



WOVEN METAL PRODUCTS

Welding Reference Guide



Experienced fabricators, unmatched precision.
Solutions at Your Service.

We're Woven Metal Products (WMP), a family-operated company based in Alvin, Texas, USA, just outside Houston.

Since 1967, we've been a trusted metal fabrication and manufacturing partner for companies of all industries and sizes.

Our team specializes in fabricating reactor and tower internals, as well as custom fabrication needs.

We can manage all your metal processing needs in-house, including punching, perforation, cutting, machining, forming, welding, and assembly.

Whatever your project requires, we'll deliver it to your exact specifications.



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Alvin, Texas, USA

Reliable Quality • **Partnership Attitude** • **Attention to Detail**



















Frequently Used Terms

- AU** – Automatic Welding
- Defect** – a discontinuity which exceeds the permissible limit of a specification; rejectable discontinuity requiring repair or replacement
- Discontinuity** – any interruption of typical structure of a material; not necessarily a defect
- MA** – Manual Welding
- ME** – Machine Welding
- MTR** – Material Test Report
- NDE/NDT** – Non-Destructive Examination/Testing
- PMI** – Positive Material Identification
- PQR** – Procedure Qualification Record
- SA** – Semi-automatic Welding
- WPQ** – Welder Performance Record
- WPS** – Welding Procedure Specification

Welding Processes

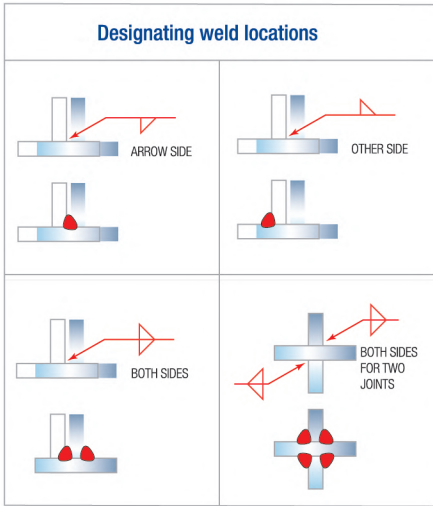
- EBW** – Electron Beam Welding
- ERW** – Electric Resistance Welding
- ESW** – Electro Slag Welding
- FCAW** – Flux Core Arc Welding
- GMAW** – Gas Metal Arc Welding
- GTAW** – Gas Tungsten Arc Welding
- LBW** – Laser Beam Welding
- OAW** – Oxyacetylene Welding
- PAW** – Plasma Arc Welding
- SAW** – Submerged Arc Welding
- SMAW** – Shielded Metal Arc Welding
- SW** – Stud Welding

Metallurgy Symbols

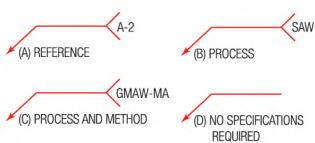
	CARBON STEEL		TYPE 316L
	TYPE 205		TYPE 317
	TYPE 410		TYPE 317L
	TYPE 430		MONEL
	TYPE 304		INCONEL
	TYPE 304L		NICKEL
	TYPE 321		SIL BRONZE
	TYPE 347		AL BRONZE
	TYPE 316		COPPER

Welding Symbols

Designating weld locations



Locations of specifications, processes, and other references on weld symbols.



Square	Scarf	V	Bevel	U	J
Flare-V	Flare bevel	Filet	Plug or slot	Stud	Spot or projection
Seam	Back or backing	Surfacing	Edge	Weld all around	Field weld
Melt through	Consumable insert (square)	Backing or spacer (rectangle)	Contour		
	Flush or flat	Convex	Concave		

