Oxygen, Or Electric Furnace Buttwelded	*Tensile Strength (P.S.I.)*	*Yield Strength (P.S.I.)*
A53 Grade A	45,000 Min.	25,000 Min.

Pipe Dimensions & Weights

Size (In.)	*O.D. (In.)*	*I.D. (In.)*	*Wall Thick.*	*Pipe Sched.*	*Num. Threads*	*Wt./Ft. P.E.*	*Wt./Ft. T & C*
1/8	.405	.269	.068	40	27	.24	.24
1/4	.540	.364	.088	40	18	.42	.42
3/8	.675	.493	.091	40	18	.57	.57
1/2	.840	.622	.109	40	14	.85	.85
3/4	1.050	.824	.113	40	14	1.13	1.13
1	1.315	1.049	.133	40	11 1/2	1.68	1.68
1 1/4	1.660	1.380	.140	40	11 1/2	2.27	2.28
1 1/2	1.900	1.610	.145	40	11 1/2	2.72	2.73
2	2.375	2.067	.154	40	11 1/2	3.65	3.68
2 1/2	2.875	2.469	.203	40	8	5.79	5.82
3	3.500	3.068	.216	40	8	7.58	7.62
3 1/2	4.000	3.548	.226	40	8	9.11	9.20
4	4.500	4.026	.237	40	8	10.79	10.89
5	5.563	5.047	.258	40	8	14.62	14.81
6	6.625	6.065	.280	40	8	18.97	19.18
8	8.625	8.071	.277	30	8	24.70	25.55
8	8.625	7.981	.322	40	8	28.55	29.35
10	10.750	10.136	.307	30	8	34.24	35.75
10	10.750	10.020	.365	40	8	40.48	41.85
12	12.750	12.090	.330	30	8	43.77	45.45
12	12.750	12.000	.376	Std.	8	49.56	51.15

Note: Many Structural Sizes are available in 21', 24', 30', 34', & 40' Lengths. All weights and dimensions are nominal. Permissible variation in weight is 5 % above or below.

Extra Strong Pipe



Size (In.)	*O.D. (In.)*	*I.D. (In.)*	*Wall Thick.*	*Wt./Ft. P. E.*
1/8	.405	.215	.095	.31
1/4	.540	.302	.119	.54
3/8	.675	.423	.126	.74
1/2	.840	.546	.147	1.09
3/4	1.050	.742	.154	1.47
1	1.315	.957	.179	2.17
1 1/4	1.660	1.278	.191	3.00
1 1/2	1.900	1.500	.200	3.63
2	2.375	1.939	.218	5.04
2 1/2	2.875	2.323	.276	7.66
3	3.500	2.900	.300	10.25
3 1/2	4.000	3.364	.318	12.51
4	4.500	3.826	.337	14.98
5	5.563	4.813	.375	20.78
6	6.625	5.761	.432	28.57
8	8.625	7.625	.500	43.39
10	10.750	9.750	.500	54.74
12	12.750	11.750	.500	65.42

Double Extra Strong Pipe

1/2	.840	.252	.294	-----
3/4	1.050	.434	.308	2.44
1	1.315	.599	.358	3.66
1 1/4	1.660	.896	.382	5.21
1 1/2	1.900	1.100	.400	6.41
2	2.375	1.503	.436	9.03
2 1/2	2.875	1.771	.552	13.70
3	3.500	2.300	.600	18.58
4	4.500	3.152	.674	27.54
5	5.563	4.063	.750	38.55
6	6.625	4.897	.864	53.16
8	8.625	6.875	.875	72.42

Above Grades: Continuous Weld, Electric Weld or Seamless - Specification A53A or A53B

Light Wall Pipe ~ Bare Uncoated AWWA C-200

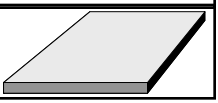
Straight Seam			
OD	*S.W. Ga.*	*Wall*	*Wt. / Foot*
4	14	.075	3.21
	12	.105	5.03
	10	.135	6.43
4 1/2	14	.075	3.62
	12	.105	6.75
	10	.135	8.64
6	14	.075	4.85
	12	.105	6.75
	10	.135	8.64
6 5/8	12	.105	7.47
8	14	.075	6.48
	12	.105	9.04
	10	.135	11.58
8 5/8	12	.105	9.76
10	12	.105	11.33
	10	.135	14.53
10 3/4	12	.105	12.19
12	12	.105	13.62
	10	.135	17.47
12 3/4	12	.105	14.48
14	12	.105	15.92
	10	.135	20.42
16	12	.105	18.21
	10	.135	23.36
	7	.180	31.67
18	12	.105	20.50
	10	.135	26.31
	7	.180	35.67

Spiral Seam			
OD	*S.W. Ga.*	*Wall*	*Wt. / Foot*
8	14	.075	6.48
	12	.105	9.04
	10	.135	11.58
8 5/8	12	.105	9.71
10	12	.105	11.33
	10	.135	14.53
10 3/4	12	.105	12.19
12	12	.105	13.62
	10	.135	17.47
12 3/4	12	.105	14.48
14	12	.105	15.92
	10	.135	20.42
16	12	.105	18.21
	10	.135	23.36
	7	.180	31.67
18	12	.105	20.50
	10	.135	26.31
	7	.180	35.67
20	10	.135	29.25
	7	.180	39.68
22	10	.135	32.20
	7	.180	43.69
24	10	.135	35.1

Double checking bundles of cut pipe before they leave the yard.

Plate Products

Hot Rolled ASTM-A36



Hot rolled plates made to ASTM-A36 are intended for use in structural applications. Plates 1/2" and under are normally sheared: while heavier plates are flame cut. Flame cutting is necessary when plate thickness exceeds mill shearing limits.

Analysis

Thickness	*Carbon*	*Manganese*	*Phosphorus*	*Sulphur*	*Silicon*
To 3/4"	.25 Max.	.80 / 1.20	.04 Max.	.05 Max.	-------
3/4 - 1 1/2"	.25 Max.	.80 / 1.20	.04 Max.	.05 Max.	-------
1 1/2 - 2 1/2"	.26 Max.	.80 / 1.20	.04 Max.	.05 Max.	.15 / .30
2 1/2 - 4"	.27 Max.	.85 / 1.20	.04 Max.	.05 Max.	.15 / .30
4" & Over	.29 Max.	.85 / 1.20	.04 Max.	.05 Max.	.15 / .30

Applications

Carbon steel plates have so many and such varied uses that a comprehensive list of plate applications would be impossible in these pages, however a few uses are: tanks, tubes, truck frames, railroad cars, and many structural uses, such as: base plates, girders, etc.

Mechanical Properties

Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation In 8 Inches*
58,000 - 80,000	36,000 Minimum*	20%

* Yield Point 32,000 P.S.I. for plates over 8 inches thick.

Machinability

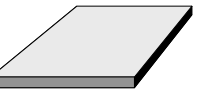
This grade is satisfactory for ordinary machining or drilling, but it is not considered a free machining grade.

Weldability

These grades present no welding problems when using all welding processes. The quality of the welds is generally extremely high for both welds and joints. Welding rod specifications are dependent on welding conditions such as the thickness of the sections to be welded, service requirements and design.

Abrasion Resistant Steel Plates

Grade AR235



"As Rolled" Abrasion Resistant Steel, also called A-R Steel, was developed to meet the many demands for a low cost abrasion resisting steel for the materials handling industry.

Analysis

Carbon	*Manganese*	*Phosphorus*	*Sulphur*	*Silicon*
.35 - .50	1.50 - 2.00	.05 Max.	.055 Max.	.15 - .35

Applications

In general, any member of a steel structure requiring material with exceptional resistance to abrasion, by either wet or dry materials, is considered a suitable application of A-R steel. Unusually long life has been obtained by using A-R in a variety of parts including wear plates, conveyor chutes, dredge pipes, screens, mixer drums, buckets and liner plates. Other applications include scrap metal baling machines, gravel crushers, hoppers, farm implements, railroad cars, and grader, mixer and scraper blades.

Typical Mechanical Properties

Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation In 8 Inches*	*Reduction Of Area*	*Brinell Hardness*
115,000	70,000	16%	35%	235

Shearing

A-R Steel has higher hardness than structural carbon steel and shearing must be done with care. To insure proper safety and the structural integrity of the finished product we will assist you with heat number and source-mill information so that you can obtain accurate information from the producing mill prior to any attempt to shear this material.

Flame Cutting

Flame cutting A-R plate produces a brittle edge due to the quenching effect of the plate. In many applications this is of little or no consequence. In applications where flame cut parts must be formed, however, specific procedures must be followed when cutting the parts to insure the safety of workers and the integrity of the parts. To insure proper safety and the structural integrity of the finished product we will assist you with heat number and source-mill information so that you can obtain accurate information from the producing mill prior to any attempt to flame cut parts that must later be formed.

Punching

A-R Steel can be punched successfully in thicknesses up to $^{1}/_{2}$" at temperatures not lower than room temperature, but more power is required than for an equal thickness of mild structural steel. The possibility of fine cracks in the material around the hole makes it advisable to ream after punching. When holes are close together, as in the case of perforated screens, it is necessary to preheat before punching or to resort to drilling. If these precautions are not taken, it is possible that cracks may occur and may extend from one hole to the next. To insure proper safety and the structural integrity of the finished product we will assist you with heat number and source-mill information so that you can obtain accurate information from the producing mill prior to punching this material.

Drilling and Machinability

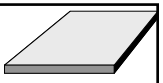
This steel can be drilled and machined satisfactorily with standard equipment. However, machine speeds and feeds must be reduced. High speed drills are necessary and should be kept cool with drilling compounds such as soluble oil or turpentine. For drilling this steel the clearance rake of the drills should be less than that for steels of lower hardness.

Weldability

Abrasion Resistant Steel may be welded with proper precautions. Preheating is recommended and after welding it is good practice to stress relieve or normalize. To normalize, heat to 1650°F. and allow to cool slowly in air. Normalizing is sometimes omitted when the welded part is not subject to severe vibration and stress. However, normalizing will prevent cracks, give uniform structure and will not reduce the abrasive-resisting qualities. The grade of welding rod to be used depends upon the thickness of section, designs, service requirements, etc.

To insure proper safety and the structural integrity of the finished product we will assist you with heat number and source-mill information so that you can obtain accurate information from the producing mill prior to punching this material.

Abrasion Resistant Steel Plates



High Brinell or Wear Plates are made from heat treated, high strength, abrasion resisting steels.

Analysis

Because these plates are made to a specific hardness range rather than to a specific ASTM grade, there is a wide range of chemistries found in these steels depending on the mill of origin.

Applications

This steel is used in applications requiring high strength and high wear resistance. Good candidates for these steels are mining, earth moving equipment, loader buckets, cutting edges, chutes, slurry pipe, ore bins, and similar uses.

Typical Mechanical Properties

Grade	*Tensile Strength (P.S.I.)*	*Yield Point (P.S.I.)*	*Elongation Percent In 2"*	*Brinell Hardness*
AR360	130,000	160,000	15	360
AR400	145,000	180,000	14	400
AR500	190,000	230,000	14	500

Fabrication

Due to the proprietary nature of High Brinell plate, procedures for welding, drilling and forming are specific to each mill's product and can be provided upon request.

Heat treated constructional alloy steels are low-carbon alloy steel with a level of strength substantially higher than that of the high-strength low alloy grades. This higher strength is obtained by heat treating, water quenching and tempering. The alloying elements and amount of the alloy content vary among the grades depending upon the section thickness and desired properties. Their general weldability is improved by the lower carbon content.

The range of hardness for ASTM A-514 is Brinell 235 - 293. This range is sometimes referred to as "Regular Quality." If you have specific hardness requirements, please contact our sales office.

Typical Analysis of A514

Carbon	*Manganese*	*Phosphorus*	*Sulphur*	*Silicon*
.12 - .21	.70 - 1.00	.035 Max.	.040 Max.	.20 - .35

Chromium	*Molybdenum*	*Vanadium*	*Titanium*	*Boron*
.40 - .0065	.15 - .25	.03 - .08	.01 - .03	.0005 - .005

Mechanical Properties For Regular Quality

			Reduction of Area (Min. %)	
Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation In 2"*	*$^3/_4$ Inch And Under*	*Over $^3/_4$ Inch*
110 to 130,000	100,000 Min.	18% Min.	40%	50%

Applications

Regular Quality is used in general structural applications where its greater strength permits reduction in weight by using smaller cross-sectional areas. It is for welded construction where procedures are suitable to maintain the properties of the plate.

321 and 360 Minimum Brinell Quality are for applications where higher hardness and strength in conjunction with increased resistance to impact abrasion are important.

Forming

Regular Quality can be cold-formed readily, provided sufficient power is available and allowance is made for greater spring back than with mild steel.

Thickness Of Material	*Minimum Radius*
Up to 1" inclusive	Two Times Thickness
Over 1 inch to 2" inclusive	Three Times Thickness

Warm forming may be done at temperatures below 1100°F. without destroying the mechanical properties or toughness. Hot forming may be done at 1600-1800°F, but the formed part must be heat-treated to restore its original properties. To insure proper safety and the structural integrity of the finished product we will assist you with heat number and source-mill information so that you can obtain accurate information from the producing mill prior to any attempt to form this material.

Machinability

The cutting speed of Regular Quality is 65 surface feet per minute or approximately 40% of 1212.

Weldability

Similar techniques to those used in structural carbon steels apply but precautions must be used. Hydrogen must be kept out of the welding operation. Large sections or those under high restraint should be preheated to temperatures not exceeding 400°F.

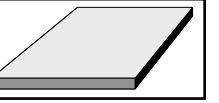
Heat Treating

Stress relieving may be performed by heating at temperatures up to 1100°F. If Regular Quality material is heated over 1100°F, it must be heat treated again to restore the original strength.

Austinize	*Quench*	*Temper*
1650°F to 1700°F	Agitated Water	1150°F to 1250°F

Medium Carbon Plates

C-1045 and C-1055



Analysis

	Carbon	*Manganese*	*Phosphorus*	*Sulphur*
C-1045	.43 - .50	.60 - .90	.04 Max.	.05 Max.
C-1055	.50 - .60	.60 - .90	.04 Max.	.05 Max.

Applications

Medium carbon steel plates are generally used in parts for heavy construction, farm and industrial equipment for non-abrasive wearing parts.

Machinability

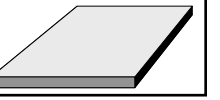
This grade is satisfactory for ordinary machining or drilling but is not considered a free machining grade.

Weldability

This quality presents no welding problems when using all welding processes. Welding rod specifications are dependent on welding conditions such as thickness, service requirements, and design.

High Tensile Plates

ASTM A572 Grade 50



High Tensile Plates are rolled by various steel mills. These plates are high strength low alloy, intended primarily for weight reduction, or longer life, by means of greater strength.

Analysis (Typical)

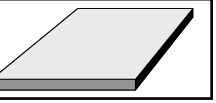
	Carbon	*Mn*	*P*	*Sulphur*	*Silicon*	*Cb*
Grade 50	.21 Max.	1.35 Max.	.04 Max.	.05 Max.	.30 Max.	.01 Min

Mechanical Properties (Typical)

	Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation In 2"*
Grade 50	65,000 Min.	50,000	Min. 23%

Pressure Vessel Quality Plate

A516 Grade 70



Availability of this material is limited. Check with our sales department for availability.

Analysis (Typical)

	Carbon	*Mn*	*Phosphorus*	*Sulphur*	*Silicon*
A516 Gr. 70	.28 Max	.90 Max	.35 Max	.04 Max.	.20

Applications

A516/70 is a carbon steel plate for boilers for stationary service and other pressure vessels. The maximum thickness under this specification is 6".

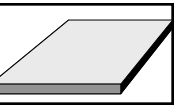
Mechanical Properties

	Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation In 8"*
A516 Gr. 70	70,000 - 90,000	38,000 Min.	17%

Weldability

These grades present no welding problems when using all welding processes. Welding quality is generally extremely high for the welds and joints. Welding rod specifications depend on welding conditions such as thickness of section, service requirements and design, to name a few of the probable welding conditions.

Weights For Plate Products



			Weight Per Plate
3/16 Inch			
7.66 Lbs. per Sq. Ft.			
48	x	96	245.1
		120	306.4
		144	367.7
		240	612.8
		288	735.4
60	x	96	306.4
		120	383.0
		144	459.6
		240	766.0
		288	919.2
72	x	120	459.6
		144	551.5
		240	919.2
		288	1103.0
		360	1378.8
84	x	240	1072.4
		360	1608.6
96	x	120	612.8
		144	735.4
		240	1225.6
		288	1470.7
		360	1838.4
120	x	240	1532.0
		360	2298.0
1/4 Inch			
10.21 Lbs. per Sq. Ft.			
48	x	96	326.7
		120	408.4
		144	490.1
		240	816.8
		288	980.2
60	x	96	408.4
		120	510.5
		144	612.6
		240	102l.0
		288	1225.2
72	x	96	490.1
		120	612.6

			Weight Per Plate
1/4 Inch (Cont.)			
72	x	144	735.1
		240	1225.2
		288	1470.2
		360	1837.6
84	x	240	1429.4
		360	2144.1
96	x	96	653.4
		120	816.8
		144	980.2
		240	1633.6
		288	1960.3
		360	2450.4
120	x	240	2042.0
		360	3063.0
5/16 Inch			
12.76 Lbs. per Sq. Ft.			
48	x	96	408.3
		120	510.4
		144	612.5
		240	1020.8
60	x	96	510.4
		120	638.0
		144	756.6
		240	1276.0
		288	1531.2
72	x	120	756.6
		144	918.7
		240	1531.2
		288	1837.4
		360	2296.8
84	x	240	1786.4
		360	2679.6
96	x	120	1020.8
		144	1225.0
		240	2041.6
		288	2449.9
		360	3062.4
120	x	240	2552.0
		360	3828.0

			Weight Per Plate
3/8 Inch			
15.31 Lbs. per Sq. Ft.			
48	x	96	489.9
		120	612.4
		144	734.9
		240	1224.8
		288	1469.8
60	x	96	612.4
		120	765.5
		144	918.6
		240	1531.0
		288	1837.2
72	x	120	918.6
		144	1102.5
		240	1837.2
		288	2204.6
		360	2755.8
84	x	240	2143.4
		360	3215.1
96	x	120	1224.8
		144	1469.8
		240	2449.6
		288	2939.5
		360	3674.4
120	x	240	3062.0
		360	4593.0
7/16 Inch			
17.87 Lbs. per Sq. Ft.			
96	x	240	2859.2
1/2 Inch			
20.42 Lbs. per Sq. Ft.			
48	x	96	653.4
		120	816.8
		144	980.2
		240	1633.6
		288	1960.3
60	x	96	816.8
		120	1021.0
		144	1225.2
		240	2042.0

Weights For Plate Products (Continued)

			Weight Per Plate
1/2 Inch (Cont.)			
60	x	288	2450.4
72	x	120	1225.2
		144	1470.2
		240	2450.4
		288	2940.5
		360	3675.6
84	x	240	2858.8
		288	3430.6
		360	4288.2
96	x	120	1633.6
		144	1960.3
		240	3267.2
		288	3920.6
		360	4900.8
120	x	240	4084.0
		360	6126.0
5/8 Inch			
25.52 Lbs. per Sq. Ft.			
48	x	96	816.6
		120	1020.8
		144	1225.0
		240	2041.6
		288	2449.9
60	x	96	1020.8
		144	1531.2
		240	2552.0
		288	3062.4
72	x	120	1531.2
		144	1837.4
		240	3062.4
		288	3674.9
		360	4593.6
84	x	240	3572.8
		360	5359.2
96	x	120	2041.6
		144	2449.9
		240	4083.2
		288	4899.8
		360	6124.8

			Weight Per Plate
5/8 Inch (Cont.)			
120	x	240	5104.0
		360	7656.0
3/4 Inch			
30.63 Lbs. per Sq. Ft.			
48	x	96	980.2
		120	1225.2
		144	1470.2
		240	2450.4
60	x	96	1225.2
		120	1531.5
		144	1837.8
		240	3063.0
		288	3675.6
72	x	120	1837.8
		144	2205.4
		240	3675.6
		288	4410.7
		360	7351.2
84	x	240	4288.2
		360	6432.2
96	x	120	2450.4
		144	2940.5
		240	4900.8
		288	5881.0
		360	7351.2
120	x	240	6126.0
		360	9189.0
7/8 Inch			
35.73 Lbs. per Sq. Ft.			
48	x	96	1143.4
		120	1429.2
		144	1715.0
		240	2858.4
60	x	96	1429.2
		120	1786.5
		144	2143.8
		240	3573.0
		288	4287.6
		360	5395.5

			Weight Per Plate
7/8 Inch (Cont.)			
72	x	120	2143.8
		144	2572.6
		240	4287.6
		288	5145.1
		360	6431.4
84	x	240	5002.2
		360	7503.3
96	x	120	2858.4
		144	3430.1
		240	5716.8
		288	6860.2
		360	8575.2
120	x	240	7146.0
		360	10719.0
1 Inch			
40.84 Lbs. per Sq. Ft.			
48	x	96	1306.9
		120	1633.6
		144	1960.3
		240	3267.2
		288	3920.6
60	x	96	1633.6
		120	2042.0
		144	2940.5
		240	4084.0
		288	4900.8
72	x	120	2450.4
		144	2940.5
		240	4900.8
		288	5881.0
		360	7351.2
84	x	240	5717.6
		360	8576.4
96	x	120	3267.2
		144	3920.6
		240	6534.4
		288	7841.3
		360	9801.6
120	x	240	8168.0

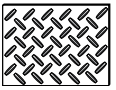
Weights For Plate Products (Continued)

	Weight Per Plate
1 Inch (Cont.)	
120 x 360	12252.0
1 1/8 Inch	
45.95 Lbs. per Sq. Ft.	
96 x 240	7352.0
1 1/4 Inch	
51.05 Lbs. per Sq. Ft.	
48 x 96	1633.6
120	2042.0
144	2450.4
192	3267.2
240	4084.0
60 x 96	2042.0
120	2552.5
144	3063.0
192	4084.0
240	5105.0
72 x 120	3063.0
144	3675.6
192	4900.8
240	6126.0
360	9189.0
84 x 240	7147.0
360	10720.5
96 x 120	4084.0
144	4900.8
192	6534.4
240	8168.0
360	12252.0
1 3/8 Inch	
56.15 Lbs. per Sq. Ft.	
96 x 240	8984.0
1 1/2 Inch	
61.26 Lbs. per Sq. Ft.	
48 x 96	1960.3
120	2450.4
144	2940.5
192	3920.6
240	4900.8
60 x 96	2450.4

	Weight Per Plate
1 1/2 Inch (Cont.)	
60 x 120	3063.0
144	3675.6
192	4900.8
240	6126.0
72 x 120	3675.6
144	4410.7
192	5881.0
240	7351.2
360	11026.8
84 x 240	8576.4
360	12864.6
96 x 120	4900.8
144	5881.0
192	7841.3
240	9801.6
1 5/8 Inch	
66.36 Lbs. per Sq. Ft.	
96 x 240	10617.6
1 3/4 Inch	
71.47 Lbs. per Sq. Ft.	
48 x 96	2287.0
120	2858.8
144	3430.6
192	4574.1
240	5717.6
60 x 96	2858.8
120	3573.5
144	4288.2
192	5717.6
240	7147.0
72 x 120	4288.2
144	5145.8
192	6861.1
240	8576.4
360	12864.6
84 x 240	10005.8
360	15008.7
96 x 120	5717.6
144	6861.1

	Weight Per Plate
1 3/4 Inch (Cont.)	
96 x 192	9148.2
240	11435.2
1 7/8 Inch	
76.57 Lbs. per Sq. Ft.	
96 x 240	12251.2
2 Inch	
81.68 Lbs. per Sq. Ft.	
60 x 240	8168.0
72 x 240	9801.6
84 x 240	11435.2
96 x 240	13068.8
2 1/4 Inch	
91.89 Lbs. per Sq. Ft.	
60 x 240	9189.0
72 x 240	11026.8
84 x 240	12864.6
96 x 240	14702.4
2 1/2 Inch	
102.1 Lbs. per Sq. Ft.	
60 x 240	10210.0
72 x 240	12252.0
96 x 240	16336.0
2 3/4 Inch	
112.3 Lbs. per Sq. Ft.	
3 Inch	
122.5 Lbs. per Sq. Ft.	
3 1/2 Inch	
142.9 Lbs. per Sq. Ft.	
4 Inch	
163.36 Lbs. per Sq. Ft.	
4 1/2 Inch	
183.8 Lbs. per Sq. Ft.	
5 Inch	
204.2 Lbs. per Sq. Ft.	
6 Inch	
245.0 Lbs. per Sq. Ft.	
8 Inch	
326.7 Lbs. per Sq. Ft.	

