



**Designation: X XXXX-XX**

**Work Item Number: WK14701**

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To: D14 Membership  
From: Larry Sloan, Technical Contact  
Subject: WK14701 – New Standard Practice for Symbolizing Adhesive Applications

Currently adhesives are represented in the “comments section” of drawings. Primary research with engineers and designers tells us they would find a symbol helpful in identifying bonding details on drawings. This standard provides for a symbol for adhesives which designers can use in CAD drawings. Consequently, we welcome D14 Committee’s input on the concept. A courtesy copy is being provided to C24 for information and membership in D14 is open to C24 members.

## Standard Practice for Symbolizing Adhesive Applications<sup>1</sup>

This standard is issued under the fixed designation X XXXX; 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 ( $\epsilon$ ) 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 the ANSI/AWS A2.4 standard entitled *Symbols for Welding and Nondestructive Testing* as well ISO 15785 standard *Technical Drawings – Symbolic Presentation and Indication of Adhesive, Fold and Pressed Joints*.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Significance and Use

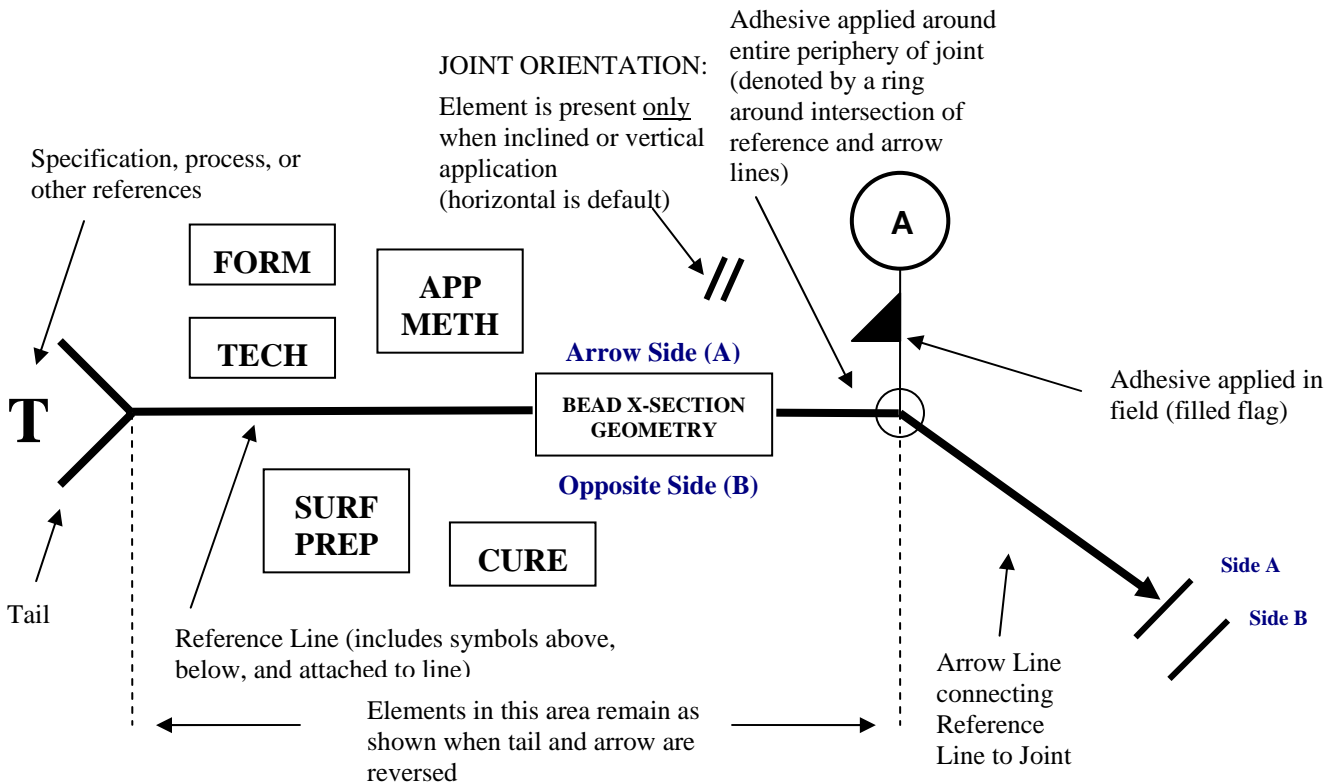
2.1 An adhesive symbol provides an efficient means of placing complete information about adhesives on engineering drawings. The joint is the basis of reference for the symbol to which the arrow line is pointed. The reference line of the symbol is used to designate the type of adhesive to be used, including information about its physical form, chemical technology family, requirements for surface preparation, application method (bead vs. roll coat), and cure method.