AISI Thickness Tolerance Ranges

Carbon Steel Sheets/Hot Rolled,
H.R.P. & O., Cold Rolled

Gage No.	Thickness, Inches			lbs. per sq. ft.	Gage No.	Thickness, Inches			lbs. per sq. ft.
	Dec. Equiv.	Tol. Range				Dec. Equiv.	Tol. Range		
	H.R. & P&O	C.R.	Wt. Equiv.		Dec. Equiv.	C.R.	Wt. Equiv.		
4	.2242	.2332 .2152		9.1463	19	.0418	.0458 .0378	1.7052	
5	.2092	.2182 .2002		8.5344	20	.0359	.0389 .0329	1.4645	
6	.1943	.2033 .1853		7.9265	21	.0329	.0359 .0299	1.3422	
7	.1793	.1873 .1713	.1883 .1703	7.3146	22	.0299	.0329 .0269	1.2198	
8	.1644	.1724 .1564	.1734 .1554	6.7067	23	.0269	.0299 .0239	1.0974	
9	.1495	.1575 .1415	.1585 .1405	6.0989	24	.0239	.0269 .0209	0.9750	
10	.1345	.1425 .1265	.1405 .1285	5.4870	25	.0209	.0239 .0179	0.8526	
11	.1196	.1276 .1116	.1256 .1136	4.8791	26	.0179	.0199 .0159	0.7302	
12	.1046	.1126 .0966	.1106 .0986	4.2672	27	.0164	.0184 .0144	0.6690	
13	.0897	.0967 .0827	.0947 .0847	3.6593	28	.0149	.0169 .0129	0.6078	
14	.0747	.0817 .0677	.0797 .0697	3.0474	29	.0135	.0155 .0115	0.5507	
15	.0673	.0733 .0613	.0723 .0623	2.7455	30	.0120	.0130 .0110	0.4895	
16	.0598	.0658 .0538	.0648 .0548	2.4396					
17	.0538	.0598 .0478	.0548 .0498	2.1948					
18	.0478	.2332 .2152	.0518 .0438	1.9500					

For reference only.

Stainless Steel Sheet

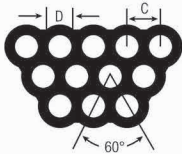
Gage No.	Thickness, Inches		Lbs. per sq. ft.	
	Dec. Equiv.	Tol. Range	Wt. Equiv. 300 Series	Wt. Equiv. 400 Series
7	0.1875	0.1945 0.1805	7.8300	7.2900
8	0.1650	0.1720 0.1580	6.8904	6.4152
10	0.1350	0.1410 0.1290	5.6376	5.2488
11	0.1200	0.1250 0.1150	5.0112	4.6656
12	0.1050	0.1100 0.1000	4.3848	4.0824
14	0.0750	0.0790 0.0710	3.1320	2.9160
16	0.0600	0.0630 0.0570	2.5056	2.3328
18	0.0480	0.0510 0.0450	2.0045	1.8662
20	0.0360	0.0380 0.0340	1.5034	1.3997
22	0.0300	0.0320 0.0280	1.2528	1.1664
24	0.0240	0.0255 0.0225	1.0022	0.9331
26	0.0180	0.0195 0.0165	0.7517	0.6998
28	0.0150	0.0165 0.0135	0.6264	0.5832

For reference only.

Open Area Calculations

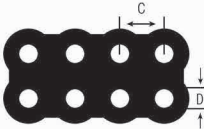
D=Hole Diameter C=Center OA=Open Area

Round Staggered



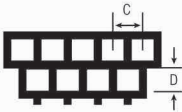
$$\frac{D^2 \times 90.69}{C^2} = \% \text{ OA}$$

Round Straight



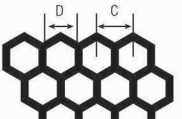
$$\frac{D^2 \times 78.54}{C^2} = \% \text{ OA}$$

Square Straight or 45° Staggered Center



$$\frac{D^2 \times 100}{C^2} = \% \text{ OA}$$

Hexagon



$$\frac{D^2 \times 100}{C^2} = \% \text{ OA}$$

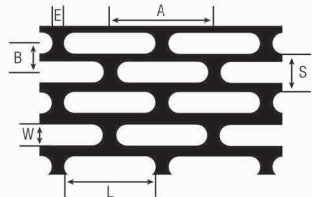
Round End Slot – Staggered Center

(Note: Straight Center is same calculation)

L = Length of Slot W = Width of Slot

A = End of Center B = Side Center

E = End Bar

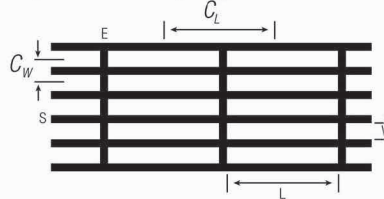


$$\text{OA} = \frac{W(L - .215W)}{AB} \times 100 = \% \text{ OA}$$

Square End Slot – Straight Center

(Note: Staggered Center is same calculation)

C_L = Center Line Length C_W = Center Line Width



$$\text{OA} = \frac{L \times W}{C_L \times C_W} \times 100 = \% \text{ OA}$$



At Woven Metal Products we strive to give you reliable quality, a partnership attitude, and extreme attention to detail.

To arrange a visit or discuss your custom fabrication needs, please contact us.



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