Floor Plate



Floor Plate is made of rolled carbon steel that has great structural strength and long wearing qualities. The practical safety tread pattern provides 4-way traction, easy cleaning and drainage.

Applications

Diamond Floor Plate is extensively used in safety floors, step treads, walkways, truck beds, truck bumpers, conveyors, cover plates, running boards, cab floors, and truck tail gates.

Analysis

Carbon	*Manganese*	*Phosphorus*	*Sulphur*
.10 - .25	.30 - .70	.05 Approximately	.05 Approximately

Typical Mechanical Properties

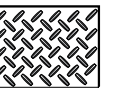
Ordinarily floor plates are not stress-carrying pieces, but typical physical properties are:

Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation In 8 Inches*
60,000	33,000	22%

Weldability

This material presents no welding problems when using all welding processes. The quality of the welds is generally extremely high for both welds and joints. Welding rod specifications are dependent on welding conditions such as the thickness of the sections to be welded, service requirements and design.

Floor Plate



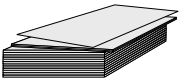
	Weight Per Plate
16 Ga.	
3.00 Lbs. per Sq. Ft.	
36 x 96	72.0
120	90.0
144	108.0
48 x 96	96.0
120	120.0
192	192.0
240	240.0
14 Ga.	
3.75 Lbs. per Sq. Ft.	
48 x 96	120.0
120	150.0
192	240.0
240	300.0
12 Ga.	
5.25 Lbs. per Sq. Ft.	
48 x 96	***168.0***
120	210.0
192	336.0
240	420.0
60 x 120	262.5
240	525.0
1/8 Inch	
6.15 Lbs. per Sq. Ft.	
36 x 120	184.5
48 x 96	196.8
120	246.0
240	492.0
288	590.4
60 x 120	307.5
240	615.0
288	710.4
72 x 240	738.0
288	885.6
3/16 Inch	
8.71 Lbs. per Sq. Ft.	
48 x 96	278.7
120	348.4
240	696.8

	Weight Per Plate
3/16 Inch (Cont.)	
60 x 96	348.4
120	435.5
240	871.0
288	1045.2
72 x 240	1045.2
288	1254.2
84 x 240	1219.4
288	1463.3
1/4 Inch	
11.26 Lbs. per Sq. Ft.	
48 x 96	360.3
120	450.4
240	900.8
288	1081.0
60 x 120	563.0
240	1126.0
288	1351.2
72 x 240	1351.2
288	1621.4
96 x 240	1801.6
288	2161.9
5/16 Inch	
13.81 Lbs. per Sq. Ft.	
48 x 96	441.9
120	552.4
240	1104.8
288	1325.8
60 x 120	690.5
240	1381.0
288	1657.2
72 x 240	1657.2
288	1988.6
96 x 240	2209.6
288	2651.5
3/8 Inch	
16.37 Lbs. per Sq. Ft.	
48 x 96	523.8
120	654.8
240	1309.6

	Weight Per Plate
3/8 Inch (Cont.)	
48 x 288	1571.5
60 x 240	1637.0
288	1964.4
72 x 240	1964.4
288	2357.3
96 x 240	2619.2
288	3143.0
1/2 Inch	
21.47 Lbs. per Sq. Ft.	
48 x 96	687.0
120	858.8
240	1717.6
288	2061.1
60 x 240	2147.0
288	2576.4
72 x 240	2576.4
288	3091.7
96 x 240	3435.2
288	4122.2
5/8 Inch	
26.58 Lbs. per Sq. Ft.	
48 x 240	2126.4
60 x 240	2658.0
72 x 240	3189.6
96 x 240	4252.8
3/4 Inch	
31.68 Lbs. per Sq. Ft.	
48 x 240	2534.4
60 x 240	3168.0
72 x 240	3801.6
96 x 240	5068.8
96 x 288	6082.6

Sheet Products

Hot Rolled ASTM-A1011



A low carbon, open-hearth steel generally produced from capped, rimmed or semi-killed steel. Our sheets are prime Commercial Quality.

Commercial Quality is suitable for all ordinary purposes where the presence of oxide on the surface is not objectionable. Sheets of this quality may be suitable for bending and moderate forming; however, they are not guaranteed against breakage except that caused by piped steel (material with tubular voids). Commercial Quality sheets should be capable of withstanding standard test bends, i.e., being bent flat on itself in any direction at room temperature.

Analysis

Carbon	*Manganese*	*Phosphorus*	*Sulphur*
.15 Max.	.30 - .60	.04 Max.	.05 Max.

Applications

Commercial Quality sheets have good ductility. They are easy to fabricate and are used for a wide variety of purposes, such as barrels and drums, lockers, cabinets, doors, blower and ventilating systems, bins, partitions, chutes, steel jackets, and agricultural equipment.

Mechanical Properties (Typical)

Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation In 8"*	*Reduction Of Area*
55,000	30,000	30%	55%

Weldability

This quality of sheet presents no welding problems, when using all welding processes. Welding quality is generally extremely high for welds and joints. Welding rod specifications are dependent on welding conditions such as thickness of section, service requirements and design to name a few of the probable welding conditions.

High Tensile Sheet ASTM A607 Grade 50

High Strength / Low Alloy sheets (sometimes referred to as High Tensile sheets) are rolled by various steel mills and are generally stocked in Grade 50.

Analysis

Carbon	*Manganese*	*Phosphorus*	*Sulphur*	*Columbium*	*Vanadium*
.23 Max.	1.35 Max.	.04 Max.	.05 Max.	.01 Min.	.01 Min.

Applications

This material is extensively used in industrial and domestic air conditioning equipment, farm buildings, farm elevators, farm wagons, fertilizer wagons, hay balers, potato planter hoppers, tractors, bins, blowers, booms, bridge parts, bulldozers, concrete forms, conveyors, earth-moving equipment, filing cabinet parts, floor plates, door frames, furnace parts, barges, boats, dredges, material handling equipment, pole line hardware, lamp and sign posts, pump parts, road machinery, scraper parts, tanks, trailers, transformer shells, trucks, wheelbarrows, worms.

Mechanical Properties

	Tensile Strength (P.S.I.)	*Yield Strength (P.S.I.)*	*Elongation In 2"*
All Gauges - Gr 50	65,000 Min.	50,000 Min.	22% Min.

Forming

High Tensile Sheet may be hot or cold formed. To insure proper safety and the structural integrity of the finished product we will assist you with heat number and source-mill information so that you can obtain accurate information from the producing mill prior to any attempt to form this material.

For cold forming, a greater force is required to produce a permanent set because of the higher yield point than carbon steel. It is suggested for cold forming that the inside radius of the bend should be at least equal to the thickness of the material for sheet and strip up to $^1/_{16}$" inclusive; at least twice the thickness of the material over $^1/_{16}$" to $^1/_4$", inclusive; and three times the thickness for material over $^1/_4$" to $^1/_2$" inclusive.

Punching and Shearing

Shearing may require tighter and more secure clamping if a clamp hold down is used because the metal tends to pull more than structural carbon steel. Punching requires up to 20% greater force than for equal thicknesses of ASTM-A569 material.

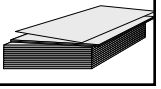
Gas Cutting

No special precautions need be taken beyond those required for structural steel, and the heat effects and cutting speeds are similar for both grades. This material can be plasma-cut with minimal warpage.

Weldability

High Tensile is readily welded by all the usual methods, i.e., shielded metal arc, submerged arc, and electrical resistance, including spot welding. An important advantage in welded structures is the fact that this material experiences an increase in the yield and tensile strength with practically no decrease in elongation when stress-relieved.

Cold Rolled Sheet ASTM A1008



Specification: Commercial Quality

Sheets of this quality should be suitable for bending and moderate forming; however, they are not guaranteed against breakage except that caused by piped steel (material with tubular voids). Sheets of Commercial Quality should be capable of withstanding a standard bend test, i.e., being bent flat on itself in any direction at room temperature.

Cold Rolled Sheets are from continuous mill production from low-carbon open-hearth rimmed, texture or capped steel with a carbon maximum of 0.15.

Applications

The dull surface texture is suitable for paints, lacquers and enamels. Cabinets, appliances, auto body parts, furniture, file cases and desks, partitions, and doors are some applications for cold rolled sheets.

Weights For Hot & Cold Rolled Sheets

Size In Inches	Weight Per Sheet
26 Ga. (.0179)	
36 x 96	18.02
120	22.53
48 x 96	24.03
120	30.04
24 Ga. (.0239)	
36 x 96	24.02
120	30.03
48 x 96	32.03
120	40.04
22 Ga. (.0299)	
36 x 96	30.02
120	37.53
48 x 96	40.03
120	50.04
20 Ga. (.0359)	
36 x 96	36.02
120	45.03
48 x 96	48.03
120	60.04
18 Ga. (.0478)	
36 x 96	48.29
120	60.36
48 x 96	64.38
120	80.48
16 Ga. (.0598)	
36 x 96	60.00
120	75.00
48 x 96	80.06
120	100.00
144	120.01
240	200.02
60 x 96	100.00
120	125.01
144	150.01

Size In Inches	Weight Per Sheet
14 Ga. (.0747)	
36 x 96	75.07
120	93.84
48 x 96	100.10
120	125.12
144	150.14
240	250.24
60 x 96	125.12
120	156.40
240	312.80
72 x 120	187.68
144	225.22
240	375.36
12 Ga.(.1046)	
36 x 96	105.10
120	131.37
48 x 96	140.13
120	175.16
144	210.19
240	350.32
60 x 96	175.16
120	218.95
144	262.74
72 x 120	262.74
144	315.29
11 Ga. (.1196)	
36 x 96	120.12
120	150.15
48 x 96	160.16
120	200.20
144	240.24
240	400.40
60 x 96	200.20
120	250.25
144	300.30
240	500.50

Size In Inches	Weight Per Sheet
72 x 96	240.24
120	300.30
144	360.36
240	600.60
10 Ga. (.1345)	
36 x 96	135.12
120	168.90
48 x 96	180.16
120	225.20
144	270.24
240	450.40
60 x 96	225.20
120	281.50
144	337.80
192	450.40
240	563.00
72 x 96	270.24
120	337.80
144	405.36
192	540.48
240	675.60
7 Ga (.1793)	
36 x 96	180.17
120	225.21
48 x 96	240.22
120	300.28
144	360.34
240	600.56
60 x 96	300.28
120	375.35
144	450.42
240	750.70
72 x 120	450.42
144	540.50

AISI Thickness Tolerance H.R. & C.R. Sheet

	Thickness In Inches			
Gage Number	*Decimal Equivalent*	*Tol. Range H.R. & P.&O.*	*Tol Range C.R. Sheet*	*Pounds Per Sq. Foot*
7	.1793	.1873 .1713	.0883 .1703	7.507
10	.1345	.1425 .1265	.1405 .1285	5.630
11	.1196	.1276 .1116	.1256 .1136	5.005
12	.1046	.1126 .0966	.1106 .0986	4.379
13	.0897	.0967 .0827	.0947 .0847	3.75
14	.0747	.0817 .0677	.0797 .0697	3.128
16	.0598	.0658 .0538	.0648 .0548	2.502
18	.0478	.0528 .0428	.0518 .0438	2.102
20	.0359	-----	.0389 .0329	1.501
22	.0299	-----	.0329 .0269	1.261
24	.0239	-----	.0269 .0209	1.001
26	.0179	-----	.0199 .0159	.751

Flat Galvanized Sheet ASTM-A653, G90

Specifications

Flat Galvanized Sheets .071 (14 gauge) and lighter are ASTM A653, Lock Forming Quality (LFQ). Sheets heavier than .071 to .124 (11 gauge) are A653 Commercial Quality. Sheets heavier than .124 to .130 (10 gauge) are Commercial Quality.

Commercial Quality

Flat galvanized sheets are from low-carbon open-hearth steel. They are flat, have closely guarded shearing tolerances, and are ductile and soft.

These sheets are produced by passing the base sheets through a bath of molten zinc which, after controlled cooling, gives a clean, bright, uniform spangle.

Stamping, cold drawing, double seaming and brake or roll forming will not impair the protective quality of these sheets.

Analysis

Carbon	*Manganese*	*Phosphorus*	*Sulphur*
.15 Max.	.30 - .60	.04 Max.	.05 Max.

Applications

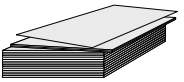
Flat galvanized sheets are used as the prime general sheet metal for heating, cooling, joist hangers, and for sign work if the sheets are primed before painting.

AISI Thickness Tolerance For Galv. Sheet

Ga. No.	*Dec. Equiv.*	*Tolerance Range*			*Ga. No.*	*Dec. Equiv.*	*Tolerance Range*		
10	.1382	.1472	To	.1292	20	.0396	.0436	To	.0356
11	.1233	.1323	To	.1143	22	.0336	.0376	To	.0296
12	.1084	.1174	To	.0994	24	.0276	.0316	To	.0236
14	.0785	.0865	To	.0705	26	.0217	.0247	To	.0187
16	.0635	.0695	To	.0575	28	.0187	.0217	To	.0157
18	.0516	.0566	To	.1466	30	.0157	.0187	To	.0127

Paintable Galvanized Sheet ASTM-A653, G40

A516 Grade 70



Paintable Galvanized Sheet, sometimes called Paint Bond or Wiped Galvanized sheet is manufactured with a surface coating that makes priming unnecessary.

Specifications

Paintable Galvanized Sheets .071 (14 ga.) and lighter are ASTM A653, lock forming quality (LFQ).

Applications

Paintable galvanized sheets are used in applications where paint, enamels and lacquers will be used or where flat, stretcher-leveled sheets are needed. These sheets can be drawn, stamped, formed, and sheared without cracking, peeling or flaking. Office furniture, cabinets of all types, appliance shells, truck and trailer bodies, lighting fixtures, all types of signs, air conditioning and refrigeration equipment are some applications for Paintable Galvanized sheet.

Chemical Composition (Typical)

Carbon	*Manganese*	*Phosphorus*	*Sulphur*
.15 Max.	.30 - .60	.05 Max.	.05 Max.

Weights For Galvanized Sheets

Size In Inches	*Weight Per Sheet*
10 Ga. (.138)	
Wt. per Sq. Ft. 5.786	
48 X 96	185.15
120	231.44
12 Ga. (.109)	
Wt. per Sq. Ft. 4.535	
48 X 96	145.12
120	181.40
14 Ga. (.079)	
Wt. per Sq. Ft. 3.284	
48 X 96	105.09
120	131.36
16 Ga. (.064)	
Wt. per Sq. Ft. 2.658	
48 X 96	85.06
120	106.32

Size In Inches	*Weight Per Sheet*
18 Ga. (.052)	
Wt. per Sq. Ft. 2.158	
48 X 96	69.06
120	86.32
20 Ga. (.040)	
Wt. per Sq. Ft. 1.658	
48 X 96	53.06
120	66.32
22 Ga. (.034)	
Wt. per Sq. Ft. 1.407	
48 X 96	45.02
120	56.28
24 Ga. (.028)	
Wt. per Sq. Ft. 1.157	
48 X 96	37.02
120	46.28

Size In Inches	*Weight Per Sheet*
26 Ga. (.022)	
Wt. per Sq. Ft. .907	
48 X 96	29.02
120	36.28
28 Ga. (.019)	
Wt. per Sq. Ft. .782	
36 X 96	18.77
120	23.46
30 Ga. (.016)	
Wt. per Sq. Ft. .657	
36 X 96	15.77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Requirements

Hot Rolled Bar Products

Commercial Quality

Commercial Quality bars are typically produced in grades C1008, C1020, and A569 by a variety of steelmaking methods and tested to chemical specifications. Commercial Quality bars are not subject to mechanical property tests. Typical properties are given for reference only. Mill size tolerances apply to all Commercial Quality bars.

Applications

Commercial Quality bars are used in many applications. Among them are structural uses involving moderate cold bending or hot forming, welding, punching, and the production of non-critical parts of buildings, bridges, railway equipment, road building equipment, agricultural equipment and implements, and general machinery.

ASTM-A36

Hot rolled, ASTM-A36 bars are produced by steelmaking methods that result in a sound product throughout the cross-section and are tested to both chemical and physical specifications. ASTM-A36 material is suitable for most construction purposes including riveted, bolted and welded structures. Material that is made to ASTM-A36 is suitable for mild hot and cold forming. Most hot rolled flats, rounds and squares are available in ASTM-A36.

Carbon (Max.)	*Manganese*	*Phosphorus (Max.)*	*Sulphur (Max.)*
.26 - .29	.60 - .90	.04	.05

Mechanical Properties

Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation In 2"*	*Brinell Hardness(BHN)*
58,000 - 65,000	36,000 Min.	23%	137

Weldability

Hot rolled A36 bars present no welding problems when using all welding processes. The quality of welds is generally extremely high for both welds and joints. Welding rod specifications are dependent on welding conditions such as the thickness of the sections to be welded, service requirements and design.

ASTM-A529

Hot rolled ASTM-A529 bars are produced in two grades, Grade 42 with a 42,000 minimum yield and Grade 50 with a 50,000 minimum yield. This is a carbon-manganese material designed for structural purposes such as riveted, bolted, and welded construction.

Analysis

	Carbon (Max.)	*Manganese (Max.)*	*Phosphorus (Max.)*	*Sulfur (Max.)*	*Silicon (Max.)*
Gr. 42	.27	1.20	.04	.05	----------
Gr. 50	.27	1.35	.04	.05	.40

Mechanical Properties

	Tensile (Min. PSI)	*Tensile (Max. PSI)*	*Yield (Min. PSI)*	*Elongation In 2 Inches*
Gr. 42	60,000	85,000	42,000	22%
Gr. 50	70,000	100,000	50,000	21%

ASTM-A572 Grade 50

High Tensile bars are rolled by various steel mills. They are a high strength low alloy material, intended primarily for weight reduction, or longer life, by means of greater strength.

Analysis (Typical)

	Carbon	*Mn*	*P*	*Sulphur*	*Silicon*	*Cb*
Grade 50	.21 Max.	1.35 Max.	.04 Max.	.05 Max.	.30 Max.	.01 Min

Mechanical Properties (Typical)

	Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation In 2 Inches*
Grade 50	65,000 Min.	50,000	Min. 23%

You Can Find Us On The Internet At:

http://www.pdmsteel.com

C-1040 Hot Rolled Rounds

Special Quality

These Special Quality rounds are medium-carbon open-hearth steel. Special controls are exercised in their production for chemical composition, heating, rolling, and surface preparation.

Analysis

Carbon	*Manganese*	*Phosphorus*	*Sulphur*
.37 - .44	.69 - .90	.04 Max.	.05 Max.

Applications

The C-1040 rounds are frequently used for axles, forming dies, gears, ordinary shafts, pinions, rock screens, stud bolts, tool shanks and other similar machinery parts where greater strength is required than can be obtained from carbon steels.

Typical Mechanical Properties (1" Round Bars)

Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation In 2"*	*% Reduction of Area*	*Brinell Hardness*	*Reduced Hardness*
91,000	58,000	27%	50	201	B 94

Machinability

Machinability is rated at 63%.

Weldability

High carbon content makes 1040 steel a little more difficult to weld. Thin sections do not require preheating. Joints of $^{1}/_{2}$" to $^{3}/_{4}$" should be preheated. A low alloy filler is recommended to develop equivalent strength in a weld as well as stress relieving. Welding rod grade is dependent upon design, service requirement, and thickness of sections.

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Hot Rolled Medium Carbon C-1055 Bars

Hot Rolled Medium Carbon steel is an open-hearth steel of fine grain size. Special production controls are used for chemical composition, rolling, heating, surface preparation, etc. The result is a quality product suitable for applications involving forging, flame or induction hardening, heat treating, and machining.

Analysis

Carbon	*Manganese*	*Phosphorus*	*Sulphur*
.50 - .60	.60 - .90	.040 Max.	.050 Max.

Applications

This steel is used in the maintenance and manufacture of plows, and various other agricultural implements such as discs, harrows, ditchers, subsoilers, cultivators, and furrowers. Medium Carbon steel is also used in the maintenance and manufacture of construction machinery such as tractors, bulldozers, scrapers, shovels, concrete mixers, etc.

Typical Mechanical Properties

Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*
112,000 - 132,000	60,000 - 81,000

Machinability

This grade is generally machined in the as-rolled condition without difficulty. Cutting speed is approximately 85 surface feet per minute.

Weldability

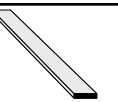
Plow steel may be welded with necessary precautions. With thin sections and a flexible design, arc or gas welding may be used without preheating the material. However, in joints over $^{1}/_{2}$" to $^{3}/_{4}$" thick preheating is necessary. A low-alloy filler is recommended to develop equivalent strength in a weld. Welding rod grade depends on design, service requirements, and thickness of grade.