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<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D14 on Adhesives and is the direct responsibility of Subcommittee D14.04 on Terminology.

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.

2.2 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 (e.g. FORM, CHEM, APPL METH) can be found in corresponding tables in Section 3.



**FIG 1 Standard Locations of Elements of the Adhesive Symbol**

### 3. Elements of the Adhesive Symbol

3.1 The elements represented in Figure 1 are explained in greater detail in Tables 1-6.

**TABLE 1: FORM**  
(Adhesive Physical Forms)

<b>One-Part System</b>	<i>1C</i>
<b>Two-Part System</b>	<i>2C</i>
<b>Film</b>	<i>FIL</i>
<b>Foam</b>	<i>FOA</i>
<b>Other</b>	<i>(specify)</i>

**TABLE 2: TECH**  
(Technology Families)

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

**TABLE 3: SURF PREP**  
**(Surface Preparation)**

<b>a. DETERGENT CLEANING<sup>A</sup></b>	<i>(insert type)</i>
<b>b. SOLVENT WIPE<sup>B</sup></b>	<i>(insert type)</i>
<b>a. CHEMICAL TREATMENT<sup>C</sup></b>	<i>(insert type)</i>
<b>c. MECHANICAL TREATMENT<sup>D</sup></b>	<i>(insert type)</i> Note (SAND grit size) or (GRIT shot size) as needed



<sup>A</sup> Note – Detergent Cleaning types may include but are not limited to: (1) detergent; (2) soap; (3) caustic soda

<sup>B</sup> Note – Solvent Wipe types may include but are not limited to: (1) acetone; (2) isopropyl alcohol

<sup>C</sup> Note – Chemical Treatment types may include but are not limited to: (1) corona; (2) flame; (3) plasma; (4) chemical etching; (5) conversion coating; (6) silicization






<sup>D</sup> Note – 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.

**TABLE 4: APP METH**  
**(Application Method)**

	DISPENSED BEAD	ROLL COAT
<i>Select Dispensed Bead or Roll Coat Application</i>	<i>YES NO</i>	<i>YES NO</i>
<b>a. Cross Section (BEAD X-SEC)</b>	<b>See Table 4a</b>	N/A
<b>b. Mix Ratio (MIX)</b>	X:Y	X:Y
<b>c. Applied Thickness (APP THCK) or Coat Weight (COAT WT)</b>	<b>Applied Thickness</b> <i>(dimension)</i>	<b>Coat Weight</b> <i>(wt/area)</i>
<b>d. Coverage Area (AREA) (as % of total area)</b>	N/A	A%
<b>e. Design (Final) Bond Line Thickness (BL THCK)</b>	<i>(dimension)</i>	<i>(dimension)</i>
<b>f. Bond Line Set Method (BL SET)</b>	<b>Part Stand-Off</b> (PSO): <i>(dimension)</i> <b>Mechanical Spacer</b> (MS): <i>(dimension)</i>	<b>Part Stand-Off</b> (PSO): <i>(dimension)</i> <b>Mechanical Spacer</b> (MS): <i>(dimension)</i>
<b>g. Surface of Application (APP SURF)<sup>E</sup></b>		

<sup>E</sup> Note – Element is displayed above, below, or on both sides of reference line depending on which substrate surface adhesive is to be applied.

**TABLE 4a: BEAD X-SECT<sup>F</sup>**  
**(Geometry of Dispensed Bead Cross-Section)**

Round	Semicircular	Triangular	Rectangular	Droplets
				

<sup>F</sup> Note –This criteria may only be applicable if adhesive is mastic; if self-leveling, leave blank.

