BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 2.70

PRODUCTION PROCESS STANDARD

Installation of Click Bond Adhesive Bonded Fasteners, Tie Mounts and Patches

Issue 9
- This standard supersedes PPS 2.70, Issue 8.
- Vertical lines in the left hand margin indicate technical changes over the previous issue.
- Direct PPS related questions to PPS.Group@aero.bombardier.com or (416) 375-4365.
- This PPS is effective as of the distribution date.

Prepared By:	(Michael Wright)	January 6, 2014
	Production Process Standards (PPS)	
Approved By:	(L.K. John)	January 7, 2014
	Materials Technology	
	(Adam Gordon)	January 9, 2014
	Quality	

Table of Contents

1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for the installation of Click Bond adhesive bonded fasteners, tie mounts and patches.

1.1.1 This PPS complements the engineering drawings that specify its use as an authorized instruction. The procedure specified in this PPS must be followed to ensure compliance with all applicable specifications. In general, if this PPS conflicts with the engineering drawing, follow the engineering drawing. The requirements specified in this PPS are necessary to fulfil the engineering design and reliability objectives.

1.1.2 Refer to PPS 13.26 for the subcontractor provisions applicable to this PPS.

1.1.3 Procedure or requirements specified in a Bombardier BAPS, MPS, LES or P. Spec. **do not** supersede the procedure or requirements specified in this PPS.

2 Hazardous Materials

2.1 Before receipt at Bombardier Toronto (de Havilland), all materials must be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier Toronto (de Havilland) Environment, Health and Safety Department. Refer to the manufacturer's MSDS for specific safety data on any of the materials specified in this PPS. If the MSDS is not available, contact the Bombardier Aerospace Toronto Environment, Health and Safety Department.

3 References

3.1 PPS 13.13 - Personal Protective Respiratory Equipment.

3.2 PPS 13.26 - General Subcontractor Provisions.

3.3 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.4 PPS 15.04 - Use of Felt Tip Markers for Marking Aircraft Parts and Assemblies.

3.5 PPS 25.52 - Bonding using DHMS A6.12 Type I Adhesive.

3.6 PPS 25.66 - Cleanliness Requirements for Application of Adhesives.

3.7 PPS 31.17 - Solvent Usage.

4 Materials, Equipment and Facilities

4.1 Materials

4.1.1 Adhesive bonded fasteners, tie mounts and patches as specified on the engineering drawing.

4.1.2 Abrasive pads (e.g., Scotch-Brite pads, 3M Canada Ltd., Type A Fine or Medium).

4.1.3 Acrylic structural adhesive kit, TSL Aerospace Technologies, CB200.

4.1.4 Adhesive cartridge, TSL Aerospace Technologies, CB200-40.

4.1.5 DHMS A6.12 Type I adhesive.

4.1.6 Lord 201/19 acrylic adhesive (e.g., 25 ml cartridge kit).

4.2 Equipment

4.2.1 Manual adhesive dispenser with mixing tip (e.g., TSL Aerospace Technologies CB100-81 manual adhesive dispenser with a CB106 mixing tip).

4.2.2 Hot air gun (e.g., Steinel STEI-HG2310-BB or Click Bond CB 115). For safety reasons, it is recommended that hot air guns include a power interrupt reset feature which will prevent an unattended heat gun from resuming heat (e.g., after a power failure). The heat gun **must** be temperature controlled to prevent heat damage to the structure.

4.2.3 Protective neoprene (e.g., DSC 422-5) or rubber (e.g., DSC 422-2) gloves.

4.2.4 Tempilstik, temperature indicating crayon, 182°F (83°C) temperature rating. Melting of the Tempilstik indicates that the temperature rating of the Tempilstik has been reached (i.e., for a 182°F (83°C) rated Tempilstik, melting of the marking will indicate that a temperature of 180°F (82°C) has been exceeded).

4.2.5 Wiping cloths (e.g., DSC 378-2).

4.3 Facilities

4.3.1 This PPS has been categorized as a “Controlled Special Process” according to PPS 13.39 and as such only facilities specifically approved according to PPS 13.39 are authorized to perform installation of Click Bond adhesive bonded fasteners, tie mounts and patches according to this PPS.

4.3.2 Bombardier subcontractors must direct requests for approval to Bombardier Aerospace Supplier Quality Management. Bombardier Aerospace facilities must direct requests for approval to the appropriate internal Quality Manager.