Hot Rolled Strip

Size In Inches		Weight Per Foot	Weight Per 20 Ft.
1/8	x 1/2	0.213	4.26
	5/8	0.266	5.32
	3/4	0.319	6.38
	7/8	0.372	7.44
	1	0.425	8.50
	1 1/8	0.478	9.56
	1 1/4	0.531	10.62
	1 1/2	0.639	12.78
	1 3/4	0.745	14.90
	2	0.851	17.02
	2 1/4	0.957	19.14
	2 1/2	1.064	21.28
	2 3/4	1.170	23.40
	3	1.276	25.52
	3 1/2	1.489	29.78
	4	1.702	34.04
	4 1/2	1.915	38.30
	5	2.127	42.54
	6	2.552	51.04
	8	3.403	68.06
	10	4.254	85.08
	12	5.105	102.10

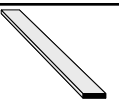
Size In Inches		Weight Per Foot	Weight Per 20 Ft.
3/16	x 1/2	0.319	6.38
	5/8	0.398	7.96
	3/4	0.478	9.56
	7/8	0.559	11.18
	1	0.639	12.78
	1 1/8	0.718	14.36
	1 1/4	0.798	15.96
	1 1/2	0.957	19.14
	1 3/4	1.117	22.34
	2	1.276	25.52
	2 1/4	1.435	28.70
	2 1/2	1.596	31.92
	2 3/4	1.755	35.10
	3	1.915	38.30
	3 1/2	2.233	44.66
	4	2.552	51.04
	4 1/2	2.872	57.44
	5	3.191	63.82
	6	3.829	76.58
	8	5.105	102.10
	10	6.381	127.62
	12	7.657	153.14

Hot Rolled Flats



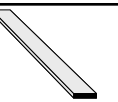
Size In Inches			Weight Per Foot	Weight Per 20 Ft.
1/4	x	1/2	.425	8.50
		5/8	.531	10.62
		3/4	.639	12.78
		7/8	.745	14.90
		1	.851	17.02
		1 1/4	1.064	21.28
		1 1/2	1.276	25.52
		1 3/4	1.489	29.78
		2	1.702	34.04
		2 1/4	1.915	38.30
		2 1/2	2.127	42.54
		2 3/4	2.340	46.80
		3	2.552	51.04
		3 1/4	2.766	55.32
		3 1/2	2.978	59.56
		4	3.403	68.06
		4 1/2	3.829	76.58
		5	4.254	85.08
		5 1/2	4.679	93.58
		6	5.105	102.10
		7	5.956	119.12
		8	6.806	136.12
5/16	x	1/2	.531	10.62
		5/8	.665	13.30
		3/4	.798	15.96
		7/8	.931	18.62
		1	1.064	21.28
		1 1/4	1.329	26.58
		1 1/2	1.594	31.88
		1 3/4	1.861	37.22
		2	2.127	42.54
		2 1/4	2.393	47.86
		2 1/2	2.658	53.16
5/16	x	2 3/4	2.925	58.50
		3	3.191	63.82
		3 1/2	3.723	74.46
		4	4.254	85.08
		4 1/2	4.785	95.70
		5	5.318	106.36
		5 1/2	5.850	117.00
		6	6.381	127.62
		7	7.445	148.90
		8	8.508	170.16
3/8	x	1/2	.639	12.78
		5/8	.798	15.96
		3/4	.957	19.14
		7/8	1.117	22.34
		1	1.276	25.52
		1 1/4	1.596	31.92
		1 1/2	1.915	38.30
		1 3/4	2.233	44.66
		2	2.552	51.04
		2 1/4	2.872	57.44
		2 1/2	3.191	63.82
		2 3/4	3.509	70.18
		3	3.829	76.58
		3 1/4	4.148	82.96
		3 1/2	4.467	89.34
		4	5.105	102.10
		4 1/2	5.743	114.86
		5	6.381	127.62
		5 1/2	7.020	140.40
		6	7.657	153.14
		7	8.933	178.66
		8	10.210	204.20

Hot Rolled Flats (Continued)



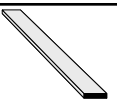
Size In Inches			Weight Per Foot	Weight Per 20 Ft.
1/2	x	3/4	1.276	25.52
		7/8	1.489	29.78
		1	1.702	34.04
		1 1/4	2.127	42.54
		1 1/2	2.552	51.04
		1 3/4	2.978	59.56
		2	3.403	68.06
		2 1/4	3.829	76.58
		2 1/2	4.254	85.08
		2 3/4	4.679	93.58
		3	5.105	102.10
		3 1/4	5.530	110.60
		3 1/2	5.956	119.12
		4	6.806	136.12
		4 1/2	7.657	153.14
		5	8.508	170.16
		5 1/2	9.359	187.18
		6	10.210	204.20
		7	11.911	238.22
		8	13.613	272.26
5/8	x	1	2.127	42.54
		1 1/4	2.658	53.16
		1 1/2	3.191	63.82
		1 3/4	3.723	74.46
		2	4.254	85.08
		2 1/4	4.785	95.70
		2 1/2	5.318	106.36
		2 3/4	5.850	117.00
		3	6.381	127.62
		3 1/4	6.913	138.26
		3 1/2	7.445	148.90
		4	8.508	170.16
		4 1/2	9.572	191.44
		5	10.640	212.80
5/8	x	5 1/2	11.699	233.98
		6	12.762	255.24
		7	14.894	297.88
		8	17.016	340.32
3/4	x	1	2.552	51.04
		1 1/4	3.191	63.82
		1 1/2	3.829	76.58
		1 3/4	4.467	89.34
		2	5.105	102.10
		2 1/4	5.743	114.86
		2 1/2	6.381	127.62
		2 3/4	7.020	140.40
		3	7.657	153.14
		3 1/2	8.933	178.66
		4	10.210	204.20
		4 1/2	11.491	229.82
		5	12.762	255.24
		5 1/2	14.038	280.76
		6	15.314	306.28
		7	17.867	357.34
		8	20.419	408.38
7/8	x	1	2.978	59.56
		1 1/4	3.723	74.46
		1 1/2	4.467	89.34
		2	5.956	119.12
		2 1/2	7.445	148.90
		3	8.933	178.66
		3 1/2	10.420	208.40
		4	11.911	238.22
		4 1/2	13.403	268.06
		5	14.894	297.88
		6	17.867	357.34
		7	20.830	416.60
		8	23.822	476.44

Hot Rolled Flats (Continued)



Size In Inches	*Weight Per Foot*	*Weight Per 20 Ft.*
1 x	1 1/4	4.254	85.08
	1 1/2	5.105	102.10
	1 3/4	5.956	119.12
	2	6.806	136.12
	2 1/4	7.657	153.14
	2 1/2	8.508	170.16
	2 3/4	9.359	187.18
	3	10.210	204.20
	3 1/4	11.060	221.20
	3 1/2	11.911	238.22
	4	13.613	272.26
	4 1/2	15.314	306.28
	5	17.016	340.32
	5 1/2	18.718	374.36
	6	20.419	408.38
	7	23.822	476.44
	8	27.226	544.52
1 1/4 x	1 1/2	6.381	127.62
	1 3/4	7.445	148.90
	2	8.508	170.16
	2 1/4	9.572	191.44
	2 1/2	10.640	212.80
	3	12.762	255.24
	3 1/2	14.894	297.88
	4	17.816	340.32
1 1/4 x	4 1/2	19.148	382.96
	5	21.270	425.40
	6	25.524	510.48
	7	29.778	595.56
	8	34.032	680.64
1 1/2 x	2	10.210	204.20
	2 1/2	12.762	255.24
	3	15.314	306.28
	3 1/2	17.867	357.34
	4	20.419	408.38
	4 1/2	22.972	459.44
	5	25.524	510.48
	6	30.629	612.58
	7	35.734	714.68
	8	40.834	816.76
2 x	2 1/2	17.016	340.32
	3	20.419	408.38
	3 1/2	23.822	476.44
	4	27.226	544.52
	4 1/2	30.629	612.58
	5	34.032	680.64
	6	40.838	816.76
	7	47.600	952.00
	8	54.451	1089.02

Universal Mill Plates



Specification: ASTM A-36 & A529 Gr. 50

Universal Mill Plates (U.M. Plates) are defined as flat steel over 8 inches wide and 1/4 inch or more in thickness. Universal Mill Plates are rolled between both horizontal and vertical rolls, producing straight, almost perfectly parallel rolled edges.

Analysis

	Carbon	*Manganese*	*Phosphorus*	*Sulphur*
A-36	.25 Max.	.80 - 1.20	.04 Max.	.05 Max.
A-529 Gr.50	.27 Max.	1.35 Max.	.04 Max.	.05 Max.

Applications

These plates are used for base plates, cover plates and a wide variety of uses where long narrow plates are desired and the appearance or specifications require a finished edge. UM Plates are not recommended for lengthwise bending or breaking, such as formed channels.

Specified Mechanical Properties

	Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation In 8 Inches*
A-36	58,000 - 80,000	36,000 Min.	20%
A-529 Gr.50	70,000 - 100,000	50,000 Min.	18%

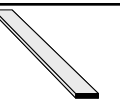
Machinability

This is not considered a free machining grade, although it is satisfactory for moderate machining operations.

Weldability

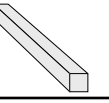
This material presents no welding problems, when using all welding processes. Welding quality is generally extremely high for welds and joints. Welding rod specifications are dependent on welding conditions such as thickness of section, service requirements, and design.

Weights For UM Plates



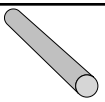
Size In Inches			*Wt. Per Foot*	*Wt. Per 20 Ft.*
1/4	x	9	7.66	153.1
		10	8.51	170.2
		11	9.36	187.2
		12	10.21	204.2
		14	11.91	238.2
5/16	x	9	9.57	191.4
		10	10.64	212.8
		12	12.76	255.2
		14	14.89	297.7
3/8	x	9	11.49	229.8
		10	12.76	255.2
		11	14.03	280.6
		12	15.31	306.3
		14	17.86	357.2
1/2	x	9	15.31	306.3
		10	17.02	340.4
1/2	x	11	18.72	374.4
		12	20.42	408.4
		14	23.82	476.5
5/8	x	9	19.15	383.0
		10	21.27	425.4
		12	25.52	510.5
		14	29.77	595.5
3/4	x	9	22.97	459.4
		10	25.52	510.5
		12	30.63	612.6
		14	35.74	714.7
1	x	9	30.63	612.6
		10	34.03	680.6
		12	40.84	816.8
		14	47.65	952.9

Hot Rolled Squares



Size In Inches	*Wt. Per Foot*	*Wt. Per 20 Ft.*	*Size In Inches*	*Wt. Per Foot*	*Wt. Per 20 Ft.*
1/4	.213	4.26	1 5/8	8.986	179.72
5/16	.332	6.64	1 3/4	10.423	208.46
3/8	.478	9.56	2	13.310	266.20
7/16	.652	13.04	2 1/8	15.367	307.34
1/2	.851	17.02	2 1/4	17.229	344.58
5/8	1.329	26.58	2 1/2	21.270	425.40
3/4	1.915	38.30	2 3/4	25.737	514.74
7/8	2.605	52.10	3	30.629	612.58
1	3.403	68.06	3 1/4	35.944	718.88
1 1/8	4.307	86.14	3 1/2	41.689	833.78
1 1/4	5.318	106.36	4	54.451	1089.02
1 3/8	6.434	128.68	4 1/2	68.915	1378.30
1 1/2	7.567	153.14	5	85.080	1701.60

Hot Rolled Rounds



Size In Inches	Wt. Per Foot	Wt. Per 20 Ft.	Size In Inches	Wt. Per Foot	Wt. Per 20 Ft.
3/16	.094	1.88	3 3/8	30.449	608.98
1/4	.167	3.34	3 1/2	32.741	654.82
5/16	.261	5.22	3 5/8	35.123	702.46
3/8	.376	7.52	3 3/4	37.585	751.70
7/16	.511	10.22	3 7/8	40.138	802.76
1/2	.669	13.38	4	42.770	855.40
9/16	.846	16.92	4 1/4	48.275	965.50
5/8	1.044	20.88	4 1/2	54.131	1082.62
3/4	1.503	30.06	4 3/4	60.307	1206.14
7/8	2.046	40.92	5	66.823	1336.46
1	2.673	53.46	5 1/4	73.669	1473.38
1 1/8	3.382	67.64	5 1/2	80.856	1617.12
1 1/4	4.177	83.54	5 3/4	88.373	1767.46
1 3/8	5.054	101.08	6	96.221	1924.42
1 1/2	6.014	120.28	6 1/4	104.398	2087.96
1 5/8	7.058	141.16	6 1/2	112.926	2258.52
1 3/4	8.186	163.72	6 3/4	121.785	2435.70
1 7/8	9.397	187.94	7	130.973	2619.46
2	10.690	213.80	7 1/4	140.492	2809.84
2 1/8	12.071	241.42	7 1/2	150.352	3007.04
2 1/4	13.533	270.66	7 3/4	160.541	3210.82
2 5/16	14.293	285.86	8	171.061	3421.22
2 3/8	15.074	301.48	8 1/4	181.921	3638.42
2 1/2	16.706	334.12	8 1/2	193.112	3862.24
2 5/8	18.417	368.34	8 3/4	204.643	4092.86
2 3/4	20.219	404.38	9	216.504	4330.08
2 7/8	22.091	441.82	9 1/4	228.695	4573.90
3	24.053	481.06	9 1/2	241.227	4824.54
3 1/4	28.237	564.74	10	267.342	5346.84

Concrete Reinforcing Bars ASTM-A615

The ASTM-A615 Specification pertains to deformed and plain billet-steel concrete reinforcement bars in cut lengths or coils. A deformed bar is defined as a bar whose surface is provided with lugs or protrusions (referred to as deformations) which inhibit longitudinal movement of the bar relative to the concrete which surrounds the bar in such construction. The standard sizes and their number designations are listed below.

Bars are of three minimum yield levels: namely, 40,000 psi, 60,000 psi, and 75,000 psi; designated as Grade 40, Grade 60, and Grade 75, respectively.

Mechanical Properties

	Grade 40	*Grade 60*	*Grade 75*
Tensile Strength, Min. P.S.I.	70,000	90,000	100,000
Yield Strength, Min. P.S.I.	40,000	60,000	75,000
Bar Number (Metric Bar No.)	*Minimum % of elongation in 8 inches*		
3 (10)	11%	9%	
4,5,6 (13,16,19)	12%	9%	
7,8 (22, 25)		8%	
9,10 (29,32)		7%	
11, 14, 18 (36,43,57)		7%	6%

Bend Test Requirements

(Minimum Diameter for Bend Tests = 180°, d = Nominal Diameter of Bar)

Bars are capable of being bent around a pin without cracking on the outside diameter as follows: (Number 14 & 18 are bent 90°).

Bar Number (Metric Bar Num.)	*Grade 40*	*Grade 60*	*Grade 75*
3,4,5 (10, 13, 16)	$3\ ^1/_2$ X d	$3\ ^1/_2$ X d	
6 (19)	5 X d	5 X d	
7,8 (22,25)		5 X d	
9,10 (29,32)		7 X d	
11 (36)		7 X d	7 X d
14,18 (43, 57)		9 X d	9 X d

Concrete Reinforcing Bars ASTM-A706

ASTM-A706 Specification pertains to low-alloy steel deformed bars in cut lengths or coils for concrete reinforcement intended for special applications where welding or bending, or both, are of importance.

Mechanical Properties

Tensile Strength, Min. P.S.I.	80,000
Yield Strength, Min. P.S.I.	60,000
Yield Strength, Max. P.S.I.	78,000
Tensile Strength shall not be less than 1.25 times the actual yield strength.	
Bar Number (Metric Bar Number)	*Minimum % of elongation in 8 in.*
3, 4, 5, 6 (10, 13, 16, 19)	14%
7, 8, 9, 10, 11 (22, 25, 29, 32, 36)	12%
14, 18 (43, 57)	10%

Bend Test Requirements

(Minimum Diameter for Bend Tests = 180°, d = Nominal Diameter of Bar)

Bars are capable of being bent around a pin without cracking on the outside diameter as follows:

Bar Number (Metric Bar Number)	*Diameter of Pin*
3, 4, 5 (10, 13, 16)	3 X d
6, 7, 8 (19, 22, 25)	4 X d
9, 10, 11 (29, 32, 36)	6 X d
14, 18 (43, 57)	8 X d

Concrete Reinforcing Bars - Weights & Dimensions

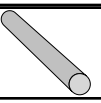
Bar Number (Metric)	*Weight Per Ft.*	*Nominal Diameter*	*Nominal Dec. Diam.*	*Cross Section Area (In^2)*	*Perimeter In Inches*
3 (10)	.376	3/8	0.375	0.11	1.178
4 (13)	.669	1/2	0.500	0.20	1.571
5 (16)	1.044	5/8	0.625	0.31	1.963
6 (19)	1.503	3/4	0.750	0.44	2.356
7 (22)	2.046	7/8	0.875	0.60	2.749
8 (25)	2.673	1	1.000	0.79	3.142
9 (29)	3.403	1 1/8	1.128	1.00	3.544
10 (32)	4.307	1 1/4	1.270	1.27	3.990
11 (36)	5.318	1 3/8	1.410	1.56	4.430
14 (43)	7.650	1 5/8	1.693	2.25	5.320
18	13.600	2 1/4	2.257	4.00	7.090

Bevel Edge Weed Cutter

Size In Inches	Depth Of Bevel	Wt. Per Foot	Wt. Per 20' Bar
1/4 X			
2	1	1.701	34.04
2 1/2	1	2.013	42.54
3	1	2.552	51.04
5/16 X			
3	1 1/4	3.191	63.82
4	1 1/4	4.254	85.06
4 1/2	1 1/4	4.785	95.70
3/8 X			
2 1/2	1 1/2	3.191	63.82
3	1 1/2	3.892	76.58
4	1 1/2	5.105	102.10
4 1/2	1 1/2	5.743	114.86
5	1 1/2	6.381	127.62
6	1 1/2	7.657	153.14
1/2 X			
4	2	6.806	136.12
5	2	8.508	170.16
6	2	10.210	204.20

Special Quality Bar Products

Chromium-Molybdenum Rounds



4140 Hot Rolled, Heat Treated And Cold Rolled Heat Treated (to 3" Diameter)

Machine Straightened and Stress Relieved

A balanced composition and careful hardening treatment gives this steel high strength and uniformly high physicals. The resultant steel has excellent tensile strength with good ductility giving better shock and impact resistance.

It machines more freely than other steels in its class, enabling the speedy production of hardened parts with no additional heat treatment. This steel is particularly suitable for oil field tools where uniform grain structure, strength, and toughness throughout are requirements.

Analysis

Carbon	*Manganese*	*Phosphorus*	*Sulphur*	*Silicon*	*Chromium*	*Molybdenum*
40 - .45	.75 - 1.00	.04 Max	.04 Max	.20 - .35	.80 - 1.10	.15 - .25

Applications

Heavy duty shafts, axles, pins, studs, bolts, couplings, oil well tool joints, winch shafts, piston rods, stay bolts, tractor arms, spindles, sprockets.

Typical Mechanical Properties

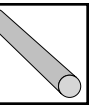
Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation In 2"*	*Percent Reduction Of Area*
125,000	105,000	16%	45

Weldability

This grade can be welded by any common welding process if the section is pre-heated, and stress relieved after welding. Welding rod grade is dependent upon design, service requirement, and thickness of sections.

To Normalize	Heat to 1600° - 1700°F and/or cool in air.
To Anneal	Heat to 1450° - 1550°F Cool in furnace slowly.
To Harden	Hardening temperature ranges from 1550° - 1600°F. Use oil as the quenching medium.

Stressproof® Cold Finished Bar Shafting



This is a severely cold worked, strain relieved carbon killed steel bar. It is available as a Cold Drawn Bar in 12 foot lengths. Some locations stock an ASTM-1144 bar with similar properties.

Analysis

Carbon	*Manganese*	*Sulphur*	*Silicon*
.40 - .48	1.35 - 1.65	.24 - .33	.15 - .30

Applications

Ideal for general maintenance and repair, as all properties are "built in" the bar. Production parts include axles, collets, gears, spline shafts, spindles, pump shafts, feed and lead screws to all kinds, worms, studs, etc.

Machinability

Stressproof machines well for its strength, with excellent tool life and a smooth finish. Cutting speeds of about 125 surface feet per minute are recommended.

Mechanical Properties

Size In Inches	*Minimum Yield Point*	*Average Tensile Strength*
1/2" To 2"	100,000 p.s.i.	125,000 p.s.i.
Over 2" To 3 1/4"	90,000 p.s.i.	120,000 p.s.i.

Tolerances

Size In Inches	*Cold Drawn (Plus)*	*Cold Drawn (Minus)*
5/16 to 1 1/2" Inc.	0.000	0.004
1 1/2 to 2 1/2" Inc.	0.000	0.005
2 1/4 to 4"	0.000	0.006

Warpage

Almost completely free from strains, it may be splined, key seated, broached, drilled, reamed, milled or threaded. Expensive straightening operations are eliminated.

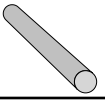
Wearability

Although easily machined, wear resistant properties are unusually high. Many heat treated or carburized parts have been successfully replaced by unhardened Stressproof in spite of its relative softness.

Reduced Costs

By eliminating hardening and straightening operations, reducing machining time, lowering steel costs when replacing alloy steels, and by improving the quality of the finished part, STRESSPROOF will give you reductions in costs on many parts. While the price is slightly higher than ordinary carbon bars, its increased strength, wearability and service life make it the most economical steel to use in many applications.

Precision C-1045 Shafting



Precision Shafting represents the highest degree of straightness, accuracy, concentricity and surface perfection obtainable in commercial practice. These bars are turned and centerless ground to close limits over their entire length, and burnished to a high finish after grinding. The fact that turning does not alter the physical properties of the bar is an important feature.

Analysis

Specification	*Carbon*	*Manganese*	*Phosphorus*	*Sulphur*
C-1045	.43 - .50	.60 - .90	.04 Maximum	.05 Maximum

Application

This steel is often called pump rod or pump shafting due to its high degree of straightness (important in high speed shafting). The special straightness serves to prevent vibrations and wear on packings and bearings which must be avoided in deep well pump work. Other uses include motor shafts and other applications where high speed work necessitates straightness and accuracy along with the ability to be machined unsymmetrically with practically no danger of warpage.

Typical Mechanical Properties

Spec.	*Tensile Strength (P.S.I.)*	*Yield Point (P.S.I.)*	*Elongation In 2 Inches*	*Percent Reduction of Area*
C-1045	110,000	78,000	20%	55

Tolerances

Diameter Of Bar	Plus Tolerance	Minus Tolerance
Less Than 1 1/2"	0	.001"
1 1/2" To Under 2 1/2"	0	.0015"
2 1/2" To 3" Inclusive	0	.002"
Over 3" To 4" Inclusive	0	.003"

Screw Machine Stock

C-12L14 Cold Finished Rounds

These special quality cold finished rounds have a machinability rating on automatic screw machines of 300 surface feet per minute. These rounds are of screw stock quality used for instruments, electronic parts, and machine shafts. They are also suitable for nickel plating.

Analysis

Spec.	Carbon	Manganese	Phosphorus	Sulphur	Lead
C-12L14	.15 Max.	.085 - 1.15	.04 - .09	.26 - .35	.15 - .35

Hot Rolled Tul Bars

Specification C1070

This is a high carbon special quality steel with greater strength in the as-rolled condition than lower carbon grades.

Analysis

Carbon	Manganese	Phosphorus	Sulphur
.65 - .75	.60 - .90	.04 Max.	.05 Max.

Applications

C1070 bars are used primarily in the manufacture and repair of farm implements where high strength is required, such as in tool bars.

Typical Mechanical Properties

Tensile Strength (P.S.I.)	Yield Point (P.S.I.)	Elongation In 2 Inches	Reduction Of Area	Brinell Hardness
126,000	65,000	12%	23%	255

Machinability

Annealing prior to machining is recommended because Tul Bars are quite difficult to machine in the as-rolled state.

Hot Rolled Tul Bars (Continued)

Weldability

C1070 steel is not readily weldable due to its high carbon content. However, gas or arc welding is possible if the material is preheated. A low alloy filler is recommended to develop equivalent strength in the weld. Stress relieving is also recommended. Welding rod grade depends on design, service requirements, and thickness of material.