**TABLE 5: CURE**  
**(Curing Parameters)**

<b>Heat:</b>	<b>Exposure Time:</b> ( <i>min</i> )		
	<b>Temperature:</b> $T_c^{\circ}C$ ( $T_f^{\circ}F$ ) at ambient humidity		
	<b>Heat Application Method<sup>G</sup>:</b> ( <i>insert type</i> )		
<b>Moisture:</b>	<b>Exposure Time:</b> ( <i>min</i> )		
	<b>Humidity Range:</b> ( <i>% range</i> )		
<b>Ultraviolet Light (UV)<sup>H</sup>:</b>	<b>Wavelength:</b> ( <i>nm</i> )	<b>Time:</b> ( <i>sec</i> )	<b>Intensity:</b> ( <i>mW/cm<sup>2</sup></i> )
<b>Electron Beam (EB)<sup>H</sup>:</b>	<b>Electron Energy:</b> ( <i>keV</i> )	<b>Time:</b> ( <i>sec</i> )	<b>Electron Current Density:</b> ( <i>A/cm<sup>2</sup></i> )
<b>Radio Frequency (RF)<sup>H</sup>:</b>	<b>Frequency:</b> ( <i>Mhz, Ghz</i> )	<b>Time:</b> ( <i>sec</i> )	<b>Intensity:</b> ( <i>W/cm<sup>2</sup></i> )
<b>Visible Light (VIS)<sup>H</sup>:</b>	<b>Wavelength:</b> ( <i>nm</i> )	<b>Time:</b> ( <i>sec</i> )	
<b>Other:</b> ( <i>specify</i> )			

<sup>G</sup> Note – 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

<sup>H</sup> Note – 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.

