Designation: D7447 – 08 (Reapproved 2023)

Standard Practice for Symbolizing Adhesive Applications[1]

This standard is issued under the fixed designation D7447; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers a standard symbol that may be used by the design-engineering community on engineering drawings to indicate a bonded assembly for any type of adhesive.

1.2 This design is based on criteria contained in ANSI/AWS A2.4 as well as ISO 15785.

1.3 The values given in SI units are to be regarded as the standard. The values in parentheses are for information only.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ANSI/AWS Standard:*[2]

ANSI/AWS A2.4 Symbols for Welding and Nondestructive Testing

2.2 *ISO Standard:*[2]

ISO 15785 Technical Drawings—Symbolic Presentation and Indication of Adhesive, Fold and Pressed Joints

3. Significance and Use

3.1 An adhesive symbol provides an efficient means of placing complete information about adhesives on engineering drawings. The joint is the basis of reference for the symbol to which the arrow line is pointed. The reference line of the symbol is used to designate the type of adhesive to be used, including information about its physical form, chemical technology family, requirements for surface preparation, application method (bead versus roll coat), and cure method. The optional tail (shown at left in Fig. 1) provides a place to include additional information about the adhesive that is not referenced in other notations.

3.2 Refer to Fig. 1 for an overview schematic of the adhesive symbol denoted by a mast supporting a circle with the letter "A" inside for adhesive. Detail behind each of the elements noted (for example, FORM, CHEM, APPL METH) can be found in corresponding tables in Section 5.

4. Elements of the Adhesive Symbol

4.1 The elements represented in Fig. 1 are explained in greater detail in Tables 1-5 and Fig. 2.

4.2 Fig. 3 illustrates an expanded view of the parameters detailed in the tables described in Tables 1-5 and Fig. 2.

5. References and Other Notations

5.1 *Symbols With References*—When specifications, processes, or other references are used with the adhesive symbol, the notation is placed in the tail (see "T" symbol in Fig. 1 or Fig. 3). This notation may reflect information about a particular manufacturer's product or other pertinent data not contained in the symbol elements.

5.2 *Symbols Without References*—Symbols may be used without specifications, processes, or other references when:

5.2.1 A note appears on the drawing: "Unless otherwise designated, all adhesive bonds are to be made in accordance with Specification No <XXX>."

5.2.2 The bonding procedure to be used is described elsewhere such as in shop instructions and process sheets: "Refer to Instruction <YYY> for bonding procedure."

5.3 *Orientation of Bond Joint*—The horizontal orientation is default ("parallel line" element should be omitted) or the element is present only when either inclined or vertical:

5.3.1 If vertical orientation, display lines as "| |" or

5.3.2 If inclined orientation, display lines as "//."

5.4 *Symbol Attachments to the Reference Line:*

5.4.1 Geometry of cross section of the dispensed bead style [BEAD X-SECT] and

[1] This practice is under the jurisdiction of ASTM Committee D14 on Adhesives and is the direct responsibility of Subcommittee D14.60 on Adhesive Material Classification System.

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[2] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