Rd. Cornered Special Quality	*Wt./Ft.*	*Wt./20'*	*Wt./28'*	*Wt./32'*	*Wt./40'*	*Wt./42'*
2" Solid	13.613	272.26	381.16	435.62	544.52	571.75
2 1/4" Solid	17.270	344.52	482.33	551.23	689.04	723.49
2 1/2" Solid	21.270	425.40	595.56	680.64	850.80	893.34
Hollow Tul Bar						
2 1/4" X .250 Wall	7.017	140.34	196.48	224.54	280.68	


C-4048

Cold Finished Bar Products

A medium low basic steel of "machine" grade without "brittleness" to forming or bending. It is tough and dependable. The manganese content runs considerably higher making it a better steel for carburized parts, since it produces a harder and more uniform case. The hot rolled bars used for cold finished are special quality bars.

Rounds of 4" diameter and smaller are cold drawn and rounds over 4" are turned and polished having a high degree of accuracy, concentricity, straightness and a highly polished surface.

Analysis

Carbon	*Manganese*	*Phosphorus*	*Sulphur*
.15 - .20	.60 - .90	.04 Max.	.05 Max.

Applications

Suitable for general shafting purposes and other uses not requiring the greater strength of alloy or high carbon steel. Extensively used for parts to be case hardened, where requirements are not too high or too severe, such as worms, pinions, gears, ratchets, dogs, chain pins and king pins.

Typical Mechanical Properties

The following data is the result of steel mill lab tests and is only a guide. It cannot be used as a basis for the acceptance or rejection of material.

Cold Drawn Bars

Tensile Strength (P.S.I.)	*Yield Point (P.S.I.)*	*Elongation in 2 Inches*	*% Reduction Of Area*
70,000 - 80,000	55,000 - 70,000	18 - 25%	45 - 57

Brinell Hardness	*Rockwell Hardness*	*Percent Machinability*	*Surface Feet Per Minute*
160 - 180	B-87	65	108

Weldability

This steel presents no welding problems when using all welding processes. Welding quality is generally extremely high for the welds and joints. Welding rod specifications are dependent on welding conditions such as thickness of section, service requirements and design.

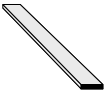
Hardening

This steel will respond to any of the standard carburizing methods. The following heat treatment is suggested for a hard case and tough core: Carburize at 1650º/1700º F for approximately eight hours, cool in box and reheat to 1400/1450º F.

Weights For CF & Specialty Rd. Bars

Size In Inches	*Wt. Per Ft.*	*Wt. Per 12'*	*Wt. Per 20'*	*Size In Inches*	*Wt. Per Ft.*	*Wt. Per 12'*	*Wt. Per 20'*
1/8	.042	.50	.84	2 3/4	20.219	242.63	404.38
3/16	.094	1.13	1.88	2 7/8	22.091	265.09	441.82
1/4	.167	2.00	3.34	2 15/16	23.062	276.74	461.28
5/16	.261	3.13	5.22	3	24.053	288.64	481.06
3/8	.376	4.51	7.52	3 1/16	25.074	300.89	501.10
7/16	.511	6.13	10.22	3 1/8	26.105	313.26	522.10
1/2	.669	8.03	13.38	3 3/16	27.156	325.87	543.12
9/16	.846	10.15	16.92	3 1/4	28.237	338.84	564.74
5/8	1.044	12.53	20.88	3 5/16	29.328	351.94	586.56
11/16	1.263	15.16	25.26	3 3/8	30.449	365.39	608.98
3/4	1.503	18.04	30.06	3 7/16	31.580	378.96	631.60
13/16	1.765	21.18	35.30	3 1/2	32.741	392.89	654.82
7/8	2.046	24.55	40.92	3 5/8	35.123	421.48	702.46
15/16	2.349	28.19	46.98	3 3/4	37.585	451.02	751.70
1	2.673	32.08	53.46	3 7/8	40.138	481.66	802.76
1 1/16	3.017	36.20	60.36	3 15/16	41.439	497.27	828.78
1 1/8	3.382	40.58	67.64	4	42.770	513.24	855.40
1 3/16	3.770	45.24	75.40	4 1/8	45.483	545.80	909.66
1 1/4	4.177	50.12	83.54	4 1/4	48.275	579.30	965.50
1 5/16	4.604	55.25	92.08	4 7/16	52.630	631.56	1052.60
1 3/8	5.054	60.65	101.08	4 1/2	54.31	649.57	1082.62
1 7/16	5.523	66.28	110.46	4 3/4	60.307	723.68	1206.14
1 1/2	6.014	72.17	120.28	4 15/16	65.161	781.93	1303.22
1 9/16	6.525	78.30	130.05	5	66.823	801.88	1336.46
1 5/8	7.058	84.70	141.16	5 1/4	73.669	884.03	1473.38
1 11/16	7.611	91.33	152.11	5 1/2	80.856	970.27	1617.12
1 3/4	8.186	98.23	163.72	5 3/4	88.373	1060.48	1767.46
1 13/16	8.781	105.37	175.62	6	96.221	1154.65	1924.42
1 7/8	9.397	112.76	187.94	6 1/4	104.398	1252.78	2087.96
1 15/16	10.033	120.40	200.66	6 1/2	112.926	1355.11	2258.52
2	10.690	128.28	213.80	6 3/4	121.785	1461.42	2435.70
2 1/16	11.371	136.45	227.42	7	130.973	1571.68	2619.46
2 1/8	12.071	144.85	241.42	7 1/4	140.492	1685.90	2809.84
2 3/16	12.790	153.48	255.80	7 1/2	150.352	1804.22	3007.04
2 1/4	13.533	162.40	270.66	7 3/4	160.541	1926.49	3210.82
2 5/16	14.293	171.52	285.86	8	171.061	2052.73	3421.22
2 3/8	15.074	180.89	301.48	8 1/4	181.921	2183.05	3638.42
2 7/16	15.885	190.62	317.62	8 1/2	193.112	2317.34	3862.24
2 1/2	16.706	200.47	334.12	8 3/4	204.643	2455.72	4092.86
2 5/8	18.417	221.00	368.34	9	216.504	2598.05	4330.08
2 11/16	19.308	231.70	386.10	9 1/4	228.695	2744.34	4573.90

Weights For Cold Drawn Flat Bars



Size In Inches			*Wt. Per Ft.*	*Wt. Per 12'*
1/8	x	1/4	.106	1.27
		5/16	.133	1.60
		3/8	.159	1.91
		1/2	.213	2.56
		5/8	.266	3.19
		3/4	.319	3.83
		7/8	.372	4.46
		1	.425	5.10
		1 1/8	.478	5.74
		1 1/4	.531	6.37
		1 1/2	.639	7.67
		1 3/4	.745	8.94
		2	.851	10.21
		2 1/4	.957	11.48
		2 1/2	1.064	12.77
		2 3/4	1.170	14.04
		3	1.276	15.31
		3 1/2	1.489	17.87
		4	1.702	20.42
		4 1/2	1.915	22.98
		5	2.127	25.52
		6	2.552	30.62
3/16	x	1/4	.159	1.91
		5/16	.199	2.39
		3/8	.239	2.87
		1/2	.319	3.83
		5/8	.398	4.78
		3/4	.478	5.74
		7/8	.559	6.71
		1	.639	7.67
		1 1/8	.718	18.62
		1 1/4	.798	19.58
		1 1/2	.957	11.48
		1 3/4	1.117	13.40
		2	1.276	15.31
		2 1/4	1.435	17.22
		2 1/2	1.596	19.15
		2 3/4	1.755	21.06
		3	1.915	22.98
		3 1/2	2.233	26.80
		4	2.552	30.62
		4 1/2	2.872	34.46
3/16	x	5	3.191	38.29
		6	3.829	45.95
		8	5.105	61.26
		10	6.381	76.57
1/4	x	5/16	.266	3.19
		3/8	.319	3.83
		1/2	.425	5.10
		5/8	.531	6.37
		3/4	.639	7.67
		7/8	.745	8.94
		1	.851	10.21
		1 1/8	.957	11.48
		1 1/4	1.064	12.77
		1 3/8	1.170	14.04
		1 1/2	1.276	15.31
		1 3/4	1.489	17.87
		2	1.702	20.42
		2 1/4	1.915	22.98
		2 1/2	2.127	25.52
		2 3/4	2.340	28.08
		3	2.552	30.62
		3 1/2	2.978	35.74
		4	3.403	40.84
		4 1/2	3.829	45.95
		5	4.254	51.05
		5 1/2	4.679	56.15
		6	5.105	61.26
		7	5.956	71.47
		8	6.806	81.67
		10	8.508	102.10
5/16	x	3/8	.398	4.78
		1/2	.531	6.37
		5/8	.665	7.98
		3/4	.798	9.58
		7/8	.931	11.17
		1	1.064	12.77
		1 1/8	1.196	14.35
		1 1/4	1.329	15.95
		1 1/2	1.596	19.15
		1 3/4	1.861	22.33
		2	2.127	25.52
		2 1/4	2.393	28.72

Weights For Cold Drawn Flat Bars (Cont.)

Size In Inches			*Wt. Per Ft.*	*Wt. Per 12'*
5/16	x	2 1/2	2.658	31.90
		2 3/4	2.925	35.10
		3	3.151	38.29
		3 1/2	3.723	44.68
		4	4.254	51.05
		4 1/2	4.785	57.42
		5	5.318	63.82
		5 1/2	5.850	70.20
		6	6.302	75.62
		8	8.508	102.10
		10	10.635	127.62
3/8	x	1/2	.639	7.67
		5/8	.798	9.58
		3/4	.957	11.48
		7/8	1.117	13.40
		1	1.276	15.31
		1 1/8	1.435	17.22
		1 1/4	1.596	19.15
		1 1/2	1.915	22.98
		1 3/4	2.233	26.80
		2	2.552	30.62
		2 1/4	2.872	34.46
		2 1/2	3.191	38.29
		2 3/4	3.509	42.11
		3	3.829	45.95
		3 1/4	4.148	49.78
		3 1/2	4.467	53.60
		4	5.105	61.26
		4 1/2	5.743	68.92
		5	6.381	76.57
		5 1/2	7.020	84.24
		6	7.657	91.88
		7	8.933	107.20
		8	10.210	122.52
		10	12.762	153.14
7/16	x	1/2	.745	8.94
		3/4	1.117	13.40
		1	1.489	17.87
		1 1/4	1.861	22.33
		1 1/2	2.233	26.80
		1 3/4	2.605	31.26
		2	2.979	35.75
7/16	x	2 1/4	3.350	40.20
		2 1/2	3.721	44.65
		3	4.467	53.60
		4	5.956	71.47
1/2	x	5/8	1.064	12.77
		3/4	1.276	15.31
		7/8	1.489	17.87
		1	1.702	20.42
		1 1/8	1.915	22.98
		1 1/4	2.127	25.52
		1 1/2	2.552	30.62
		2	3.403	40.84
		2 1/4	3.829	45.95
		2 1/2	4.254	51.05
		2 3/4	4.679	56.15
		3	5.105	61.26
		3 1/4	5.530	66.36
		3 1/2	5.956	71.47
		4	6.806	81.67
		4 1/2	7.657	91.88
		5	8.508	102.10
		5 1/2	9.359	112.31
		6	10.210	122.52
		7	11.911	142.93
		8	13.613	163.96
		9	15.314	183.77
		10	17.016	204.19
5/8	x	3/4	1.596	19.15
		7/8	1.861	22.33
		1	2.127	25.52
		1 1/8	2.393	28.72
		1 1/4	2.658	31.90
		1 1/2	3.191	38.29
		1 3/4	3.723	44.68
		2	4.254	51.05
		2 1/4	4.785	57.42
		2 1/2	5.318	63.82
		2 3/4	5.850	70.20
		3	6.381	76.57
		3 1/2	7.445	89.34
		4	8.508	102.10
		4 1/2	9.572	114.86

Weights For Cold Drawn Flat Bars (Cont.)

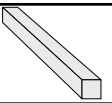
Size In Inches			*Wt. Per Ft.*	*Wt. Per 12'*
5/8	x	5	10.640	127.68
		5 1/2	11.699	140.39
		6	12.762	153.14
		7	14.894	178.73
		8	17.015	204.29
		10	21.280	255.36
		12	25.524	306.29
3/4	x	7/8	2.233	26.80
		1	2.552	30.62
		1 1/8	2.872	34.46
		1 1/4	3.191	38.29
		1 1/2	3.829	45.95
		1 3/4	4.467	53.60
		2	5.105	61.26
		2 1/4	5.743	68.92
		2 1/2	6.381	76.57
		2 3/4	7.020	84.24
		3	7.857	91.88
		3 1/4	8.295	99.54
		3 1/2	8.933	107.20
		4	10.210	122.52
		4 1/2	11.491	137.89
		5	12.762	153.14
		5 1/2	14.038	168.46
		6	15.314	183.77
		7	17.887	214.40
		8	20.419	245.03
		10	25.524	306.29
		12	30.629	367.55
7/8	x	1	2.978	35.74
		1 1/8	3.350	40.20
		1 1/4	3.723	44.68
		1 3/8	4.059	49.14
		1 1/2	4.467	53.60
		1 3/4	5.211	62.53
		2	5.956	71.47
		2 1/4	6.700	80.40
		2 1/2	7.445	89.34
		2 3/4	8.189	98.27
		3	8.933	107.20
		3 1/2	10.420	125.04
		4	11.911	142.93

Size In Inches			*Wt. Per Ft.*	*Wt. Per 12'*
7/8	x	5	14.894	178.73
		6	17.867	214.40
		8	23.822	285.86
		12	35.734	428.81
1	x	1 1/4	4.254	51.05
		1 1/2	5.105	61.26
		1 3/4	5.956	71.47
		2	6.806	81.67
		2 1/4	7.657	91.88
		2 1/2	8.508	102.10
		2 3/4	9.359	112.31
		3	10.210	122.52
		3 1/4	11.060	132.72
		3 1/2	11.911	142.93
		4	13.613	163.36
		4 1/2	15.314	183.77
		5	17.016	204.19
		5 1/2	18.718	224.62
		6	20.419	245.03
		7	23.822	285.86
		8	27.226	326.71
		10	34.032	408.38
		12	40.838	490.06
1 1/4	x	1 1/2	6.381	76.57
		1 3/4	7.445	89.34
		2	8.508	102.10
		2 1/4	9.572	114.86
		2 1/2	10.640	127.68
		2 3/4	11.701	140.41
		3	12.762	153.14
		3 1/2	14.894	178.73
		4	17.016	204.19
		4 1/2	19.148	229.78
		5	21.270	255.24
		6	25.524	306.29
		8	34.032	408.38
		10	42.540	410.48
		12	51.048	612.58
1 1/2	x	1 3/4	8.933	107.20
		2	10.210	122.52
		2 1/4	11.486	137.83
		2 1/2	12.762	153.14

Weights For Cold Drawn Flat Bars (Cont.)

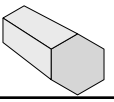
Size In Inches			*Wt. Per Ft.*	*Wt. Per 12'*
1 1/2	x	2 3/4	14.038	168.46
		3	15.314	183.77
		3 1/4	16.590	199.10
		3 1/2	17.867	214.40
		4	20.419	245.03
		4 1/2	22.972	275.66
		5	25.524	306.29
		6	30.629	367.55
		8	40.838	490.06
		10	51.048	612.58
		12	61.258	735.10
1 3/4	x	2	11.911	142.93
		2 1/4	13.401	160.81
		2 1/2	14.889	178.67
		2 3/4	16.375	196.50
		3	17.867	214.40
		3 1/2	20.845	350.14
		4	23.822	285.86
		5	29.778	357.34
		6	35.734	428.81
		8	47.645	571.74
2	x	2 1/4	15.310	183.72
2	x	2 1/2	17.016	204.19
		2 3/4	18.718	224.62
		3	20.419	245.03
		3 1/2	23.822	285.86
		4	27.226	326.71
		4 1/2	30.625	367.55
		5	34.032	408.38
		6	40.838	490.06
		8	54.451	653.41
		10	68.064	816.77
		12	81.677	980.12
2 1/2	x	3	25.524	306.29
		3 1/2	29.778	357.34
		4	34.032	408.38
		5	42.540	510.48
		6	51.048	612.58
		8	68.064	816.77
3	X	3 1/2	35.734	428.81
		4	40.838	490.06
		4 1/2	45.943	551.32
		5	51.048	612.58
		6	61.258	735.10

Cold Drawn Square Bars



Size In Inches	Wt. Per Ft.	Wt. Per 12'	Size In Inches	Wt. Per Ft.	Wt. Per 12'
1/8	.053	.64	1 3/8	6.434	77.21
3/16	.120	1.44	1 1/2	7.657	91.88
1/4	.213	2.56	1 5/8	8.986	107.83
5/16	.332	3.98	1 3/4	10.423	125.08
3/8	.478	5.74	1 7/8	11.964	143.57
7/16	.652	7.82	2	13.613	163.36
1/2	.851	10.21	2 1/4	17.229	206.75
9/16	1.077	12.92	2 1/2	21.270	255.24
5/8	1.329	15.95	2 3/4	25.737	308.84
11/16	1.609	19.31	3	30.629	367.55
3/4	1.915	22.98	3 1/4	35.944	431.33
13/16	2.247	26.96	3 1/2	41.689	500.27
7/8	2.605	31.26	4	54.400	652.80
15/16	2.991	35.89	4 1/2	68.915	826.98
1	3.403	40.84	5	85.080	1020.96
1 1/16	3.842	46.10	5 1/2	102.947	1235.36
1 1/4	5.318	63.82	6	122.515	1470.18

Cold Drawn Hexagon Bars



Size In Inches	Wt. Per Ft.	Wt. Per 12'	Size In Inches	Wt. Per Ft.	Wt. Per 12'
3/16	.104	1.25	1 7/16	6.091	73.09
1/4	.184	2.21	1 1/2	6.631	79.57
5/16	.288	3.46	1 5/8	7.782	93.38
3/8	.414	4.97	1 3/4	9.026	108.31
7/16	.565	6.78	1 7/8	10.360	124.32
1/2	.737	8.84	2	11.791	141.49
9/16	.933	11.20	2 1/8	13.313	159.76
5/8	1.151	13.81	2 1/4	14.556	174.67
11/16	1.393	16.72	2 3/8	16.626	199.51
3/4	1.658	19.90	2 1/2	18.417	221.00
13/16	1.946	23.35	2 5/8	20.309	243.71
7/8	2.256	27.07	2 3/4	22.291	267.49
15/16	2.590	31.08	3	26.525	318.30
1	2.947	35.36	3 1/8	28.787	345.44
1 1/8	3.731	44.77	3 1/4	31.101	373.20
1 3/16	4.156	49.87	3 1/2	36.104	433.25
1 1/4	4.605	55.26	4	47.154	565.85
1 3/8	5.572	66.86			

Expanded Metal & Grating Products

Expanded Metal, Expanded Metal Grating, Bar Grating, PDM Stair Treads, and Diamond Grip are all products that have openings in their horizontal surfaces which increase friction for safer climbing and standing, and allow dirt, oil, etc. to fall through. This provides a certain amount of self-cleaning.

Expanded Metal - Raised

Style Designation	*Stock Sizes*	*Center To Center Of Bonds*		*Thickness Of Strand*	*Weight In Pounds Per Square Foot*	
		Width	*Length*		*Plain*	*Galv.*
1/4 - No. 18	48 x 96	.255	1.00	.048	1.14	1.71
1/2 - No. 18	48 x 96	.500	1.20	.048	.70	.85
1/2 - No. 16	48 x 96	.500	1.20	.060	.86	.97
1/2 - No. 13	48 x 96	.500	1.20	.092	1.47	1.73
3/4 - No. 16	48 x 96	.923	2.00	.060	.54	.65
3/4 - No. 13	48 x 96	.923	2.00	.092	.80	.92
3/4 - No. 10	48 x 96	.923	2.00	.092	1.20	1.36
3/4 - No. 9	48 x 96	.923	2.00	.134	1.80	1.95
1- No. 16	48 x 96	1.090	2.40	.060	.44	.51
1 1/2 - No. 16	48 x 96	1.330	3.00	.060	.40	.48
1 1/2 - No. 13	48 x 96	1.330	3.00	.092	.60	.68
1 1/2 - No. 10	48 x 96	1.330	3.00	.092	.79	.89
1 1/2 - No. 9	48 x 96	1.330	3.00	.134	1.20	1.31
1 1/2 - No. 6	48 x 96	1.330	3.00	.198	2.50	2.73
2 - No. 9	48 x 96	1.850	4.00	.134	.90	1.02

Expanded Metal - Flattened

Style Designation	Stock Sizes	Center To Center Of Bonds		Thickness Of Strand	Weight In Pounds Per Square Foot	
		Width	Length		Plain	Galv.
1/4 - No. 20	48 x 96	.255	1.03	.030	.83	1.24
1/4 - No. 18	48 x 96	.255	1.03	.040	1.11	1.65
1/2 - No. 20	48 x 96	.500	1.26	.029	.40	.51
1/2 - No. 18	48 x 96	.500	1.26	.039	.66	.88
1/2 - No. 16	48 x 96	.500	1.26	.050	.82	1.00
1/2 - No. 13	48 x 96	.500	1.26	.070	1.40	1.62
3/4 - No. 16	48 x 96	.923	2.10	.048	.51	.61
3/4 - No. 14	48 x 96	.923	2.12	.061	.63	.75
3/4 - No. 13	48 x 96	.923	2.10	.070	.76	.86
3/4 - No. 9	48 x 96	.923	2.12	.120	1.71	1.86
3/4 - No. 9	48 x 120	.923	2.12	.120	1.71	1.86
3/4 - No. 9	48 x 144	.923	2.12	.120	1.71	1.86
1 - No. 16	48 x 96	1.090	2.56	.048	.41	.50
1 1/2 - No. 13	48 x 96	1.330	3.20	.070	.57	.68
1 1/2 - No. 9	48 x 96	1.330	3.20	.110	1.11	1.28

Expanded Metal - Grating

Style Designation	Stock Sizes	Center To Center Of Bonds		Weight In Pounds Per Square Foot	
		Width	Length	Plain	Galv.
3.0 Lb. Catwalk	120 x 24	1.33	5.33	3.00	3.20
3.0 Lb. Grating	48 x 96	1.33	5.33	3.00	3.20
3.0 Lb. Grating	48 x 120	1.33	5.33	3.00	3.20
3.14 Lb. Skywalk	48 x 96	2.00	6.00	3.14	3.34
3.14 Lb. Skywalk	48 x 120	2.00	6.00	3.14	3.34
4.0 Lb. Grating	48 x 96	1.33	5.33	4.00	4.30
4.0 Lb. Grating	48 x 120	1.33	5.33	4.00	4.30
4.27 Lb. Walkway	48 x 96	1.41	4.00	4.27	4.57
5.0 Lb. Grating	48 x 96	1.33	5.33	5.00	5.50
5.0 Lb. Grating	48 x 120	1.33	5.33	5.00	5.50
6.25 Lb. Grating	48 x 96	1.41	5.33	6.25	6.85

Expanded Metal Terminology

Material Terminology

Expanded Metal (sometimes called raised or regular expanded metal) is metal sheet that is simultaneously slit and stretched into a rigid, open mesh. This material is available in carbon steel, stainless steel, galvanized steel, and aluminum.

Flattened Expanded Metal is made by passing expanded metal through a rolling mill to flatten it. This process reduces the thickness slightly and provides a smooth, flat surface.

