Engineering Specification for Weld Callouts

Sites Applicable: 19909 120th Ave NE, Suite 103, Bothell, WA 98011
2805 E. Plano Pkwy., Suite 300, Plano, TX 75074
29700 Commerce Ave., Chesterfield, MI 48051

Approved by: Matt Ahl, VP Engineering

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1. PURPOSE

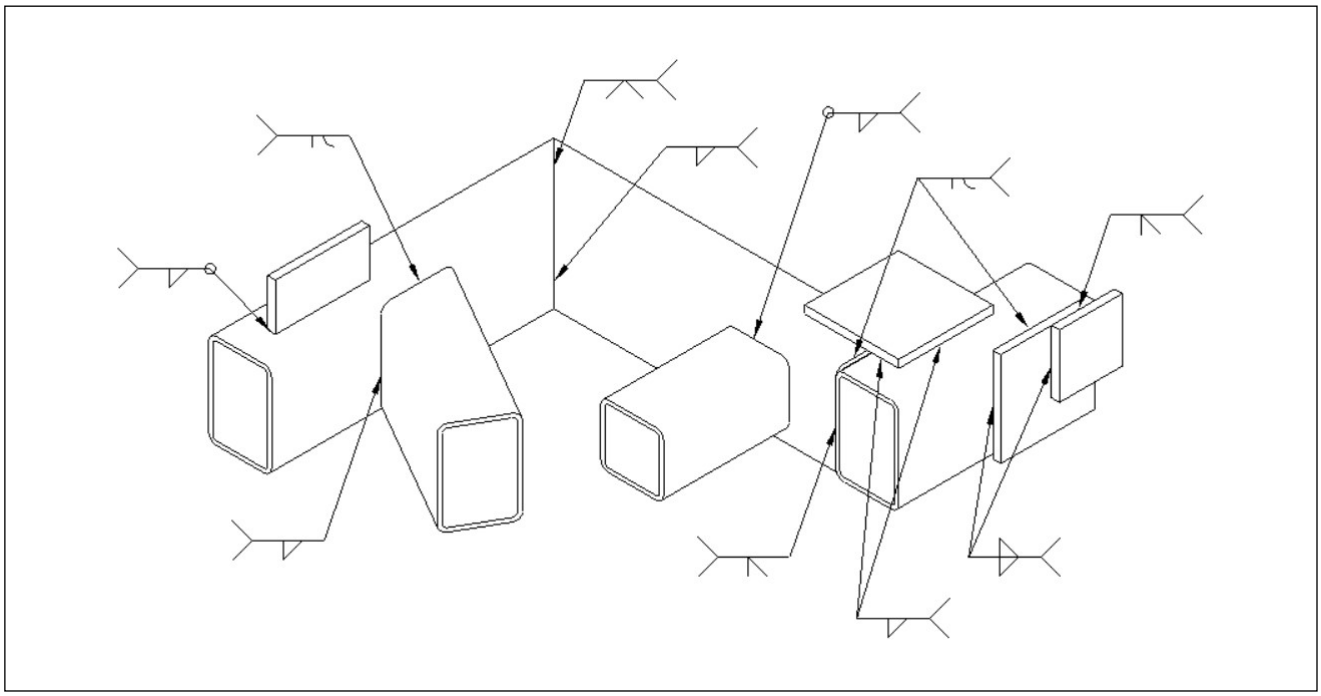
The objective of this specification is to ensure welds of proper quality, and to ensure the safety, quality and serviceability of the product without increasing cost or fabrication time.

This specification is not a quality control standard or intended to replace welding, safety & health regulations, nor does it replace the welding requirements stated on the 'issued for fabrication shop' or 'part' drawings.

2. 2D WELD SYMBOLS

2.1. Drawing Callout for Weld Symbols

2.1.1. General Weld Schematic



Note: Symbols shown above are typical for all welded joints of similar construction unless otherwise specified.

3. GENERAL WELD SIZE REQUIREMENTS

3.1. General Welding Steel

- All welds shall be in accordance with AWS D1.1.
- 100% weld required on weldments, where accessible, unless otherwise specified.

3.2. General Welding Aluminum

- All welds shall be in accordance with AWS D1.2.
- 100% weld required on weldments, where accessible, unless otherwise specified.