3.2 Figure 2 illustrates an expanded view of the parameters detailed in the tables described above.

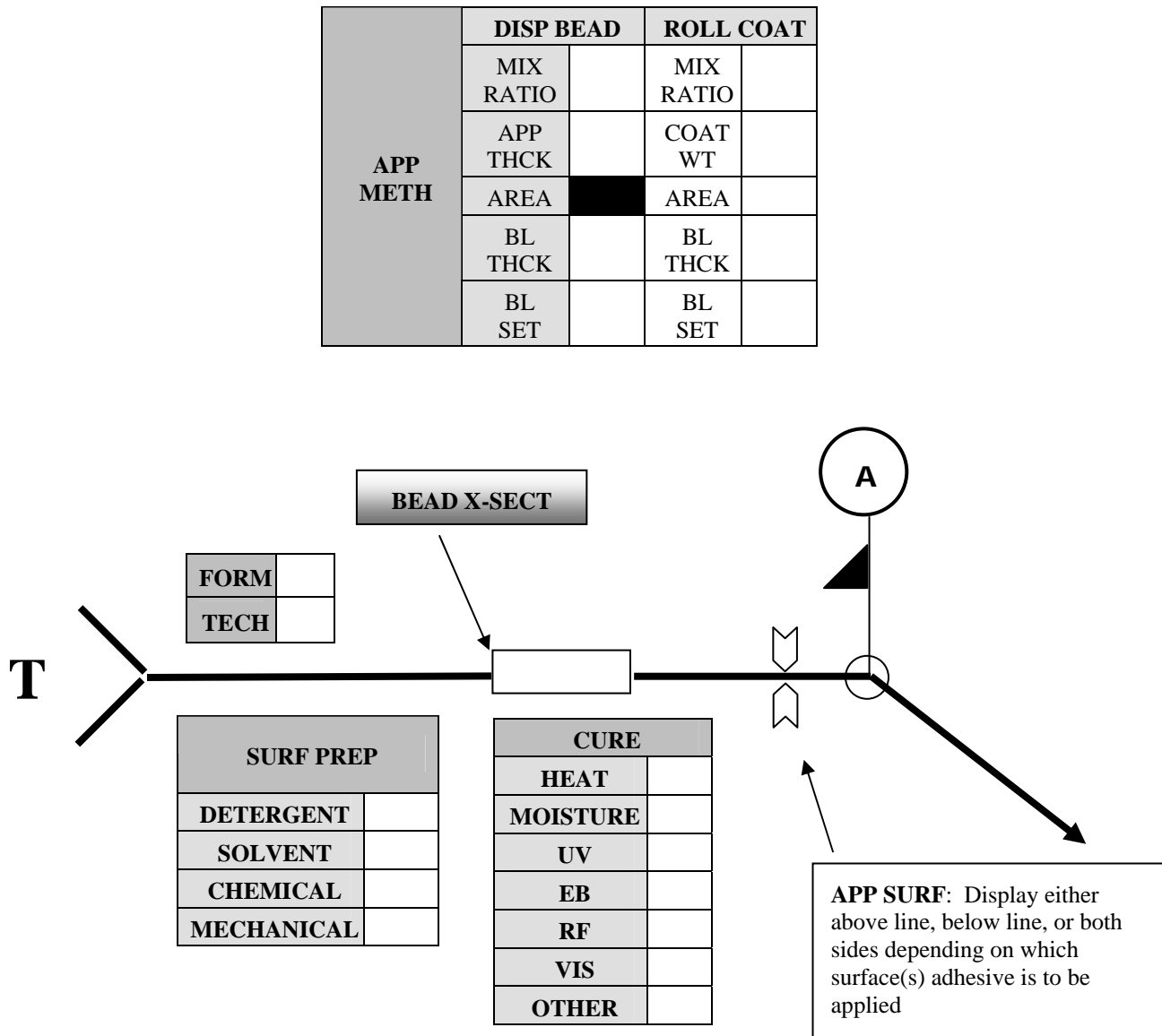


FIG 2 Expanded Detail of Elements of the Adhesive Symbol

## 4. References and Other Notations

4.1 *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 FIGS 1 or 2). This notation may reflect information about a particular manufacturer’s product or other pertinent data not contained in the symbol elements.

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

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

4.2.2 The bonding procedure to be used is described elsewhere such as in shop instructions and process sheets: “Refer to Instructions <YYY> for bonding procedure.”)

4.3 *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:

4.3.1 If vertical orientation, display lines as “| |” or

4.3.2 If inclined orientation, display lines as “/ /.”

4.4 *Symbol Attachments to the Reference Line*

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

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

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

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

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

4.5 *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).

4.6 The mast line contains “A” notation to denote adhesive.

4.7 *Symbol Attachments to “Circle A” Mast Line*

4.7.1 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.

4.8 Figures 3 and 4 are examples of a bonded joint before and after the use of the symbol.

For illustrative purposes, assume adhesive is applied in the plant.