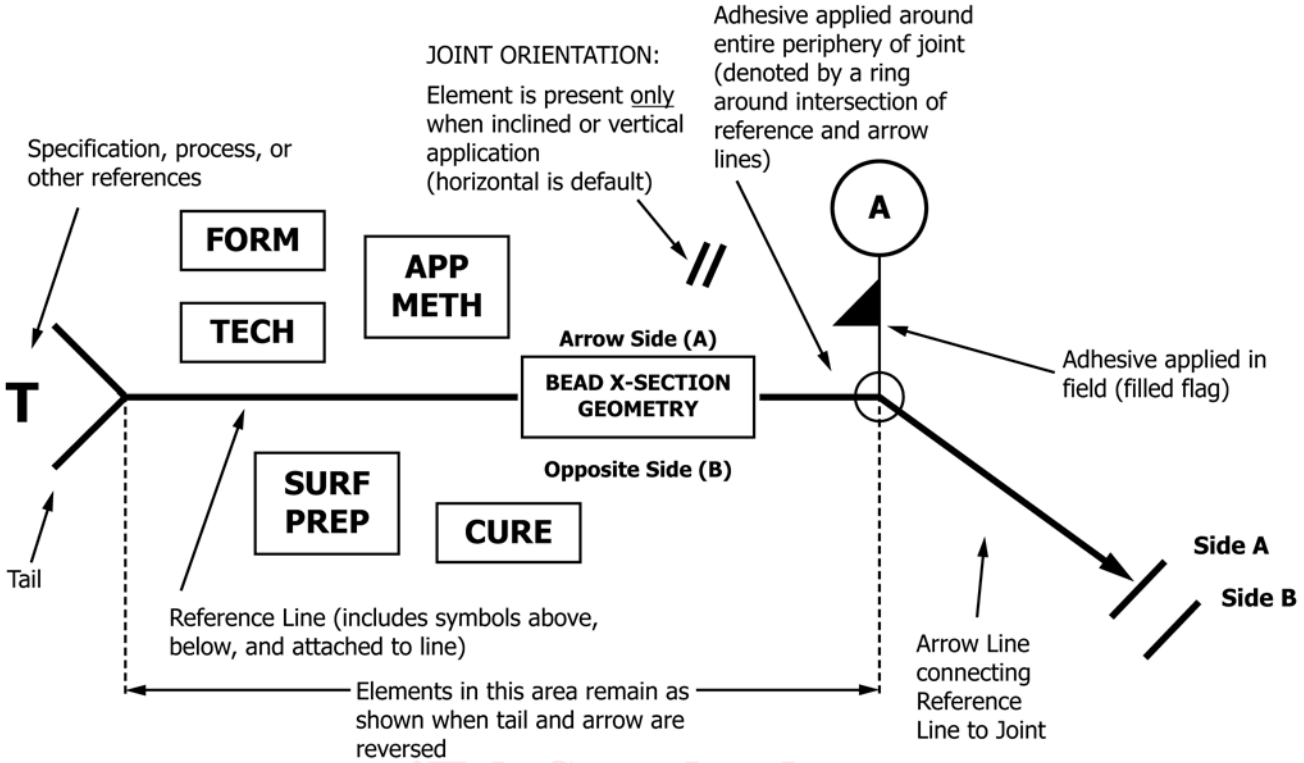


FIG. 1 Standard Locations of Elements of the Adhesive Symbol

TABLE 1 FORM
(Adhesive Physical Forms)

One-Part System	1C
Two-Part System	2C
Film	FIL
Foam	FOA
Other	(specify)

TABLE 2 TECH
(Technology Families)

Acrylic (other than AN, CA)	AC
Anaerobic	AN
Casein	CS
Cyanoacrylate	CA
Epoxy	EP
Hot Melt	HM
Melamine-Formaldehyde	MF
Phenol-Formaldehyde	PF
Polyimide	PI
Polyurethane	PUR
Polyurethane/Epoxy Hybrid	PUR/EP
Silane Modified	SL
Silicone	SI
Other	(specify)

TABLE 3 SURF PREP
(Surface Preparation)

a. DETERGENT CLEANING[A]	(insert type)
b. SOLVENT WIPE[B]	(insert type)
c. CHEMICAL TREATMENT[C]	(insert type)
d. MECHANICAL TREATMENT[D]	(insert type)
	Note (SAND grit size) or (GRIT shot size) as needed

[A] Detergent Cleaning types may include but are not limited to: (1) detergent; (2) soap; (3) caustic soda.
[B] Solvent Wipe types may include but are not limited to: (1) acetone; (2) isopropyl alcohol.
[C] Chemical Treatment types may include but are not limited to: (1) corona; (2) flame; (3) plasma; (4) chemical etching; (5) conversion coating; (6) silicatization.
[D] Mechanical Treatment types may include but are not limited to: (1) manual sanding; (2) sandblasting; (3) tumbling; (4) vapor honing. Indicate SAND grit size or GRIT shot size as needed.