Expanded Metal Grating is made from thicker sheet or plate, by a process similar to that which produces expanded metal. Expanded metal grating is often used for catwalks and platform applications where self cleaning and good footing are required.

Decorative Expanded Metal is manufactured so that the open areas have unique, decorative shapes. This material is often used for architectural screening.

Expanded Metal Stair Treads use expanded metal grating for the horizontal surfaces and generally use flat bar on the vertical surfaces and angles at the corners.

Descriptive Terminology

The ***Bond*** is the point where adjacent *Strands* intersect. The bond is always twice the width of the *Strand*.

C.S.F. (100 Square Feet) is the unit of measure that is used to weigh and price expanded metal.

Camber is a slight bow which can occur during manufacturing and results in an out-of-square condition.

Deburring is a process whereby most expanded metal is passed through rotary steel brushes to remove burrs and rough edges. Expanded metal grating and very light expanded metal are generally not deburred.

The open area formed by the *Strands* and bonds is referred to as the ***Diamond*** (because the opening is generally diamond shaped) or the ***Opening***.

F.X.M. is the commonly used abbreviation for Flattened Expanded Metal.

L.W.D. or ***L.W.O.*** refers to the Long Way of the Diamond or Long Way of the Opening. This is used to make it clear that you are measuring in a direction that is parallel to the largest dimension of the diamond. (See also *S.W.D. or S.W.O.*)

Mesh is the nominal distance, expressed in inches, from the center of one bond to the center of an adjacent bond measured across the *S.W.D.*

The ***Opening Size*** is the area enclosed by the *Strands* and bonds.

The ***Overall Thickness*** is the finished thickness of the sheet which often determines the selection of framing components.

The ***Percent of Open Area*** is used by designers to calculate the degree to which light and air can pass through a piece of expanded metal.

The ***Pitch*** is the measurement from a point on one diamond to the same point on an adjacent diamond.

R.X.M. is the commonly used abbreviation for Raised Expanded Metal.

S.W.D. or ***S.W.O.*** refers to the Short Way of the Diamond or the Short Way of the Opening. This is used to make it clear that you are measuring in a direction that is parallel to the smallest dimension of the diamond. *(See also L.W.D. or L.W.O.)*

The ***Strand*** is the single metal strip that forms the border of the diamond, or opening. The strand has thickness (the thickness of the sheet) and width.

Bar Grating Products

Welded Bar Grating is a manufactured product which has a multitude of uses. For instance, it is used to cover trenches in pavement, to make self-cleaning stair treads and to construct platforms around equipment.

There are a number of questions that you will need to answer when ordering Welded Bar Grating:

1. What material? Most Welded Bar Grating is made from carbon steel but it is also available in Stainless Steel and Aluminum. A similar product is made from fiberglass for use in highly corrosive applications.

2. Which way do the bearing bars run? For greatest strength the bearing bars will usually run the short way of the span. (If you had a trench that was 10" X 120" the bearing bars would normally span the 10" dimension of your trench. See the illustration of bearing and cross bars on the next page)

3. What is the size of the area that you need to cover? Give the size in inches and remember to allow for clearance. If you are putting grating into a 10" wide trench, a 10" wide piece of grating will not fit. You would want to order your grating somewhat narrower, say 9 $^{3}/_{4}$" or 9 $^{7}/_{8}$" in width in order to clear.

4. Are the pieces to be banded? Banding is used to close the spaces between the bearing bars. This makes for a more finished look, keeps the ends from being bent out of shape and reduces the chance of injury from the exposed ends of the bearing bars when the pieces have to be handled.

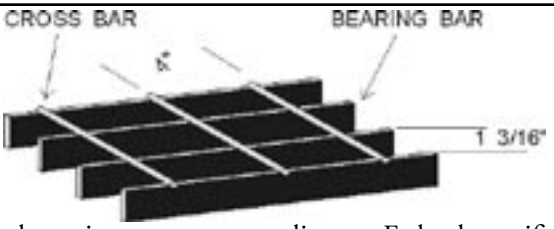
5. Are the pieces to be painted or galvanized? When special ordering you may specify that the grating be painted or galvanized by the manufacturer.

6. Are the bearing bars to be serrated or smooth? When special ordering you may specify that the top edge of the bearing bars be cut in such a manner that a series of bumps will provide greater friction.

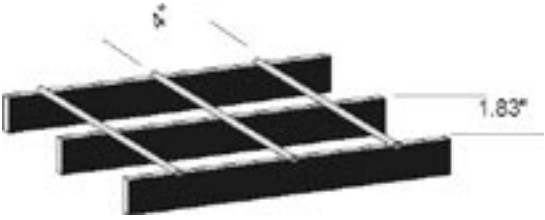
Remember that while Welded Bar Grating is available in custom sizes, you will want to work from standard 3' X 24' panels whenever possible. (4' wide panels may be special ordered) This means that in the example of a 10" X 120" trench used above it would take 3 pieces 10" by 36" and 1 piece 10" X 12" to cover the trench with bearing bars running the short way of the span.

While it might seem easier to cover the area with one piece, you would have to run the bearing bars the 10' way to cover the trench with one piece. The 10' span would be very weak. Remember also, that you may occasionally have to remove the grating to clean your trench and one man can handle three-foot long pieces more easily than he can handle a ten foot long piece.

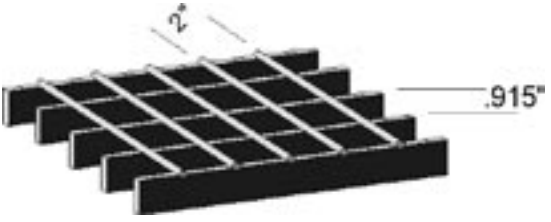
Types & Spacings Of Welded Bar Grating



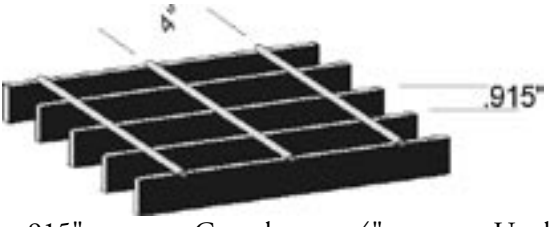
Standard welded spacing pattern according to Federal specification RRG-661c. Bearing bars on 1 $^{3}/_{16}$" centers. Cross bars on 4" centers. Most commonly used pattern.



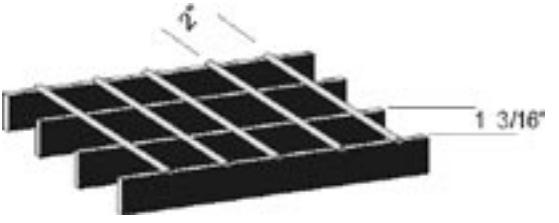
Cross bars on 4" centers. Bearing bar spacing opened up to 1.83" centers. This grating is used for maximum light and air circulation.



Cross bars on 2" centers with bearing bars on .915" centers. Ideal for sidewalks. Accommodates bicycle traffic.



Bearing bars on .915" centers. Cross bars on 4" centers. Used where heavy loads are applied and depth is restricted.



Cross bar spacing narrowed to 2" centers. Bearing bars standard on 1 $^{3}/_{16}$" centers. Increased surface contact for long life under heavy traffic.

Bar Grating Load Table

U= Uniform Load D = Deflection C=Concentrated Load

Bearing Bar Size In Inches		*Span*				
		2'0"	*2'6"*	*3'0"*	*3'6"*	*4'0"*
3/16 X 3/4	U	575	370	259	186	144
	D	.093	.152	.218	.294	.373
	C	579	463	388	330	289
	D	.077	.120	.173	.235	.310
1/8 X 1	U	688	440	304	225	172
	D	.073	.110	.160	.219	.286
	C	688	549	459	391	343
	D	.059	.091	.129	.175	.232
3/16 X 1	U	1030	659	460	335	256
	D	.073	.112	.160	.219	.287
	C	1029	822	687	588	513
	D	.058	.090	.129	.176	.230
1/8 X 1 1/4	U	1072	688	475	351	269
	D	.059	.090	.175	.233	.290
	C	1074	859	714	610	538
	D	.048	.073	.104	.142	.180
3/16 X 1 1/4	U	1610	1029	714	528	401
	D	.059	.090	.128	.174	.230
	C	1610	1283	1074	919	801
	D	.048	.073	.105	.141	.180
1/8 X 1 1/2	U	1541	988	687	501	387
	D	.045	.074	.106	.148	.193
	C	1542	1237	1030	884	723
	D	.038	.058	.086	.116	.155
3/16 X 1 1/2	U	2320	1484	1032	758	580
	D	.047	.076	.107	.148	.193
	C	2320	1858	1548	1325	1160
	D	.038	.060	.088	.116	.154
3/16 X 1 3/4	U	3140	2018	1401	1030	788
	D	.041	.062	.093	.126	.164
	C	3150	2522	2100	1803	1573
	D	.031	.053	.075	.100	.134
3/16 X 2	U	4118	2633	1830	1346	1029
	D	.038	.058	.080	.112	.140
	C	4118	3293	2748	2350	2059
	D	.029	.047	.062	.089	.116
3/16 X 2 1/4	U	5210	3330	2310	1670	1301
	D	.033	.050	.073	.099	.128
	C	5210	4169	3475	2913	2604
	D	.028	.040	.058	.080	.103

Diamond Grip

Diamond-Grip, made by ISG Safety Products, Ltd., is a light weight, high friction product which is used to provide a nonskid, self cleaning surface for stair treads, walkways, work platforms, and mezzanines. This material comes in galvanized channels of various gauges, widths and depths. It is most often stocked in 12 & 14 Gauge.

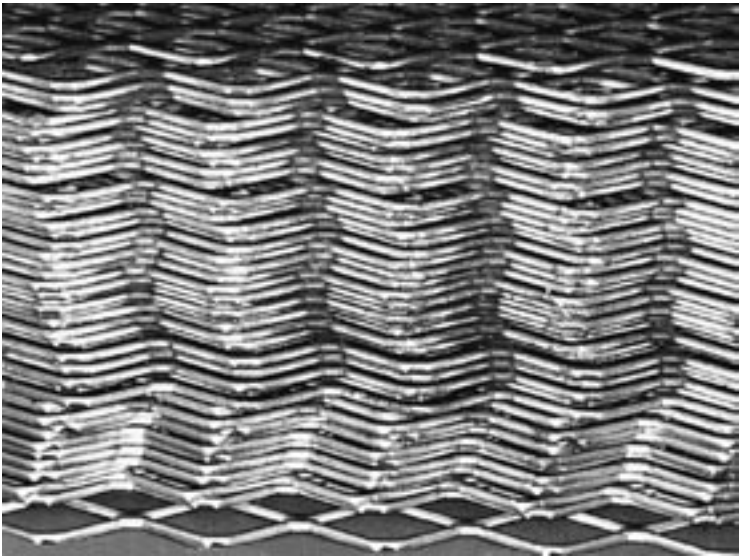
Size	*Channel Height*			
	1 1/2" High	*2" High*	*2 1/2" High*	*3" High*
4 3/4" Wide X 144" Long	X	X	X	
7" Wide X 144" Long	X	X	X	X
9 1/2" Wide X 144" Long	X	X	X	X
11 3/4" Wide X 144" Long	X	X	X	X
18 3/4" Wide X 144" Long	X	X	X	X

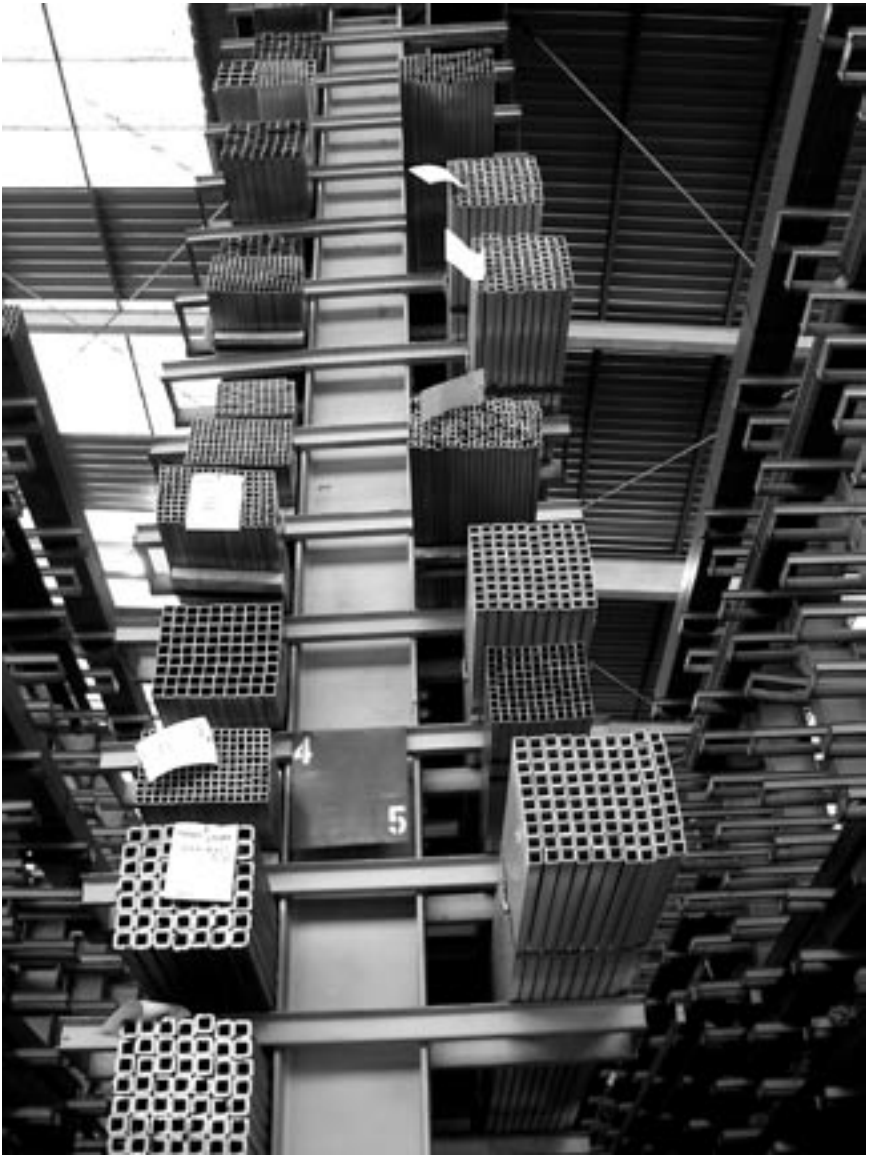
Diamond Grip Stair Treads

14 Ga. X 24" Long X 9 1/2" Wide X 1 1/2" Deep

14 Ga. X 30" Long X 9 1/2" Wide X 1 1/2" Deep

12 Ga. X 36" Long X 9 1/2" Wide X 1 1/2" Deep

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DuraGal® Products

DuraGal products are high strength, in-line galvanized steel products that are available in selected flat, angle, channel and tubing sizes. DuraGal products are galvanized to 0.3 oz/ft^2. The zinc coating has been formulated so that it can be formed without flaking.

Their higher strength allows for possibly significant weight savings.

- ✔ Flats have a yield up to 58,000 psi.
- ✔ Angles with a thickness of .094 have a yield up to 50,000 psi.
- ✔ All other angles have a yield of 65,000 psi.
- ✔ Channels have a yield up to 65,000 psi.
- ✔ Square and rectangular tubing have a yield up to 65,000 psi.

Easy to cut, weld, drill, paint or powder coat.

No need for shot blasting/wire cleaning after fabrication.

Welding and painting guides are available. Ask your salesperson or visit the Material Information page on the PDM web site (http://www.pdmsteel.com).

Structural Applications

Domestic/Residential Construction	Farm Structures
Low Rise Commercial Buildings	Facades
Internal Factory Material Handling	Walkways
Stairways, Ladders and Platforms	Ore Conveyors

Manufacturing Applications

Hanger Brackets (Elect./AirConditioning)	Fencing
Agricultural Equipment	Bed Rails
Transportable Building Floor Frames	Scaffolding
Truck Bodies/Trailers/Bins	Framing/Trusses

Engineered Construction Applications

Mezzanine Floors	Mechanical Handling
Storage Systems	Conveyors

DuraGal® Sizes

The range of sizes produced and available at any given time changes. The charts below will give you a representative sample of the sizes available. Contact your PDM salesperson for availability of particular sizes in your area.

DuraGal® Flats - 20' Lengths

Size/Thickness	5/32 *(.156)*	3/16 *(.188)*	15/64 *(.234)*	5/16 *(.313)**
2	X	X	—	—
2 1/2	X	X	—	—
3	X	X	X	—
3 1/2	—	—	X	—
4	X	X	X	X
5	X	X	X	—
6	X	X	X	X
8	—	X	X	X
10	—	X	X	X
12	—	X	X	X

DuraGal® Roll Formed Channels (20' & 40')

Size/Thickness	5/32 *(.156)*	3/16 *(.188)*	15/64 *(.234)*	5/16 *(.313)**
3 X 1 1/2	X			
4 X 2	X			
5 X 2 1/2	X			
6 X 3		X		
7 X 3		X		
8 X 3		X	X	
9 X 3			X	
10 X 3 1/2			X	

DuraGal® Roll Formed Angles

Up to 2 1/2" X 2 1/2" in 20' Lengths
Over 2 1/2" X 2 1/2" in 20' and 40' Lengths

Size / Thickness	*3/32 (.094)*	*5/32 (.156)*	*3/16 (.188)*	*15/64 (.234)*	*5/16 (.313)**
1 1/4 X 1 1/4	X				
1 1/2 X 1 1/2	X	X			
1 3/4 X 1 3/4	X	X			
2 X 2	X	X	X	X	
2 1/2 X 2 1/2		X	X	X	
3 X 3		X	X	X	X
3 1/2 X 3 1/2		X	X	X	X
4 X 4		X	X	X	X
5 X 5		X	X	X	X
6 X 6			X	X	X
3 X 2		X	X	X	
4 X 3				X	X
5 X 3				X	X
6 X 4				X	X

** Available per Mill Enquiry*

Pre-Galvanized Square Fencing Pickets (24')

Size	*.065*	*.072*	*.083*	*.095*	*.109*	*.120*	*.134*	*.148*	*.180*
5/8 X 5/8	X								
3/4 X 3/4	X								
1 X 1	X								

The strength and corrosion-resistance of DuraGal tubing makes it the perfect choice for agricultural and ranch structures.

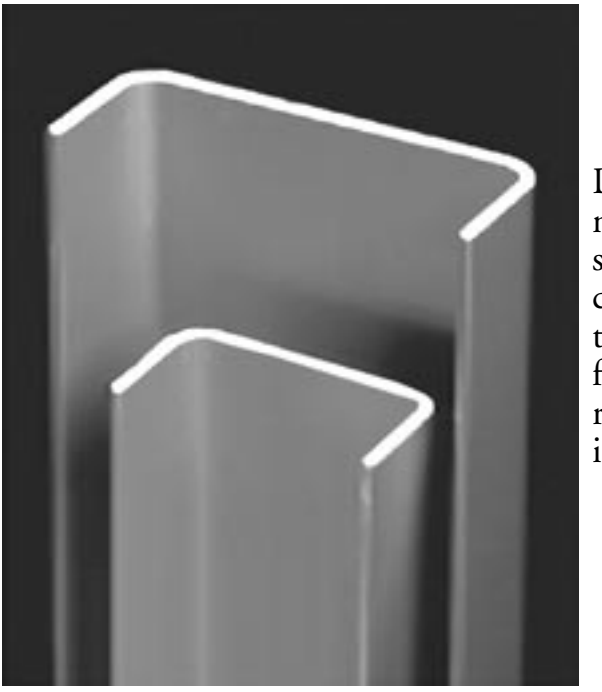
DuraGal® Square Tubing (20' & 24')

Size	.065	.072	.083	.095	.109	.120	.134	.148	.165	.180	.203	.220	.238
1 1/4 X 1 1/4				X									
1 1/2 X 1 1/2	X	X	X	X									
2 X 2		X	X	X	X	X	X	X					
2 1/2 X 2 1/2	X	X	X	X	X	X	X	X	X	X			
3 X 3		X	X	X	X	X	X	X	X	X			
4 X 4		X	X	X	X	X	X	X	X	X	X	X	

DuraGal® Rectangular Tubing (20' & 24')

Size	.065	.072	.083	.095	.109	.120	.134	.148	.165	.180	.203	.220	.238
2 X 1	X	X	X	X									
3 X 2	X	X	X	X	X	X	X	X	X	X			
4 X 2			X	X	X	X	X	X	X	X	X	X	X
5 X 3					X	X	X	X	X	X	X	X	X
6 X 2			X	X	X	X	X	X	X	X	X	X	X

Note: Other Lengths are available per mill enquiry.



DuraGal channels combine high strength and good corrosion protection in a roll formed shape with radiused corners inside and out.

Useful Information

Steel Making & Heat Treating Terms

Age Hardening - Precipitation hardening; a process of aging that increases hardness and strength and ordinarily decreases ductility. Age hardening usually follows rapid cooling from solution heat treatment temperatures or cold working.

Aging - A change in properties of an aluminum alloy that generally occurs slowly at atmospheric temperatures and more rapidly at higher temperatures.

Air Hardening Steel - An alloy steel which does not require quenching from a high temperature to harden but which is hardened by simply cooling in air from above its critical temperature range.

Alloy - The mixture of any element with a pure metal. However, there are several elements regularly occurring in plain carbon steel as manufactured, such as carbon, manganese, silicon, phosphorous, sulphur, oxygen, nitrogen and hydrogen. Plain carbon steel is therefore an alloy of iron and carbon and these other elements are incidental to its manufacture. Steel does not become alloy steel until these elements are increased beyond their regular composition for a specific purpose, or until other metals are added in significant amounts for a specific purpose.

Alloy Steel - Steel is considered to be alloy steel when the maximum of the range given for the content of alloying elements exceeds one or more of the following limits: manganese 1.65%, silicon over 0.5%, copper over 0.6%, or in which a definite range or a definite minimum quantity of any of the following elements is specified or required within the limits of the recognized field of constructional alloy. Steels: Aluminum, chromium up to 3.99%, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium, or any other alloying element added to obtain a desired alloying effect.

Annealing - Applies normally to softening by changing the micro-structure and is a term used to describe the heating and cooling cycle of metals in the solid state. The term annealing usually implies relatively slow cooling in carbon and alloy steels. The more important purposes for which steel is annealed are as follows:

To remove stresses; to induce softness; to alter ductility, toughness, or electric, magnetic or other physical and mechanical properties; to change the crystalline structure; and to produce a definite micro-structure.

Austempering - This is a method of hardening steel by quenching from austenizing temperature into a heat extracting medium (usually salt) which is maintained at some constant temperature level between 400° and 800° and holding the steel in this medium until austenite is transformed to bainite. The austempering process is limited to sections less than $^1/_2$" diameter. The advantages of this method of interrupted quenching are increased ductility and toughness at the resulting hardness of Rockwell 45-55.

Austenite - The solid solution of iron and carbon which is attained by heating to high temperatures above the upper critical temperature. This temperature or temperature range is called the austenizing temperature and must be attained to obtain the proper micro-structure and full hardness of steel in heat treating. The austenizing temperature varies for the different grades of carbon, alloy and tool steels.