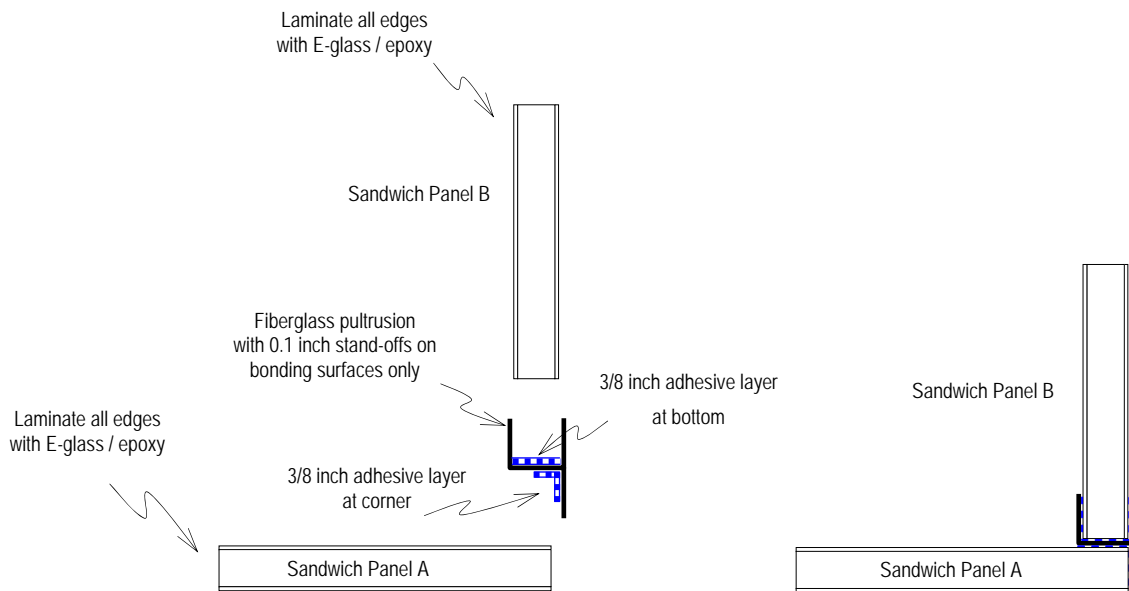
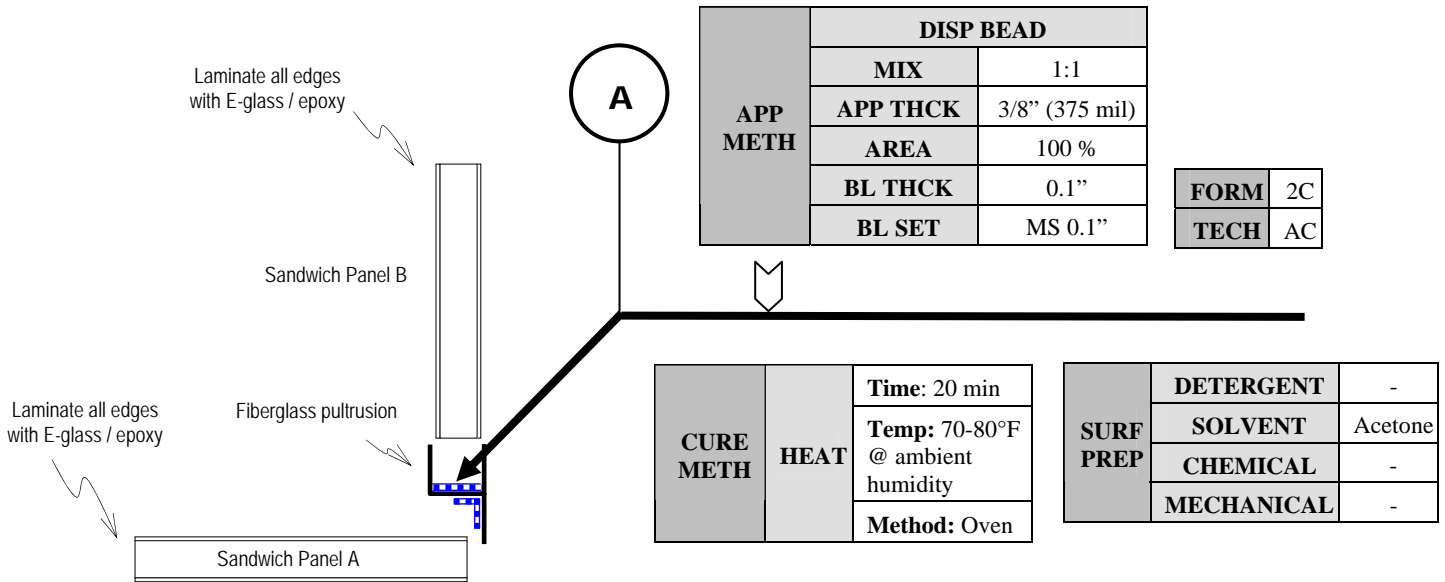


Figure 3a. Exploded View for Assembly

Figure 3b. Bonded Assembly

**FIG 3 Drawing Before Symbol**



**FIG 4 Application of Symbol (1 in. = 2.54 cm and  $t_{\text{C}} = (t_{\text{F}} - 32)/1.8$ )**  
*(for clarity, symbol is shown for upper adhesive bond only)*

## 5. Keywords

5.1 adhesive; CAD; joint; symbol