5.4.2 An arrow-shaped element indicating surface application of the adhesive [APP SURF] that may be shown positioned as:

5.4.2.1 *Above line only*—If adhesive is to applied to substrate surface to which arrow is pointing,

5.4.2.2 *Below line only*—If adhesive is to be applied to substrate surface opposite to which arrow is pointing, and

5.4.2.3 *Both above and below line*—If adhesive is to be applied to both substrate surfaces.

5.5 *Symbol Attachments to the Intersection of the Reference and Arrow Lines*—A circle is noted where the adhesive is to be applied around the perimeter of a joint (for example, pipe to flange joint).

5.6 The mast line contains "A" notation to denote adhesive.

5.7 *Symbol Attachments to "Circle A" Mast Line:*

5.7.1 The presence of a filled flag indicates the adhesive is to be applied in the field and the absence of this element indicates factory application.

5.8 Fig. 4 and Fig. 5 are examples of a bonded joint before and after the use of the symbol. For illustrative purposes, assume adhesive is applied in the plant.

6. Keywords

6.1 adhesive; CAD; joint; symbol

TABLE 4 APP METH
(Application Method)

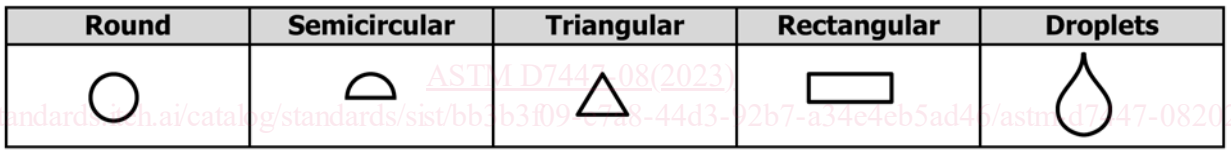
Select Dispensed Bead or Roll Coat Application	DISPENSED BEAD YES	DISPENSED BEAD NO	ROLL COAT YES	ROLL COAT NO
a. Cross Section (BEAD X-SEC)	See Fig. 2		N/A	
b. Mix Ratio (MIX)	X:Y		X:Y	
c. Applied Thickness (APP THCK) or Coat Weight (COAT WT)	Applied Thickness (dimension)		Coat Weight (wt/area)	
d. Coverage Area (AREA) (as % of total area)	N/A		A %	
e. Design (Final) Bond Line Thickness (BL THCK)	(dimension)		(dimension)	
f. Bond Line Set Method (BL SET)	Part Stand-Off (PSO): (dimension) Mechanical Spacer (MS): (dimension)		Part Stand-Off (PSO): (dimension) Mechanical Spacer (MS): (dimension)	
g. Surface of Application (APP SURF)[A]				

[A] Element is displayed above, below, or on both sides of reference line depending on which substrate surface adhesive is to be applied.

TABLE 5 CURE
(Curing Parameters)

	Exposure Time: (min)		
Heat:	Temperature: Tc°C (Tf °F) at ambient humidity		
	Heat Application Method:[A] (insert type)		
Moisture:	Exposure Time: (min)		
	Humidity Range: (% range)		
Ultraviolet Light (UV):[B]	Wavelength: (nm)	Time: (sec)	Intensity: (mW/cm^2)
Electron Beam (EB):[B]	Electron Energy: (keV)	Time: (sec)	Electron Current Density: (A/cm^2)
Radio Frequency (RF):[B]	Frequency: (Mhz, Ghz)	Time: (sec)	Intensity: (W/cm^2)
Visible Light (VIS):[B]	Wavelength: (nm)	Time: (sec)	
Other: (specify)			

[A] Heat Application Method may include but is not limited to: (1) heated press; (2) oven; (3) infrared (IR); (4) hot air impingement; (5) induction heating.
[B] At the design phase, dosage, wavelength, and time parameters may NOT be known as ultimate values will depend on the specifics of the manufacturing process; these fields should be left blank under these circumstances.



[1]Note–This criteria may only be applicable if adhesive is mastic; if self-leveling, leave blank.

FIG. 2 BEAD X-SECT[1]
(Geometry of Dispensed Bead Cross-Section)