Bainite - A decomposition or transformation product of austenite which is a type of microconstituent or structure in steel. This term is used by metallurgists to describe a particular structure of steel when the steel is polished, etched and examined with a microscope.

Basic Oxygen Furnace - The process of manufacturing steel in this type of furnace is called the basic oxygen process and is the most efficient method of producing low and medium carbon and low and medium alloy steels. In this process high purity oxygen is blown onto the surface of a bath of molten iron contained in a basic lined and ladle shaped vessel. The melting cycle duration is extremely short with quality comparable to open hearth steel.

Basic Process - A steel making process either basic oxygen, open hearth or electric in which the furnace is lined with a basic refractory. A slag, rich in lime and phosphorous is removed to provide a purer steel.

Billet - A solid semi-finished round or square product that has been hot worked by forging, rolling or extrusion. An iron or steel billet has a minimum width or thickness of 1 $^{1}/_{2}$ inches and the cross sectional area varies from 2 $^{1}/_{4}$ to 36 square inches.

Blast Furnace - A vertical shaft type furnace used for reducing iron ore to cast pig iron or to hot metal for further melting. This product is used in an open hearth or basic oxygen furnace for the production of steel.

Bloom - Generally a rolled product from an ingot generally greater than 36 square inches in area. This is generally considered the first operation in the production of bars or structurals.

Brinell Hardness - A hardness number determined by applying a 3000 kilogram load to the surface of the material to be tested through a hardened steel ball of 10mm. The diameter of the depression is measured and the hardness is the ratio of load to spherical area of the impression. Tables of numbers have been prepared and the hardness is read from the table from the diameter of the depression.

Carbon Steel - Steel is classified as carbon steel when no minimum content is specified or required for aluminum, boron, chromium, cobalt. columbium, molybdenum, nickel, titanium, tungsten, vanadium, or zirconium, or any other element added to obtain a desired alloy effect; when the specified minimum for copper does not exceed .40% or when the maximum content specified for manganese does not exceed 1.65%; silicon .60%; copper .60%.

Carburizing - Adding carbon to the surface of steel by heating the metal below its melting point in contact with carbonaceous solids, liquids, or gases .

Case Hardening - A heat treatment or a combination of heat treatments of surface hardening involving a change in the composition of the outer layer of an iron base alloy in which the surface is made substantially harder by inward diffusion of a gas or liquid followed by appropriate thermal treatment. Typical hardening processes are carburizing, cyaniding, carbon nitriding and nitriding.

Charpy Test - A pendulum type single blow impact test in which the specimen, usually notched, is supported at both ends as a simple beam and broken by a falling pendulum of given weight. The energy absorbed, as determined by the subsequent rise of the pendulum, is a measure of impact strength or notch toughness and is measured in foot pounds. The test specimen is 2" or 2.165" long, .394" square and has a key hole type notch in the center made by centering a No. 47 drill .160" from one side and sawing through the hole.

Cold Drawing - This is a process for finishing a hot rolled rod or bar at room temperature by pulling it through the hole of a die of the same shape but smaller in size. The bars or rods are cleaned of scale by pickling or other methods prior to cold drawing and then coated with lime which acts as a lubricant in the drawing operation.

Cold Finishing - The cold finishing of steel, generally used for bars and shafting, may be defined as the process of reducing their cross sectional area, without heating, by one of five methods:

1. Cold rolling
2. Cold drawing
3. Cold drawing and grinding
4. Turning and polishing
5. Turning and grinding

Cold Rolling - The cold working of hot rolled material by passing it between power driven rolls. The process is generally used for flat bars of such a size that they cannot be pulled through a die and for the production of cold rolled sheets by cold reducing hot rolled and pickled sheets. Whereas wire and sheets are cold drawn and cold rolled continuously from coil, bars are individually cold drawn.

Cold Working - Plastic deformation of a metal at a temperature low enough to insure strain hardening.

Core - The center portion of a piece of steel which may be of different chemical composition than the outside, as in the case of carburized parts or which may have different mechanical properties than the outside due to the failure of penetration of heat treatment effect.

Cyaniding - Surface hardening by carbon and nitrogen absorption of a steel article or a portion of it by heating at a suitable temperature in contact with cyanide salt, followed by quenching.

Decarburization - When steel is subjected to high temperatures, such as are used in hot rolling, forging, and heat treating in a media containing air, oxygen, or hydrogen there is a loss of carbon at the surface which is know as decarburization. This resultant loss of carbon or chemistry change at the surface of the steel part reduces the strength of the part by reducing the size of the section and produces a softer surface hardness than the core of the part.

Elastic Limit - The greatest stress which a material is capable of developing without a permanent deformation remaining upon complete release of the stress.

Electric Furnace Steel - Steel made in any furnace where heat is generated almost always by arc. Until the advent of the “mini mill” the relatively high cost of electric furnace steels limited their use to tool steels and other high value steels. Today, mini mills use electric furnaces to melt scrap for high volume - relatively low cost steel products.

Elongation - The amount of permanent extension in the vicinity of the fracture in the tensile or tension test, usually expressed as a percentage of the original gauge length, such as 25% to 2"or 21% in 8".

Endurance Limit - Also known as fatigue limit, is a limiting stress, below which metal will withstand without fracture an indefinitely large number of cycles of stress. If the term is used without qualification, the cycles of stress are usually such as to produce complete reversal of flexural stress. Above this limit failure occurs by the generation and growth of cracks until fracture results in the remaining section.

Fatigue - The phenomenon of the progressive fracture of a metal by means of a crack which spreads under repeated cycles of stress.

Ferrous - Metals or alloys that contain appreciable amount of iron.

File Hardness - Hardness as determined by the use of a file of standardized hardness on the assumption that a material which cannot be cut with the file is as hard as, or harder than, the file. Files covering range of hardnesses may be employed.

Flame Hardening - A heat treat method used to harden the surface of some parts where only a small portion of the surface is hardened and where the part might distort in a regular carburizing or heat treating operation. The operation consists of heating the surface to be hardened by an acetylene torch to the proper quenching temperature followed immediately by a water quench and proper tempering. Generally wrought or cast steels with carbon content of .30 to .40%, low alloy steels, and ductile and malleable cast iron are suitable for flame hardening.

Fracture Testing - Breaking a specimen and examining the fractured surface with the unaided eye or with a low power microscope to determine such things as composition, grain size, case depth, soundness, or presence of defects.

Hardenability - This relates to the ability of steel to harden deeply upon quenching and takes into consideration the size of the part, the method of quenching, and the analysis and grain size of the steel. Carbon steels are considered as shallow hardening and various alloy and tool steel grades are considered deep hardening or through hardening. The test used to determine the hardenability of any grade of steel is the Jominy Test.

Hardening - The heating and quenching of certain iron base alloys from a temperature above the critical temperature range for the purpose of producing a hardness superior to that obtained when the alloy is not quenched. When applicable, the following more specific terms should be used: age hardening, case hardening, flame hardening, induction hardening, precipitation hardening, and quench hardening.

Hardness - The ability of a metal to resist penetration. The principal methods of hardness determination are the Brinell, Rockwell and Scleroscope tests.

Heat Treatment - An operation or combination of operations involving the heating and cooling of a metal in the solid state for the purpose of obtaining certain desirable conditions or properties. Heat treating operations include annealing, normalizing, quenching and tempering, etc.

Impact Test - A test used to determine the impact energy measured in foot pounds, to fracture a material by means of an Izod or Charpy Test.

Inclusions - Nonmetallic materials occurring in metals. More specifically in steel; oxides, sulfides, and silicates which are mechanically held during solidification of the ingot.

Ingot - A steel casting that is cast into a mold which when solidified will be rolled in a blooming mill to plates, slabs for sheets, or blooms and billets into structurals and bars.

Izod Test - An impact test similar to the charpy with the difference being in the test specimen. In the Izod test the specimen is 2.953" long, .3937" square with a 45° notch located 1.1024" from the impact end. The distance from the bottom of the notch to the opposite side is .315".

Jominy Test - This is a test used to determine the hardenability of any grade of steel. It consists of water quenching, under closely controlled conditions, one end of a one inch diameter specimen of the steel and measuring the degree of hardness at regular distances from the quenched end. The varying levels of hardness obtained at regular intervals along the bar are then either tabulated or plotted on graphs.

Killed Steel - Steel deoxidized with a strong deoxidizing agent such as silicon or aluminum in order to reduce the oxygen content to such a level that no reaction occurs between carbon and oxygen during solidification of the molten steel in the ingot. Killed steel products will produce a more chemically uniform analysis from the bottom to the top of the ingot. Killed steel is considered as having less chemical segregation than semi-killed or rimmed steel.

Machinability - The relative ease of machining a metal. The machinability index for various steels and machinability tables are available for comparing machining rates with 1212 steel as the standard for carbon and alloy steels.

Martempering or Marquenching - This is a method of hardening steel by quenching from the austenizing temperature into some heat extracting medium, usually salt, which is maintained at some constant temperature level above the point at which martensite starts to form (usually about 450°F.), holding the steel in this medium until the temperature is uniform throughout, cooling in air from the formation of martensite and tempering by the conventional method. The advantages of this method of interrupted quenching are a minimum of distortion and residual strains. The size of the part can be considerably larger than for austempering.

Martensite - A microconstituent or structure in quenched steel with the maximum hardness of any of the structures resulting from the decomposition or transformation of austenite. Steel which is to be quenched and tempered properly must first be fully hardened in the martensitic state and then drawn or tempered back.

Mechanical Properties - The properties of a material that reveal its elastic and inelastic behavior where force is applied, thereby indicating its suitability for mechanical applications, for example, modulus of elasticity, tensile strength, elongation, hardness and fatigue limit.

Mill Edge - The edge of strip, sheet or plate in the as-rolled (unsheared) state.

Modulus of Elasticity - The ratio within the limit of elasticity of the stress to corresponding strain. The stress in pounds per square inch is divided by the elongation in fractions of an inch for each inch of the original gauge length of the specimen. The modulus of elasticity for cold rolled steel is 29,500,000 psi and for other steels varies between 28,600,000 and 30,300,000 psi.

Nitriding - Adding nitrogen to iron-base alloys by heating the metal in contact with ammonia gas, or other suitable nitrogenous material. Nitriding is conducted at a temperature usually in the range of 935-1000°F. and produces surface hardening of the metal without quenching.

Non Ferrous - Metals or alloys that contain no appreciable quantity of iron. This term is applied to such metals as aluminum, copper, magnesium, etc.

Normalizing - Heating steels to approximately 100°F. above the critical temperature range followed by cooling to below that range in still air at ordinary temperatures. This heat treat operation is used to erase previous heat treating results in carbon steels to .40% carbon, low alloy steels. and to produce a uniform gain structure in forged and cold worked steel parts.

Oil Hardening - Process of hardening a ferrous alloy of suitable composition by heating within or above the transformation range and quenching in oil.

Olsen Ductility Test - A cupping test in which a piece of sheet metal, restrained except for the center, is deformed by a standard steel ball until fracture occurs. The height of the cup in thousandths of an inch at time of failure is a measure of the ductility.

Open Hearth Process - One of the main methods used in the production of steel from hot metal (iron) produced in the blast furnace. The furnace can be charged with hot metal, and cold steel scrap for further refining into a carbon or alloy steel. Generally open hearth furnaces range from 75 to 450 tons of melting capacity in one heat.

Oxidation - The addition of oxygen to a compound. Exposure to atmosphere sometimes results in oxidation of the exposed surface, hence a staining or discoloration. This effect is increased with temperature increase to the point where heavy scale is formed and the steel product has a decarburized surface.

Pearlite - Another microscopic structure of steel which is produced by slow cooling or air cooling low to medium carbon and low alloy steels from the austenitic state.

Physical Properties - Those properties familiarly discussed in physics exclusive of those described under mechanical properties; for example: density, electrical conductivity and coefficient of thermal expansion.

Pickling - The process of removing hot rolled mill scale from billets, bars or hot rolled sheets with sulfuric or hydrochloric acid. The scale is removed for hot rolled pickled and oiled sheets or for further processing of the hot rolled steel product into cold drawn bars and wire and cold rolled sheets and strip.

Plastic Deformation - Deformation of a material that will remain permanent after removal of the load which caused it.

Precipitation Hardening - A process of hardening an alloy in which constituent precipitates from a supersaturated solid solution. This process is used for non ferrous alloys to change the mechanical properties of the metal and is also called aging or age hardening.

Proportional Limit - Same as elastic limit.

Quenching - In the heat treating of steel, the step of cooling metals rapidly in order to obtain martensite by immersing or quickly cooling the steel in a quenching medium. The quenching media may be water, brine, oil, special solutions, salts or metals. The intensity of the quench is determined by the temperature, volume and velocity of the media. In the case of air hardening tool steels the quenching medium is air at room temperatures.

Quenching and Tempering - In this operation the procedure consists of heating the material to the proper austenizing temperature, holding that temperature for a sufficient time to effect the desired change in crystalline structure, and quenching in a suitable medium; water, oil or air depending on the chemical composition. After quenching, the material is reheated to a predetermined temperature below the critical range and then cooled under suitable temperatures (tempering).

Reduction of Area - The percentage difference between the original cross sectional area and that of the smallest area at the point of rupture. The percentage figure can be considered a measurement of ductility.

Residual Stress - Microscopic stresses that are set up within a metal as the result of nonuniform plastic deformation or thermal gradients. Stresses of this nature are caused by cold working or by drastic gradients of temperature from quenching or welding.

Residuals - Elements present in an alloy in small quantities but not added intentionally.

Resilience - The tendency of a material to return to its original shape after the removal of a stress that has produced elastic strain.

Rimmed Steel - Low carbon steel in which incomplete deoxidation permits the metal to remain liquid at the top of the ingot, resulting in the formation of a bottom and side rim of relatively pure iron of considerable thickness. Steel products such as sheets produced from this type of ingot will have a very good surface quality free of surface defects.

Rockwell Hardness - A hardness test performed on a Rockwell hardness testing machine. Hardness is determined by a dial reading which indicates the depth of penetration of a steel ball for softer steels and diamond cone for heat treated and harder steels when a load is applied.

Rolled Edges - Finished edges, the final contours of which are produced by side or edging rolls. The edge contours most commonly used are square corners, rounded corners and a rounded edge.

Rolling - A term applied to the operation of shaping and reducing metal in thickness by passing it between rolls which compress, shape and lengthen it following the roll pattern. Steel is either hot rolled or cold rolled depending upon the product being manufactured.

Rolling Directions - The direction in which the steel product is rolled perpendicular to the axis of the rolls during rolling.

Rolling Mills - Equipment used for rolling down metal to a smaller size or to a given shape employing sets of rolls the contours of which determine and fashion the product into numerous intermediate and final shapes. e.g. blooms, slabs, rails, bars, rods, sections, plates, sheets and strip.

Rust - A corrosion product consisting of hydrated oxides of iron. This term is only applied to ferrous alloys.

Scale - A complex iron oxide formed on the steel surface during the hot rolling operation or formed on steel parts which are heat treated in the presence of oxygen.

Scleroscope or Shore Hardness - A hardness test performed on a Shore Scleroscope Hardness Tester. The hardness is determined by the rebound of a diamond pointed hammer (or tup) when it strikes the surface of a specimen. The hammer is enclosed in a glass tube and the height of the rebound is read either against a graduated scale inscribed on the tube, or on a dial, depending on the model used. This type of hardness testing is generally used on large parts which cannot be tested by either using Rockwell or Brinell machine.

Scrap - Material unsuitable for direct use but usable for reprocessing by remelting.

Segregation - Pertaining to chemical segregation which occurs during the solidification of the molten steel in the ingot mold. Rimmed and capped steels are considered to have high levels of segregation; semikilled steels intermediate segregation; and, killed steels the minimum amount.

Semikilled Steel - A commonly used grade of steel manufactured for low carbon bars and structurals. A steel is considered semikilled when it is produced so that it is incompletely deoxidized and it contains sufficient dissolved oxygen to react with the carbon to form carbon monoxide to offset solidification shrinkage in the ingot.

Sheet Steel - Either hot or cold rolled sheets produced on continuous sheet mill where the minimum width produced is 24". Sheet coils when slit to narrower widths is called slit sheet.

Shot Blasting - Cleaning surface of metal by air blast, using metal shot as an abrasive.

Slab - A semi-finished steel product intermediate between ingot and plate with the width at least twice the thickness for rolling down into plates or sheets.

Solid Solution - Many metals possess the ability to dissolve certain other elements in the solid state forming solid solutions which in many ways are analogous to ordinary liquid solutions. In the case of steel the solid solution is called austenite.

Solution Heat Treatment - Heating an alloy to a suitable temperature, holding at the temperature long enough to allow one or more constituents to enter into solid solution and then cooling rapidly enough to hold the constituents in solution. The alloy is left in a supersaturated, unstable state and may subsequently exhibit quench aging.

Spark Testing - This is an inspection method for quickly determining the approximate analysis of steel. It is intended primarily for the separation of mixed steel and when properly conducted, is a fast, accurate and economical method of separation. It consists of holding the sample against a high speed grinding wheel and noting the character and color of the spark which is compared with samples of known analysis.

Stainless Steel - Corrosion resistant steel of a wide variety, but always containing a high percentage of chromium. The minimum chromium content for stainless steel is 11%, although lesser amounts of chromium are found in stainless products such as those used for automobile mufflers. Stainless steels have the properties of being highly resistant to corrosion attack by organic acids, weak mineral acids, atmospheric corrosion, etc. Some standard grades of stainless steel also have 3.5 to 22% of nickel which further increases resistance to chemical and atmospheric corrosion.

Steel - An iron base alloy, malleable in the same temperature range as initially cast, and containing carbon in amounts greater than .05% and less than about 2.00%. Other alloying elements may be present in significant quantities, but all steels contain at least small amounts of manganese and silicon.

Strain - Deformation produced on a body by an outside force.

Strip Steel - (Cold Rolled) A flat cold rolled steel product rolled to widths 23 $^{15}/_{16}$" and narrower, under .250" in thickness, which has been cold reduced to desired decimal thickness and temper on single stand, single stand reversing, or tandem cold mills in coil form from coiled hot rolled pickled strip steel.

Subcritical Annealing - Also ***Stress Relief Annealing***. A heat treating operation used to relieve or dissipate stresses in weldments, heavily machined parts, castings and forgings. The parts are heated to 1150°F., uniformly heated through, and are either air cooled from temperature or slow cooled from temperature depending on the type of part and subsequent finishing or heat treating operations.

Tandem Mill - Arrangement of rolling mills, in direct line, allowing the metal to pass from one set of rolls to the next for the reduction of steel.

Temper - The state of or condition of a metal as to its hardness or toughness produced by either thermal or heat treatment and quench or cold working or a combination of same in order to bring the metal to its specified consistency.

Tempering - Also termed drawing. Reheating hardened, usually quenched, steel to some temperature below the lower critical temperature followed by any desired rate of cooling after the steel has been thoroughly soaked at temperature. Usual tempering temperatures are 300° to 1100°F.

Tensile Strength - The maximum load in pounds per square inch that the sample will carry before breaking under a slowly applied gradually increasing load during a tensile test.

Tolerance - The specified permissible deviation from a nominal dimension, the permissible variation in the size of the part or allowable variation in chemistry.

Tool Steel - Actually, any grade of steel that can be used for a tool. Generally the term tool steel as applied in the steel industry is a grade of steel characterized by high hardness and resistance to abrasion coupled in many instances with resistance to softening at elevated temperatures. These properties are attained with high carbon and high alloy contents and the steel is usually melted in electric furnaces to assure cleanliness and homogeneity of the product.

Toughness - The ability of a metal to absorb energy and deform plastically before fracturing. It is usually measured by the energy absorbed in a notch impact test such as the Charpy or Izod Impact Test. The area under the stress strain curve in tensile testing is also a measure of toughness.

Tumbling - Cleaning articles by rotating them in a cylinder with cleaning materials.

Ultimate Strength - See tensile strength.

Ultrasonic Testing - A method of nondestructive testing of bars, plates or parts with high frequency sound waves produced with electronic equipment. The test is used for locating internal or surface discontinuities or inhomogeneities in materials.

Water Hardening - High carbon grades of tool steel, straight carbon steels and low alloy steels that are hardened by quenching in water during the heat treating operation.

Work Hardening - An increase in hardness and strength caused by plastic deformation at temperatures lower than the recrystallization range.

Yield Point - The yield point is the load per unit area at which a marked increase in deformation of the specimen occurs without increase of load during a tensile test.

Yield Strength - Stress corresponding to some fixed permanent deformation such as .1 or 2% offset from the modulus or elastic slope.

Young's Modulus - Same as modulus of elasticity.

Standard AISI and SAE Steels

The steel industry has established standard steels for the purpose of eliminating, as much as possible, the production of a wide variety of steels which have similar characteristics and uses. These standard steels were set up to serve the significant needs of fabricators and users of steel products. Consequently these standard steels have been adopted by the American Iron and Steel Institute (AISI) and in most cases the AISI standards have been adopted by the Society of Automotive Engineers (SAE).

The American Iron and Steel institute and Society of Automotive Engineers have adopted a numbering system for the purpose of identifying these standard steels. We have used the AISI number system wherever applicable in this book.

The AISI Numbering System

The AISI code system for identification of various steel grades utilizes a four digit number which identifies the steel as either carbon or alloy grade and also indicates the range in percentage figures of carbon and alloy content. The important Parts of the numbering system are as follows:

a) The first two digits designate either a high sulphur group, a high sulphur and phosphorus group, or an alloy group.
b) The last two digits designate the approximate middle of the carbon range.
c) H (suffix) appearing after the four numbers indicates the steel grade is produced to chemical and hardenability limits. (Example 5140H).
d) L (insert) indicates lead added to standard steel grade. (Example 12L14).
e) B (insert) indicates boron added to standard steel grade. (Example 86B45).

Standard Carbon Steels

Standard carbon steel is known as such when no minimum content is required or specified for aluminum, boron, chromium, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, or zirconium, or for any other element that may be added to obtain a desired alloying effect; when the minimum for copper is not in excess of 0.40 per cent, and when the maximum content does not exceed manganese 1.65, silicon 0.60, copper 0.60.

Standard Alloy Steels

An alloy steel is considered as such when the maximum range of alloying elements is in excess of one or more of the following limits:

(A) Copper 0.60%, manganese 1.65%, silicon 0.60%.

(B) Where a definite range or minimum quantity of the following elements is specified or required: aluminum, boron, chromium up to 3.99%; columbium, co-

balt, molybdenum, nickel, titanium, tungsten, vanadium, zirconium or any other element is added to obtain a desired alloying effect. Steel is alloyed with various elements to improve physical properties and to produce special properties, such as resistance to corrosion or heat. Specific effects of the addition of such elements are outlined below.

Common Alloying Elements

Aluminum (Al) is a deoxidizer and degasifier. It retards grain growth and is used to control austenitic grain size. In nitriding steels it aids in producing a uniformly hard and strong nitrided case when used in amounts 1.00%- 1.25%.

Carbon (C) although not usually considered as an alloying element, is the most important constituent of steel. It raises tensile strength, hardness, and resistance to wear and abrasion, but lowers ductility, toughness and machinability.

Chromium (Cr) increases tensile strength, hardness, hardenability, toughness, resistance to wear and abrasion, resistance to corrosion and scaling at elevated temperatures.

Cobalt (Co) increases strength and hardness and permits higher quenching temperatures. It also intensifies the individual effects of other major elements in more complex steels.