3.3. Minimum Weld Sizes for Fillet Welds

Base Metal Thickness (T) in Inches	**Minimum Size of Fillet Weld** (see Note 1)
T ≤ 0.250 in	1/8 in (see Note 2)
0.250 in < T ≤ 0.500 in	3/16 in
0.500 in < T ≤ 0.750 in	1/4 in
0.750 in < T	5/16 in

Data above from AWS D1.1, Table 7.7

Note:

1. Except that the weld size need not exceed the thickness of the thinner part joined.
2. Minimum size for cyclically loaded structures shall be .1875in

3.4. Minimum Weld Sizes for Groove Welds

Groove / Bevel angle (θ): 45° ≥ θ ≤ 60°

Base Metal Thickness (T) in Inches	**Minimum Size of Groove/Bevel Weld**
0.250 in < T ≤ 0.500 in	3/16 in
0.500 in < T ≤ 0.750 in	1/4 in
0.750 in < T ≤ 1.50 in	5/16 in
1.50 in < T ≤ 2.25 in	3/8 in

3.5. Intermittent Welds

- Intermittent welds are preferred for any welds over 10 inches long.
- All intermittent welds should cover 50% of total weld length unless otherwise noted.
- For decking sheets, the following intermittent welds are preferred:
  - All stitch welds on the top of decks should cover 33% of total weld length unless noted otherwise.
  - All stitch welds on the bottom of decks should cover 25% of total weld length unless noted otherwise.
- Stagger stitch welds when both sides are accessible.

4. REFERENCE WELD REQUIREMENTS

4.1. Minimum Weld Size

- Fillet weld size could not exceed the thickness of the thinner part joined.
- Minimum size for cyclically loaded structures is 3/16 in.

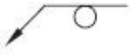
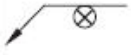
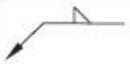
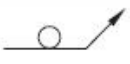
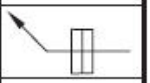
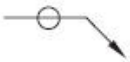
4.2. Intermittent Weld Length

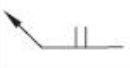
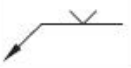
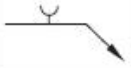
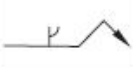
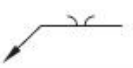
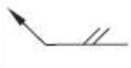
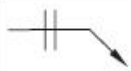
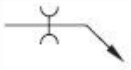
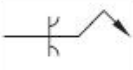
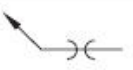
Intermittent Weld Length and Spacing			
Continuous Weld %	Length of Weld and Distance Between Centers		
75		3 - 4	
66			4 - 6
60		3 - 5	
57			4 - 7
50	2 - 4	3 - 6	4 - 8
44			4 - 9
43		3 - 7	
40	2 - 5		4 - 10
37		3 - 8	
33		3 - 9	4 - 12
30		3 - 10	
25	2 - 8	3 - 12	
20	2 - 10		
16	2 - 12		

Table from “Design of Weldments” by Blodgett

4.3. Reference Weld Symbols

Basic Welding Symbols and Their Location Significance

Location Significance	Fillet	Plug or Slot	Spot or Projection	Stud	Seam	Back or Backing	Surfacing	Edge
Arrow Side								
Other Side				Not Used			Not Used	
Both Sides		Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	
No Arrow Side or Other Side Significance	Not Used	Not Used		Not Used		Not Used	Not Used	Not Used

Location Significance	Groove							Scarf for Brazed Joint
	Square	V	Bevel	U	J	Flare-V	Flare-Bevel	
Arrow Side								
Other Side								
Both Sides								
No Arrow Side or Other Side Significance		Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used

Supplementary Symbols

Weld-All-Around	Field Weld	Melt-Thru	Consumable Insert
			(Square)

Backing/Spacer (Rectangular)	Contour		
	Flush or Flat	Convex	Concave
Backing, Spacer			

Basic Joints
Identification of Arrow Side and Other Side Joint

Butt Joint	Corner Joint
Arrow of Welding Symbol, Arrow Side of Joint, Other Side of Joint	Arrow Side of Joint, Arrow of Welding Symbol, Other Side of Joint

T-Joint	Lap Joint
Arrow of Welding Symbol, Arrow Side of Joint, Other Side of Joint	Other Side Member of Joint, Arrow Side Member of Joint, Arrow of Welding Symbol

Location of Elements of a Welding Symbol

Edge Joint

Letter Designations

Where letter designations are to be included in the tail of the welding symbol, reference is made to Table 1, Letter Designations of Welding and Allied Processes and Their Variations, of AWS A2.4-98.

American Welding Society
550 N.W. LeJeune Road
Miami, Florida 33126

5. REFERENCES

5.1. Reference Materials

- American Welding Society. AWS D1.1/D1.1M:2020 - Structural Welding Code—Steel, 24th Edition
- American Welding Society. AWS D1.2/D1.2M:2014 - Structural Welding Code—Aluminum, 6th Edition
- Blodgett O.W. - Design of Welded Structures – James Lincoln Welding Foundation 1966 14th printing 1991
- Blodgett O. W. - Design of Weldments - James Lincoln Welding Foundation 1963

REVISION HISTORY

Revision	Date	Comments	Revised By
08/11/2020	08/11/2020	Initial release.	Bret Miller
11/13/2020	11/13/2020	Added section 3.5 and 4.1 outlining intermittent welding. Updated reference material in section 4.	Bret Miller