Manganese (Mn) is a deoxidizer and degasifier and reacts with sulphur to improve forgeability. It increases tensile strength, hardness, hardenability and resistance to wear, and decreases tendency toward scaling and distortion. It increases the rate of carbon penetration in carburizing.

Molybdenum (Mo) increases strength, hardness, hardenability and toughness, as well as creep resistance and strength at elevated temperatures. It improves machinability and resistance to corrosion and it intensifies the effect of other alloying elements. In hot work steels, it increases red hardness properties.

Nickel (Ni) increases strength and hardness without sacrificing ductility and toughness. It also increases resistance to corrosion and scaling at elevated temperatures when used in suitable quantities in high chromium (stainless) steels.

Phosphorus (P) increases strength and hardness and improves machinability. lt adds marked brittleness or cold shortness to steel.

Silicon (Si) is a deoxidizer and degasifier. It increases tensile and yield strength, hardness, forgeability and magnetic permeability.

Sulfur (S) improves machinability in free cutting steels, but without sufficient manganese it produces brittleness at red heat. It decreases weldability, impact toughness and ductility.

Tungsten (W) increases strength, hardness and toughness. Tungsten steels have superior hot working and greater cutting efficiency at elevated temperatures.

Vanadium (V) increases strength, hardness and resistance to shock impact. It retards grain growth, permitting higher quenching temperatures. It also enhances the red hardness properties of high speed metal cutting tools and intensifies the individual effects of other major elements.

General Classification of AISI Steel Grades

The last two digits of the AISI four-numbered series indicate the approximate middle range of the carbon content. For instance, 4130 designates carbon range of 0.28 to 0.33%.

The first two digits indicate the type of alloying element used as listed below:

10XX	Carbon Steels
11XX	Resulphurized
12XX	Resulphurized & Rephosphorized Grades
13XX	Manganese 1.75%
23XX	Nickel 3.50%
25XX	Nickel 5.00%
31XX	Nickel 1.25% - Chromium 0.65 or 0.80%
33XX	Nickel 3.50% - Chromium 1.55%
40XX	Molybdenum 0.25%
41XX	Chromium 0.95% - Molybdenum 0.20%
43XX	Nickel 1.80% - Chromium 0.50 or 0.80% - Molybdenum 0.25%
46XX	Nickel 1.80% - Molybdenum 0.25%
48XX	Nickel 3.50% - Molybdenum 0.25%
50XX	Chromium 0.30 or 0.60%
51XX	Chromium 0.80%. 0.95% or 1.05%
5XXX	Carbon 1.00-Chromium 0.50, 1.00 or 1.45%
51XX	Chromium 0.80 or 0.95% - Vanadium 0.10% or 0.15% min.
86XX	Nickel 0.55%-Chromium 0.50% - Molybdenum 0.20%
87XX	Nickel 0.55%-Chromium 0.50% - Molybdenum 0.25%
92XX	Manganese 0.85% - Silicon 2.00%
93XX	Nickel 3.25% - Chromium 1.20% - Molybdenum 0.12%
94XX	Manganese 1.00% - Nickel 0.45% - Chromium 0.40% - Moly. 0.12%
97XX	Nickel 0.55% - Chromium 0.17% - Molybdenum 0.20%
98XX	Nickel 1.00% - Chromium 0.80% - Molybdenum 0.25%

Spanish Fork, Utah

AISI Steel Specifications - Carbon Steel

The chemical composition ranges in the following tables represent the limits of the ladle or heat analysis for a given steel grade.

AISI No.	*Carbon*	*Manganese*	*AISI No.*	*Carbon*	*Manganese*
1005	.06 Max	.35 Max	1041	.36 - .44	1.35 - 1.65
1006	.08 Max	.25 - .40	1042	.40 - .47	.60 - .90
1008	.10 Max	.25 - .50	1043	.40 - .47	.70 - 1.00
1100	.08 - .13	.30 - .60	1045	.43 - .50	.60 - .90
1011	.08 - .13	.60 - .90	1046	.43 - .50	.70 - 1.00
1012	.10 - .15	.30 - .60	1049	.46 - .53	.60 - .90
1013	.11 - .16	.50 - .80	1050	.48 - .55	.60 - .90
1015	.13 - .18	.30 - .60	1051	.45 - .56	.85 - 1.15
1016	.13 - .18	.60 - .90	1052	.47 - .55	1.20 - 1.50
1017	.15 - .20	.30 - .60	1053	.48 - .55	.70 - 1.00
1018	.15 - .20	.60 - .90	1054	.50 - .60	.50 - .80
1019	.15 - .20	.70 - 1.00	1055	.50 - .60	.60 - .90
1020	.18 - .23	.30 - .60	1059	.55 - .65	.50 - .80
1021	.18 - .23	.60 - .90	1060	.55 - .65	.60 - .90
1022	.18 - .23	.70 - 1.00	1061	.54 - .65	.75 - 1.05
1023	.20 - .25	.30 - .60	1062	.54 - .65	.85 - 1.15
1024	.19 - .25	1.35 - 1.65	1064	.60 - .70	.50 - .80
1025	.22 - .28	.30 - .60	1065	.60 - .70	.60 - .90
1026	.22 - .28	.60 - .90	1066	.60 - .71	.85 - 1.15
1027	.22 - .29	1.20 - 1.50	1069	.65 - .75	.40 - .70
1029	.25 - .31	.60 - .90	1070	.65 - .75	.60 - .90
1030	.28 - .34	.60 - .90	1074	.70 - .80	.50 - .80
1031	.27 - .34	.30 - .60	1075	.70 - .80	.40 - .70
1033	.30 - .36	.70 - 1.00	1078	.72 - .85	.30 - .60
1034	.32 - .38	.50 - .80	1080	.75 - .88	.60 - .90
1035	.32 - .38	.60 - .90	1084	.80 - .93	.60 - .90
1036	.30 - .37	1.20 - 1.50	1085	.80 - .93	.70 - 1.00
1037	.32 - .38	.70 - 1.00	1086	.80 - .93	.30 - .50
1038	.35 - .42	.60 - .90	1090	.85 - .98	.60 - .90
1039	.37 - .44	.70 - 1.00	1095	.90 -1.03	.30 - .50
1040	.37 - .44	.60 - .90			

Woodland, Washington

AISI Steel Specifications - Resulphurized

AISI No.	Carbon	Manganese	Phosphorus (Max)	Sulphur (Max)
1108	.08 - .13	.50 - .80	.040	.08 - .13
1109	.08 - .13	.60 - .90	.040	.08 - .13
1110	.08 - .13	.30 - .60	.040	.08 - .13
1113	.10 - .16	1.00 -1.30	.040	.24 - .33
1115	.13 - .18	.60 -.90	.040	.08 - .13
1116	.14 - .20	1.10 - 1.40	.040	.16 - .23
1117	.14 - .20	1.00 - 1.30	.040	.08 - .13
1118	.14 - .20	1.30 - 1.60	.040	.08 - .13
1119	.14 - .20	1.00 - 1.30	.040	.24 - .33
1120	.18 - .23	.70 - 1.00	.040	.08 - .13
1125	.22 - .28	.60 - .90	.040	.08 - .13
1126	.23 - .29	.70 - 1.00	.040	.08 - .13
1132	.27 - .34	1.35 - 1.65	.040	.08 - .13
1137	.32 - .39	1.35 - 1.65	.040	.08 - .13
1138	.34 - .40	.70 - 1.00	.040	.08 - .13
1139	.35 - .43	1.35 - 1.65	.040	.12 - .20
1140	.37 - .44	.70 - 1.00	.040	.08 - .13
1141	.37 - .45	1.35 - 1.65	.040	.08 - .13
1144	.40 - .48	1.35 - 1.65	.040	.24 - .33
1145	.42 - .49	.70 - 1.00	.040	.04 - .07
1146	.42 - .49	.70 - 1.00	.040	.08 - .13
1151	.48 - .55	.70 - 1.00	.040	.08 - .13
1111	.13 Max	.60 - .90	.07 - .12	.08 - .15
1112	.13 Max	.70 - 1.00	.07 - .12	.16 - .23
1113	.13 Max	.70 - 1.00	.07 - .12	.24 - .33

Approximate Steel Hardness Conversion Numbers

Rockwell		*Brinell*				
C Scale 100 kg. 120 Cone	*B Scale 100 kg. 1/16" ball*	*Hardness Number*	*Diameter 3000 kg. 10mm Ball*	*Vickers*	*Shore Scleroscope*	*Tensile Strength 1000 lbs/sq"*
68	...	...	...	940	97	...
67	...	...	...	900	95	...
66	...	...	...	865	92	...
65	...	739	...	832	91	...
64	...	722	2.28	800	88	...
63	...	705	2.31	772	87	...
62	...	688	2.33	746	85	...
61	...	670	2.36	720	83	...
60	...	654	2.40	697	81	...
59	...	634	2.43	674	80	326
58	...	615	2.47	653	78	315
57	...	595	2.51	633	76	305
56	...	577	2.55	613	75	295
55	...	560	2.58	595	74	287
54	...	543	2.63	577	72	278
53	...	525	2.67	560	71	269
52	...	512	2.71	544	69	262
51	...	496	2.75	528	68	253
50	...	481	2.79	513	67	245
49	...	469	2.83	498	66	239
48	...	455	2.87	484	64	232
47	...	443	2.91	471	63	225
46	...	432	2.94	458	62	219
45	...	421	2.98	446	60	212
44	...	409	3.02	434	58	206
43	...	400	3.05	423	57	201
42	...	390	3.09	412	56	196
41	...	381	3.12	402	55	191
40	...	371	3.16	392	54	186
39	...	362	3.19	382	52	181
38	...	353	3.24	372	51	176
37	...	344	3.28	363	50	172
36	(109)	336	3.32	354	49	168
35	...	327	3.37	345	48	163
34	(108)	319	3 41	336	47	159
33	...	311	3.45	327	46	154

Approximate Steel Hardness Conversion Numbers

Rockwell		*Brinell*				
C Scale 100 kg. 120 Cone	*B Scale 100 kg. 1/16" ball*	*Hardness Number*	*Diameter 3000 kg. 10mm Ball*	*Vickers*	*Shore Scleroscope*	*Tensile Strength 1000 lbs/sq"*
32	(107)	301	3 51	318	44	150
31	(106)	294	3.54	310	43	146
30	...	286	3.59	302	42	142
29	...	279	3.63	294	41	138
28	(104)	271	3.69	286	41	134
27	(103)	264	3.74	279	40	131
26	...	258	3.78	272	38	127
25	...	253	3.81	266	38	124
24	(101)	247	3.84	260	37	121
23	100	243	3.88	254	36	118
22	99	237	3.93	248	35	115
21	...	231	3.98	243	35	113
20	98	226	4.02	238	34	110
(18)	97	219	4.09	230	33	106
(16)	95	212	4.15	222	32	102
(14)	94	203	4.24	213	31	98
(12)	91	187	4.42	196	28	90
(10)	91	187	4.42	196	28	90
(8)	90	179	4.51	188	27	87
(6)	87	171	4.58	180	26	84
(4)	85	165	4.67	173	25	80

Values in ( ) are beyond normal range and are given for information only.

Chemical Elements

Name	*Symbol*	*Atomic No.*	*Name*	*Symbol*	*Atomic No.*	*Name*	*Symbol*	*Atomic No.*
Actinium	Ac	89	Gold	Au	79	Promethium	Pm	61
Aluminum	Al	13	Hafnium	Hf	72	Protoactinium	Pa	91
Americium	Am	95	Helium	He	2	Radium	Ra	88
Antimony	Sb	51	Holmium	Ho	67	Radon	Rn	86
Argon	A	18	Hydrogen	H	1	Rhenium	Re	75
Arsenic	As	33	Indium	In	49	Rhodium	Rh	45
Astatine	At	85	Iodine	I	53	Rubidium	Rb	37
Barium	Ba	56	Iridium	Ir	77	Ruthenium	Ru	44
Berkelium	Bk	97	Iron	Fe	26	Samarium	Sm	62
Beryllium	Be	4	Krypton	Kr	36	Scandium	Sc	21
Bismuth	Bi	83	Lanthanum	La	57	Selenium	Se	34
Boron	B	5	Lead	Pb	82	Silicon	Si	14
Bromine	Br	35	Lithium	Li	3	Silver	Ag	47
Cadmium	Cd	48	Lutecium	Lu	71	Sodium	Na	11
Calcium	Ca	20	Magnesium	Mg	12	Strontium	Sr	38
Californium	Cf	98	Manganese	Mn	25	Sulfur	S	16
Carbon	C	6	Mercury	Hg	80	Tantalum	Ta	73
Cerium	Ce	58	Molybdenum	Mo	42	Technetium	Tc	43
Cesium	Cs	55	Neodymium	Nd	60	Tellurium	Te	52
Chlorine	Cl	17	Neon	Ne	10	Terbium	Tb	65
Chromium	Cr	24	Neptunium	Np	93	Thallium	Tl	81
Cobalt	Co	27	Nickel	Ni	28	Thorium	Th	90
Columbium	Cb	41	Niobium= Columbium			Thulium	Tm	69
Copper	Cu	29	Nitrogen	N	7	Tin	Sn	50
Curium	Cm	96	Osmium	Os	76	Titanium	Ti	22
Dysprosium	Dy	66	Oxygen	O	8	Tungsten	W	74
Erbium	Er	68	Palladium	Pd	46	Uranium	U	92
Europium	Eu	63	Phosphorus	P	15	Vanadium	V	23
Fluorine	F	9	Platinum	Pt	78	Xenon	Xe	54
Francium	Fr	87	Plutonium	Pu	94	Ytterbium	Yb	70
Gadolinium	Gd	64	Polonium	Po	84	Yttrium	Y	39
Gallium	Ga	31	Potassium	K	19	Zinc	Zn	30
Germanium	Ge	32	Praseodymium	Pr	59	Zirconium	Zr	40

Decimal Equivalents of Fractional Parts of an Inch

Fraction of an Inch	*Decimal of an Inch*	*Millimeters*	*Fraction of an Inch*	*Decimal of an Inch*	*Millimeters*
1/64	.015625	0.39688	33/64	.515625	13.09690
1/32	.03125	0.79375	17/32	.53125	13.49378
3/64	.046875	1.19063	35/64	.546875	13.89065
1/16	.0625	1.58750	9/16	.5625	14.28753
5/64	.078125	1.98438	37/64	.578125	14.68440
3/32	.09375	2.38125	19/32	.59375	15.08128
7/64	.109375	2.77813	39/64	.609375	15.47816
1/8	.1250	3.17501	5/8	.6250	15.87503
9/64	.140625	3.57188	41/64	.640625	16.27191
5/32	.15625	3.96876	21/32	.65625	16.66878
11/64	.171875	4.36563	43/64	.671875	17.06566
3/16	.1875	4.76251	11/16	.6875	17.46253
13/64	.203125	5.15939	45/64	.703125	17.85941
7/32	.21875	5.55626	23/32	.71875	18.25629
15/64	.234375	5.95314	47/64	.734375	18.65316
1/4	.2500	6.35001	3/4	.7500	19.05004
17/64	.265625	6.74689	49/64	.765625	19.44691
9/32	.28125	7.14376	25/32	.78125	19.84379
19/64	.296875	7.54064	51/64	.796875	20.24067
5/16	.3125	7.93752	13/16	.8125	20.63754
21/64	.328125	8.33439	53/64	.828125	21.03442
11/32	.34375	8.73127	27/32	.84375	21.43129
23/64	.359357	9.12814	55/64	.859375	21.82817
3/8	.3750	9.52502	7/8	.8750	22.22504
25/64	.390625	9.92189	57/64	.890625	22.62192
13/32	.40625	10.31877	29/32	.90625	23.01880
27/64	.421875	10.71565	59/64	.921875	23.41567
7/16	.4375	11.11252	15/16	.9375	23.81255
29/64	.453125	11.50940	61/64	.953125	24.20942
15/32	.46875	11.90627	31/32	.96875	24.60630
31/64	.484375	12.30315	63/64	.984375	25.00318
1/2	.5000	12.70003	1	1.0000	25.40005

U.S. Gallons in Round Tanks (To1 Foot Depth)

Tank Diameter		Number of U.S. Gallons	Cubic Ft. & Area in Sq. Ft.	Tank Diameter		Number of U.S. Gallons	Cubic Ft. & Area in Sq. Ft.
Feet	Inches			Feet	Inches		
1	0	5.87	.765	4	0	94.00	12.566
1	1	6.89	.922	4	1	97.96	13.095
1	2	8.00	1.069	4	2	102.00	13.635
1	3	9.18	1.227	4	3	106.12	14.186
1	4	10.44	1.396	4	4	110.32	14.748
1	5	11.79	1.576	4	5	114.61	15.321
1	6	13.22	1.767	4	6	118.97	15.90
1	7	14.73	1.969	4	7	123.42	16.50
1	8	16.32	2.182	4	8	127.95	17.10
1	9	17.99	2.405	4	9	132.56	17.72
1	10	19.75	2.640	4	10	137.25	18.35
1	11	21.58	2.885	4	11	142.02	18.99
2	0	23.50	3.142	5	0	146.88	19.63
2	1	25.50	3.409	5	1	151.82	20.29
2	2	27.58	3.687	5	2	156.83	20.97
2	3	29.74	3.976	5	3	161.93	21.65
2	4	31.99	4.276	5	4	167.12	22.34
2	5	34.31	4.587	5	5	172.38	23.04
2	6	36.72	4.909	5	6	177.72	23.76
2	7	39.21	5.241	5	7	183.15	24.48
2	8	41.78	5.585	5	8	188.66	25.22
2	9	44.43	5.940	5	9	194.25	25.97
2	10	47.16	6.305	5	10	199.92	26.73
2	11	49.98	6.681	5	11	205.67	27.49
3	0	52.88	7.069	6	0	211.51	28.27
3	1	55.86	7.467	6	3	229.50	30.68
3	2	58.92	7.876	6	6	248.23	33.18
3	3	62.06	8.296	6	9	267.69	35.78
3	4	65.28	8.727				
3	5	68.58	9.168	7	0	287.88	38.48
3	6	71.97	9.621	7	3	308.81	41.28
3	7	75.44	10.085	7	6	330.48	44.18
3	8	78.99	10.559	7	9	352.88	47.17
3	9	82.62	11.045				
3	10	86.33	11.541	8	0	376.01	50.27
3	11	90.13	12.048	8	3	399.88	53.46
				8	6	424.48	56.75
				8	9	449.82	60.13

U.S. Gallons in Round Tanks (To1 Foot Depth)

Tank Diameter		Number of U.S. Gallons	Cubic Ft. & Area in Sq. Ft.	Tank Diameter		Number of U.S. Gallons	Cubic Ft. & Area in Sq. Ft.
Feet	Inches			Feet	Inches		
9	0	475.89	63.62	14	6	1235.30	165.13
9	3	502.70	67.20	14	9	1278.20	170.87
9	6	530.24	70.88				
9	9	558.51	74.66	15	0	1321.90	176.71
				15	3	1366.40	182.65
10	0	587.52	78.54	15	6	1411.50	188.69
10	3	617.26	82.52	15	9	1457.40	194.83
10	6	640.74	86.59				
10	9	678.95	90.76	16	0	1504.10	201.06
				16	3	1551.40	207.39
11	0	710.90	95.03	16	6	1599 50	213 82
11	3	743.58	99.40	16	9	1648.40	220.35
11	6	776.99	103.87				
11	9	811.14	108.43	17	0	1697.90	226.98
				17	3	1748.20	233.71
12	0	846.03	113.10	17	6	1799.30	240.53
12	3	881.65	117.86	17	9	1851.10	247.45
12	6	918.00	122.72				
12	9	955.09	127.68	18	0	1903.60	254.47
				18	3	1956.80	261.59
13	0	992.91	132.73	18	6	2010.80	268.80
13	3	1031.50	137.89	18	9	2065.50	276.12
13	6	1070.80	143.14				
13	9	1110.80	148.49	19	0	2120.90	283.53
				19	3	2177.10	291.04
14	0	1151.50	153.94	19	6	2234.00	298.65
14	3	1193.00	159.48	19	9	2291.70	306.35

Checking the first part before production cutting begins.

Rules Relative To Measurement

To Find Side of an Inscribed Square

Multiply the diameter by 0.7071.
Or multiply the circumference by 0.2251.
Or divide the circumference by 4.4428.

Squares

A side multiplied by 1.4142 equals the diameter of its circumscribing circle.
A side multiplied by 4.443 equals the circumference of its circumscribing circle.

To Find the Area of a Circle

Multiply the circumference by one quarter of the diameter.
Or multiply the diameter squared by 0.7854.
Or multiply the circumference squared by .07958.
Or multiply $^1/_2$ of the diameter squared by 3.1416.

To Find the Surface of a Sphere or Globe

Multiply the diameter by the circumference.
Or multiply the square of the diameter by 3.1416.
Or multiply four times the square of the radius by 3.1416.

Square Measure

Square Inches		Square Feet		Square Yards		Rods		Acres
144	=	1						
1,296	=	9	=	1				
39,204	=	272.25	=	20.25				
1,568,160	=	19,890	=	1,210	=	1		
6,272,640	=	43,580	=	4,840	=	4	=	1

An acre is 69.5701 yards square; or, 208.710321 feet square.
A township is 6 miles square; equal to 36 sections.
A section is 1 mile square; equal to 640 acres.
$^1/_4$ section is $^1/_2$ mile square; equal to 160 acres.
$^1/_{16}$ section is $^1/_4$ mile square; equal to 40 acres.

U.S. & Metric Measurement Equivalents

Area

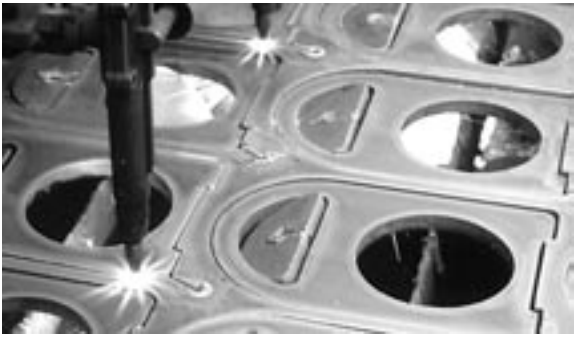
1 Centare (ca)	=	*100 square decimeters (dm^2)*
1 Centare (ca)	=	*10,000 square centimeters (cm^2)*
1 Centare (ca)	=	*1,000,000 square millimeters (mm^2)*
1 Hectare (ha)	=	*10,000 square meters (m^2)*
1 Sq. Kilometer (km^2)	=	*1,000,000 square meters (m^2)*

Length

Unit	*Millimeters*	*Centimeters*	*Inches*	*Feet*	*Yards*	*Meters*
1 Millimeter	1.0	0.1	0.03937	0.003281	0.0010936	.001
1 Centimeter	10.0	1.0	0.3937	0.032808	0.010936	.01
1 Inch	25.4001	2.54001	1.0	0.083333	0.027778	.025400
1 Foot	304.801	30.4801	12.0	1.0	0.333333	.304801
1 Yard	914.402	91.4402	36.0	3.0	1.0	.914402
1 Meter	1000.0	100.0	39.37	3.28083	1.09361	1.0
(1 Nautical Mile = 6080.2 Feet)						

Weight

Unit	*Grains*	*Grams*	*Ounces*	*Pounds*	*Kilograms*
1 Grain	1.0	0.064799	0.002286	0.000143	0.000065
1 Gram	15.4324	1.0	0.035274	0.002205	0.001
1 Ounces	437.5	28.3495	1.0	0.0625	0.028350
1 Pound	7000.0	543.592	16.0	1.0	0.453592
1 Kilogram	15432.4	1000.0	35.274	2.20462	1.0
Unit	**Kilograms**	**Pounds**	**Metric Tons**	**Net Tons (Short)**	**Gross Tons (Long)**
1 Metric Ton	1000.0	2204.62	1.0	1.10231	0.984206
1 Net (Short) Ton	907.185	2000.0	0.907185	1.0	0.892857
1 Gross (Long) Ton	1016.05	2240.0	1.01605	1.2	1.0



U.S. & Metric Measurement Equivalents (Cont.)

Area

Unit	*Square Inches*	*Square Feet*	*Square Yards*	*Square Meters*
1 Sq. Foot	144	1.0	0.1111	0.09290
1 Sq. Yard	1,296	9.0	1.0	0.83613
1 Sq. Meter	1,550	10.7639	1.19599	1.0
1 Acre	6,272,640	43,560	4,840	4,046.86
1 Sq. Mile	—	27,878,400	3,097,600	2,589,999
1 Sq. Kilometer	—	10,763,867	1,195,985	1,000,000

Volume & Capacity

1Liter	=	***100 Centiliters (cl)***
1 Liter	=	***1,000 Milliliters***
1 Dekaliter (dkl)	=	***1,000 Cubic Centimeters (cc)***
1 Dekaliter (dkl)	=	***10 Liters***
1 Hectoliter (hl)	=	***100 Liters***
1 Kiloliter (kl)	=	***1 Cubic Meter (M^3)***
1 Kiloliter ()	=	***1,000 Liters***

Volume & Capacity

Unit	**Cu. Cent.**	**Cubic Inches**	**Liters**	**Quarts (Liq.)**	**Quarts (Dry)**	**Gals. (Liq.)**	**Gals. (Dry)**	**Cubic Feet**
1 Cu. Cent	1.0	0.06102	0.001	0.00106	0.0009	0.00026	0.0002	0.00004
1 Cu. Inch	16.387	1.0	0.0164	0.01732	0.0149	0.00433	0.0037	0.00058
1 Pt. (Liq.)	473.18	28.875	0.4732	0.5	0.4297	0.125	0.1074	0.01371
1 Pt. (Dry)	550.62	33.6	0.5506	0.9081	0.5	0.14546	0.125	0.01045
1 Liter	1000.0	61.023	1.0	0.8594	0.9081	0.26417	0.227	0.03531
1 Qt. (Liq.)	946.36	57.75	0.9464	1.0	0.8594	0.25	0.2148	0.03342
1 Qt. (Dry)	1101.2	67.201	1.101	1.1637	1.0	0.29291	0.25	0.03889
1 Gal. (Liq.)	3785.4	231.0	3.785	4.0	3.438	1.0	0.8594	0.13368
1 Gal. (Dry)	4404.9	268.8	4.405	4.6546	4.0	1.1636	1.0	0.15556
1 Cu. Foot	28317.0	1728.0	28.32	29.922	25.71	7.4805	6.429	1.0
1 Bushel	35239.3	2150.4	35.24	37.237	32.0	9.3092	8.0	1.2445
1 Barrel	119241.2	7276.5	119.2	126.0	108.3	31.5	27.07	4.2109
1 Cu. Yard	764559.4	46656.0	764.6	807.9	694.3	201.97	173.6	27.0
1 Cu. Meter	1,000,000	61023.4	1000.0	1056.0	908.073	264.171	227.022	35.31447

Decimals of a Foot

Fraction	*Dec.*	*Fraction*	*Dec.*	*Fraction*	*Dec.*	*Fraction*	*Dec.*
1/16	.0052	3 1/16	.2552	6 1/16	.5052	9 1/16	.7552
1/8	.0104	3 1/8	.2604	6 1/8	.5104	9 1/8	.7604
3/16	.0158	3 3/16	.2656	6 3/16	.5158	9 3/16	.7656
1/4	.0208	3 1/4	.2708	6 1/4	.5208	9 1/4	.7708
5/16	.0260	3 5/16	.2760	6 5/16	.5260	9 5/16	.7760
3/8	.0313	3 3/8	.2813	6 3/8	..5313	9 3/8	.7813
7/16	.0365	3 7/16	.2865	6 7/16	.5365	9 7/16	.7865
1/2	.0417	3 1/2	.2917	6 1/2	.5417	9 1/2	.7917
9/16	.0469	3 9/16	.2969	6 9/16	.5469	9 9/16	.7969
5/8	.0521	3 5/8	.3021	6 5/8	.5521	9 5/8	.8021
11/16	.0573	3 11/16	.3073	6 11/16	.5573	9 11/16	.8073
3/4	.0625	3 3/4	.3125	6 3/4	.5625	9 3/4	.8125
13/16	.0677	3 13/16	.3177	6 13/16	.5677	9 13/16	.8177
7/8	.0729	3 7/8	.3229	6 7/8	.5729	9 7/8	.8229
15/16	.0781	3 15/16	.3281	6 15/16	.5781	9 15/16	.8281
1	.0833	4	.3333	7	.5833	10	.8333
1 1/16	.0885	4 1/16	.3385	7 1/16	.5885	10 1/16	.8385
1 1/8	.0938	4 1/8	.3438	7 1/8	.5938	10 1/8	.8438
1 3/16	.0990	4 3/16	.3490	7 3/16	.5990	10 3/16	.8490
1 1/4	.1042	4 1/4	.3542	7 1/4	.6042	10 1/4	.8542
1 5/16	.1094	4 5/16	.3594	7 5/16	.6094	10 5/16	.8594
1 3/8	.1146	4 3/8	.3646	7 3/8	.6146	10 3/8	.8646
1 7/16	.1198	4 7/16	.3698	7 7/16	.6198	10 7/16	.8698
1 1/2	.1250	4 1/2	.3750	7 1/2	.6250	10 1/2	.8750
1 9/16	.1302	4 9/16	.3802	7 9/16	.6302	10 9/16	.8802
1 5/8	.1354	4 5/8	.3854	7 5/8	.6354	10 5/8	.8854
1 11/16	.1406	4 11/16	.3906	7 11/16	.6406	10 11/16	.8906
1 3/4	.1458	4 3/4	.3958	7 3/4	.6458	10 3/4	.8958
1 13/16	.1510	4 13/16	.4010	7 13/16	.6510	10 13/16	.9010
1 7/8	.1563	4 7/8	.4063	7 7/8	.6563	10 7/8	.9063
1 15/16	.1615	4 15/16	.4115	7 15/16	.6615	10 15/16	.9115
2	.1667	5	.4167	8	.6667	11	.9167
2 1/16	.1719	5 1/16	.4219	8 1/16	.6719	11 1/16	.9219
2 1/8	.1771	5 1/8	.4271	8 1/8	.6771	11 1/8	.9271
2 3/16	.1823	5 3/16	.4323	8 3/16	.6823	11 3/16	.9323
2 1/4	.1875	5 1/4	.4375	8 1/4	.6875	11 1/4	.9375
2 5/16	.1927	5 5/16	.4427	8 5/16	.6927	11 5/16	.9427
2 3/8	.1979	5 3/8	.4479	8 3/8	.6979	11 3/8	.9479
2 7/16	.2031	5 7/16	.4531	8 7/16	.7031	11 7/16	.9531
2 1/2	.2083	5 1/2	.4583	8 1/2	.7083	11 1/2	.9583
2 9/16	.2135	5 9/16	.4635	8 9/16	.7135	11 9/16	.9635
2 5/8	.2188	5 5/8	.4688	8 5/8	.7188	11 5/8	.9688
2 11/16	.2240	5 11/16	.4740	8 11/16	.7240	11 11/16	.9740
2 3/4	.2292	5 3/4	.4792	8 3/4	.7292	11 3/4	.9792
2 13/16	.2344	5 13/16	.4844	8 13/16	.7344	11 13/16	.9844
2 7/8	.2396	5 7/8	.4896	8 7/8	.7396	11 7/8	.9896
2 15/16	.2448	5 15/16	.4948	8 15/16	.7448	11 15/16	.9948
3	.2500	6	.5000	9	.7500	12	1.0000

Comparison Of Gauges Used In The U.S.

O. Wire Gauge	*American*	*Birmingham*	*U.S. Standard*	*Imperial Wire*	*Stubbs Steel*	*States Plate*	*Music Wire*
000000	....	....	....	.464	....	.4687	....
00000	....	....	....	.432	....	.4375	....
0000	.4600	.454	.3938	.400	....	.4062	....
000	.4096	.425	.3625	.372	....	.3750	....
00	.3648	.380	.3310	.348	....	.3427	.0085
0	.3248	.340	.3065	.324	....	.3125	.009
1	.2893	.300	.2830	.300	.227	.2810	.010
2	.2576	.284	.2625	.276	.219	.2656	.011
3	.2294	.259	.2437	.252	.212	.2500	.012
4	.2043	.238	.2253	.232	.207	.2343	.013
5	.1819	.220	.2070	.212	.204	.2187	.014
6	.1620	.203	.1920	.192	.201	.2031	.016
7	.1442	.180	.1770	.176	.199	.1875	.017
8	.1284	.165	.1620	.160	.197	.1718	.019
9	.1144	.148	.1483	.144	.194	.1562	.022
10	.1018	.134	.1350	.128	.191	.1406	.024
11	.0907	.120	.1205	.116	.188	.1250	.027
12	.0808	.109	.1055	.104	.185	.1093	.029
13	.0719	.095	.0915	.092	.182	.0937	.030
14	.0640	.083	.0800	.080	.180	.0781	.032
15	.0570	.072	.0720	.072	.178	.0703	.034
16	.0508	.065	.0625	.064	.175	.0625	.036
17	.0452	.058	.0540	.056	.172	.0562	.038
18	.0403	.049	.0475	.048	.168	.0500	.040
19	.0358	.042	.0410	.040	.164	.0437	.042
20	.0319	.035	.0348	.036	.161	.0375	.044
21	.0284	.032	.0317	.032	.157	.0343	.046
22	.0253	.028	.0286	.028	.155	.0312	.048
23	.0225	.025	.0258	.024	.153	.0281	.050
24	.0201	.022	.0230	.022	.151	.0250	.054
25	.0179	.020	.0204	.020	.148	.0218	.058
26	.0159	.018	.0818	.018	.146	.0187	.062
27	.0141	.016	.0173	.0164	.143	.0171	.066
28	.0126	.014	.0162	.0149	.139	.0156	.070
29	.0112	.013	.0150	.0136	.134	.0140	.074
30	.0100	.012	.0140	.0124	.127	.0125	.078
31	.0089	.010	.0132	.0116	.120	.0109	.082
32	.0079	.009	.0128	.0108	.115	.0101	.086
33	.0070	.008	.0118	.0100	.112	.0093	.090
34	.0063	.007	.0104	.0092	.110	.0085	.094
35	.0056	.005	.0095	.0084	.108	.0078	.098
36	.0050	.004	.0090	.0076	.106	.0070	.102
37	.0044	....	....	.0068	.103	.0066	....
38	.0039	....	....	.0060	.101	.0062	....
39	.0035	....	....	.0052	.099	....	....
40	.0031	....	....	.0048	.097	....	....

While we give the above table for purposes of reference, there is so much chance for error in ordering by gauge number that we urge everyone to order by decimal size rather than gauge number. Steel mills roll steel sheets to U.S. Standard gauge. Plate mills usually roll to Birmingham guage, unless otherwise ordered. Bands, cold rolled strip, and spring steel are usually rolled to Birmingham guage. Round wire is rolled to Washburn & Moen (U. S. Standard) gauge.

Color Codes

To assist you in the identification of steel products purchased from PDM Steel Service Centers, please refer to the following Color Codes. The color code list which follows is arranged according to product category and description:

Hot Rolled Strip & Bars	Structural Shapes	Pipe & Round Tubing
Cold Rolled Strip & Bars	Sq. & Rectangular Tubing	Expanded Metal
Alloy Rounds	Sheet	Expanded Met. Grating
Rebar	Plate	

Hot Rolled Strip & Bars

HR Strip

Thickness	*Specification*	*Color*
1/8"	Comm.Qual.	Yellow
3/16"	Comm. Qual.	Green

HR Flats, Rounds, and Squares

Thickness	*Specification*	*Color*
.109	DuraGal	Purple
1/8"	A36	Yellow
.156"	DuraGal	Black
3/16"	A36	Green
.234"	DuraGal	Red
1/4"	A36	Red
5/16"	A36	White
3/8"	A36	Blue
7/16"	A36	Gold
1/2"	A36	Orange
9/16"	A36	Copper
5/8"	A36	Yellow
3/4"	A36	Green
7/8"	A36	Pink
1"	A36	Black
1 1/8"	A36	Yellow
1 1/4"	A36	Red
1 3/8"	A36	Blue
1 1/2"	A36	Orange
2"	A36	Black

Description	*Specification*	*Color*
HR Flat and Round (Min. 50 ksi)	A529	Blue and White
HR Flat	A572 Gr. 50	Green and White
HR Flat	C1008	Blue and Green
HR Flat and Round	C1018	Black & Blue
HR Flat, Round, and Square	C1040/1045	Green and Red
HR Flat	C1055	Green and Orange
HR Flat, Hollow, and Solid Tul Bar	C1070	Red and Orange
HR Flat, Round, Square	C1095	Silver
B.E. Weedcutter	C1055	Green
B.E. Weedcutter	C1070	Orange

Hot Rolled Bar Shapes

Bar Angles, Channels & Tees

Thickness	*Specification*	*Color*
.094"	DuraGal	Blue
1/8"	A36	Yellow
3/16"	A36	Green
Bar Tees	A36	Blue

Alloy Bars

Description	*Specification*	*Color*
HR HT Stress Relieved Round	4140	Blue and Purple
CF HT Stress Relieved Round	4140	Green and Purple
CF HT Stress Relieved Square	4130	White and Purple
CF HT Sq. (NOT Stress Relieved)	4130	White and Orange
CF Round	ETD 150®	Purple

Rebar

Description	*Specification*	*Color*
Rebar GR 40	A615	Blue
Rebar GR 60	A615	Red
Rebar GR 60 (Weldable)	A706	Yellow

Cold Finished Bars

Description	*Specification*	*Color*
CF Flat	C1018	Black
CF Round	C1018	Black
CF Rd-Drawn G.&P./T.G.&P.	C1018	Black and White
CF Round	C1045	Red
CF Round	C1215	White
CF Round-Leaded	12L14	Orange
CF Round	1117	Gold
CF Rd. Stressproof®	1144	Yellow
CF Rd. Stress Relieved	1144	Green
Fatigue Proof®	1137	Brown
Precision Ground Shaft	C1045	Pink
xx Undersize **Over 1" stored in cardboard tubes.		
CF Square	C1018	Black
CF Square (Round Corners)	C1018	Pink
CF Hex	C1018	Black
CF Hex - Leaded	12L14	Orange

Color coding tubing before it is placed into inventory in Santa Clara.

Structural Shapes

Structural Angles

Thickness	*Specification*	*Color*
.109	DuraGal	Purple
1/8"	A36	Yellow
.156"	DuraGal	Black
3/16"	A36	Green
.234"	DuraGal	Red
1/4"	A36	Red
5/16"	A36	White
3/8"	A36	Blue
7/16"	A36	Gold
1/2"	A36	Orange
5/8"	A36	Yellow
3/4"	A36	Green
7/8"	A36	Pink
1"	A36	Black

Description	*Specification*	*Color*
Wide Flange	A36	Blue
Hi Tensile	A572 Gr.50	Green & Yellow
Dual Grade	A992	Green, Blue & Yellow
M Beams (Misc.)	A36	Blue
S Beams (Std. I)	A36	Blue
H Pilings (Domestic)	A36	Blue and Red
H Pilings (Import)	A36	Blue and White
Channels		A529
Blue and White		
Channels, Standard	A36	
1st wt.		Blue
2nd wt.		Blue and Red
3rd wt.		Blue and Green
4th wt.		Blue and Yellow
Channels, Misc.	A36	Blue

Tube, Square & Rectangular (Includes DuraGal)

Wall Thickness	*Specification*	*Color*
.049	A500 A / A513	Black
.060, .063, .065	A500 A / B / C / A513	White
.072, .073, .075	A500 A / A513	Copper
.083	A500 A / B / C / A513	Pink
.090, .095	A500 A / A513	Blue
.109	A500 A / A513	Purple
.120, .125	A500 A / B / C	Yellow
.180, .188	A500 B / C	Green
.238, .250	A500 B / C	Red
.313	A500 B	White
.375	A500 B	Blue
.500	A500 B	Orange
.625	A500 B	Yellow

Tube, Pre-Primed

Wall Thickness	*Specification*	*Color*
Under 2" Sq. & 3" X 1" Rect.	A513	As Above
Over 2" Sq. & 3" X 1 1/2" Rect.	A500 B	As Above

Tube, Flashout

2.53 X 2.53 X 0.250	Red and Gold

Tube, Round HREW & CREW

Wall Thickness	*Specification*	*Color*
Mech Tube-HREW & CREW	A513-T1 & T2	Same as Square Tube

Pipe

Description	*Specification*	*Color*
Pipe Std (Sch 40)	A53A	Green
X Heavy (Sch 80)	A53A	White
Pipe Std (Sch 40)	A53B	Blue
X Heavy (Sch 80)	A53B	Red
Pre-Primed (KleenKote®) Pipe	No Grade	N/C
Uncoated Pipe	A53A	Orange
Uncoated Pipe	A53B	Pink
Uncoated Pipe (Sched. 10)	A53A	Gold

Plate

Plate products are marked with the color code for the grade on the corners of the plate. The color code for the thickness of the plate is marked as a stripe of color on the ends of the plate. (Example: $^{5}/_{8}$" A572 Gr 50 would have Green & Yellow on all four corners to denote the grade and a stripe of Blue on both ends to denote the thickness.)

Description	*Specification*	*Color Code For Grade (On all Corners)*
Hot Rolled	A36	Blue
Floor Plate	Comm. Q	No Color
Abrasion Resistant	AR235	Yellow
Brinell	321	Purple and Yellow
Brinell	360	Red and Yellow
Brinell	400	Copper and Yellow
Brinell	500	Black and Yellow
Brinell, Formable	400	White and Yellow
Brinell, Formable	440	Pink and Yellow
Brinell, Formable	500	Pink, Black and Yellow
Constructional Alloy (Tl® Type)	A514	Pink
High Strength, Low Alloy	A656 Gr 80	Pink and White
High Tensile	A572 Gr 42	Green and White
High Tensile	A572 Gr 50	Green and Yellow
High Tensile	A572 Gr 60	Green and Gray
ABS Certified	A283 Gr C	Green and Blue
Weathering	A588	Blue and Yellow
HR Corten®	A242	Blue and White
HR Pressure Vessel Quality	A516 Gr 70	White
HR Low Carbon	C1010	Copper
HR Low Carbon	C1015	Copper and Blue
HR Low Carbon (Robinson Proc.)	C1010	Copper and Purple
HR (Robinson Proc.)	A36	Blue and Purple
HR Stress Free Plate	A36	Blue and Orange
HR Stress Free Plate	C1008	Yellow and Orange
HR Stress Free Plate	A570	Red and Orange
HR Med Carbon	C1035	Orange
HR Med Carbon	C1040/1045	Green
HR Med Carbon	C1055	Green and Red

HR UM	A36	Blue
HR UM (Min. 50 ksi)	A529	Blue and White
33 Max. Carbon	33 Max. Carbon	Gold

Plate

Thickness	*Color Code/Thickness (Marked on both ends)*
3/16"	Green
1/4"	Red
5/16"	White
3/8"	Blue
7/16"	Gold
1/2"	Orange
5/8"	Yellow
3/4"	Green
7/8"	Pink
1"	Black
1 1/8"	Yellow
1 3/16"	Green
1 1/4"	Red
1 3/8"	Blue
1 1/2"	Orange
1 5/8"	Yellow
1 3/4"	Green
1 7/8"	Pink
2"	Black
2 1/8"	Yellow
2 1/4"	Red
2 1/2"	Orange
2 3/4"	Green
3"	Black
3 1/2"	Orange
4"	Black
4 1/2"	Orange

Sheet, Hot Rolled and Gauge Floor Plate

Thickness		*Specification*	*Color*
7 Ga	(.1793)	A569	Orange
10 Ga	(.1345)	A569	Gold
11 Ga	(.1196)	A569	Black
12 Ga	(.1046)	A569	Yellow
13 Ga	(.0847)	A569	Orange
14 Ga	(.0747)	A569	Red
16 Ga	(.0598)	A569	Green

Sheet Miscellaneous

Description	*Specification*	*Color*
Sheet (Calwell®)	PQ55	Red and Black
Sheet (Robinson Process)	C1010	Copper and Purple
Sheet (High Tensile)	A607 (Gr 45)	White
Sheet (High Tensile)	A607 (Gr 50)	Green and Yellow

Sheet, Cold Rolled

Thickness	*Spec.*	*Color*
10 Ga (.1345)	A366	Gold
11 Ga (.1196)	A366	Black
12 Ga (.1046)	A366	Yellow
13 Ga (.0847)	A366	Orange
14 Ga (.0745)	A366	Red
16 Ga (.0598)	A366	Green
18 Ga (.0478)	A366	Pink
20 Ga (.0359)	A366	Gold
22 Ga (.0299)	A366	Yellow
24 Ga (.0239)	A366	Red
26 Ga (.0179)	A366	Green

Sheet, Flat Galvanized

Thickness	*Spec.*	*Color*
10 Ga (.138)	A653 CQ, CTD	Gold
12 Ga (.109)	A653 CQ, CTD	Yellow
14 Ga (.079)	A653 CQ, CTD	Red
16 Ga (.064)	A653 LFQ, CTD	Green
18 Ga (.052)	A653 LFQ, CTD	Pink
20 Ga (.040)	A653 LFQ, CTD	Gold
22 Ga (.034)	A653 LFQ, CTD	Yellow
24 Ga (.028)	A653 LFQ, CTD	Red
26 Ga (.022)	A653 LFQ, CTD	Green
28 Ga (.019)	A653 LFQ, CTD	Pink
30 Ga (.016)	A653 LFQ, CTD	Gold
PQS Electro Galvanized (Chromated)	A653 Class C	As Above
PQS Wiped Galvanized (A40)	A653 LFQ	As Above
Aluzinc Plus (Steel sheet with aluminum/zinc coating)		As Above

Expanded Metal

Width of opening (color end). Thickness of strand (color side)

Opening	*Thickness*	*Color*
$1/4$"	# 6	Black
$1/2$"	# 9	Red
$1/2$"	# 10	Gold
$3/4$"	# 13	Green
1"	# 14	White
1"	# 16	Orange
1 $1/2$"	# 18	Blue
2"	# 20	Yellow

Example: $1/4$" #20—Black end, yellow side.

Expanded Metal Grating

Weight	*Spec.*	*Color*
3.00 Lb.	Comm Q	White
3.14	Comm Q	Orange
4.00	Comm Q	Yellow
4.27	Comm Q	Green
5.00	Comm Q	Blue
6.25	Comm Q	Gold
7.00	Comm Q	Red
All Other Products		No Color

Notes