4.3.3 Facility approval shall be based on a facility report, a facility survey and completion of a qualification test program, if required. The facility report must detail the materials and equipment to be used, the process sequence to be followed and the laboratory facilities used to show compliance with the requirements of this PPS. Any deviation from the procedure or requirements of this PPS must be detailed in the facility report. Based upon the facility report, Bombardier Toronto (de Havilland) Materials Technology may identify additional qualification and/or process control test requirements. During the

facility survey, the facility requesting qualification must be prepared to demonstrate their capability. Once approved, no changes to subcontractor facilities may be made without prior written approval from Bombardier Aerospace Supplier Quality Management.

4.3.3.1 Unless otherwise specified by Bombardier Aerospace Supplier Quality Management, for approval of subcontractor facilities to perform installation of Click Bond adhesive bonded fasteners, tie mounts and patches according to this PPS completion of a test program and submission of suitable test samples representative of production parts is required. Test samples must meet the requirements specified in section 6.

5 Procedure

5.1 General

5.1.1 Unless otherwise specified herein, for the purposes of this standard the term Click Bond includes Click Bond adhesive bonded fasteners, tie mounts and patches.

5.1.2 Adhesive application, positioning of the Click Bond and clamping (i.e., section 5.4, Step 1 through Step 4) must all take place before the working time of the mixed adhesive expires (e.g., 5 minutes at 75°F (24°C) for CB200 and CB200-40 adhesive). Any movement of the parts after the working time of the adhesive has expired will result in lower bonding strength and is not acceptable.

5.1.3 Ensure that the area in which Click Bonds are being applied meets the requirements of PPS 25.66. If possible, for optimum bonding, install Click Bonds when the ambient temperature is between 65°F and 85°F (18°C - 29°C) and the relative humidity is below 60%. Take reasonable care to avoid installing Click Bonds when the optimum conditions can not be met.

5.1.4 For installation of Click Bonds it is acceptable to use the CB200 acrylic structural adhesive kit (see para. 4.1.3), the CB200-40 adhesive cartridge (see para. 4.1.4), DHMS A6.12 Type I adhesive or Lord 201/19 acrylic adhesive. Except as otherwise noted in this PPS, refer to PPS 25.52 for the procedure and requirements for bonding using DHMS A6.12 Type I adhesive.

5.1.5 Whenever using a hot air gun or heat gun (ref. para. 4.2.2) take care to ensure not to use too high a heat setting. The heat setting used must be appropriate to the task the hot air gun is being used for without causing damage to parts or surrounding structure. If necessary use heat guards to protect surrounding structure. If unsure what heat setting to use, start at a lower temperature setting and increase slowly to determine the proper setting. For the usage specified herein (i.e., removal of installed Click Bonds), do not set the portable temperature controlled heat gun higher than 180°F (82°C).

5.2 Preparation of Bonding Surfaces

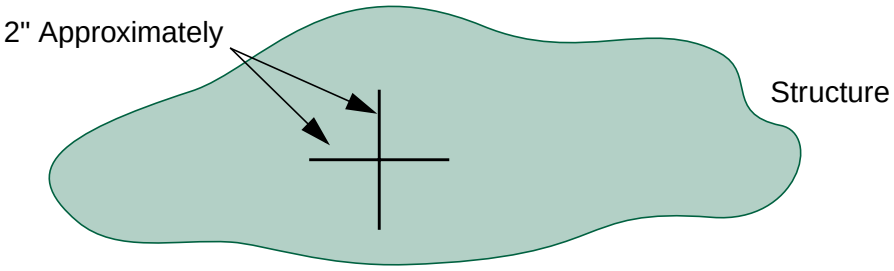
5.2.1 Prepare bonding surfaces as follows:

Step 1. Apply Click Bonds to chemical conversion coated (e.g., alodined) or primed surfaces **only**. If the contact surface of the structure has been top-coated and was not masked, locally remove the top-coat using chemical stripper or locally abrade using an abrasive pad.

Step 2. Lightly abrade the base plate of the Click Bond and the contact surface of the structure at the location specified on the Engineering drawing using a Scotch-Brite pad.

Step 3. Solvent clean the contact surfaces of the base plate and structure according to PPS 31.17.

Step 4. Mark the location of the Click Bond as specified on the engineering drawing, using a non-permanent marker according to PPS 15.04.



5.3 Preparation of Adhesive

5.3.1 When using adhesive from the CB200 acrylic structural adhesive kit (see para. 4.1.3), prepare adhesive for bonding as follows:

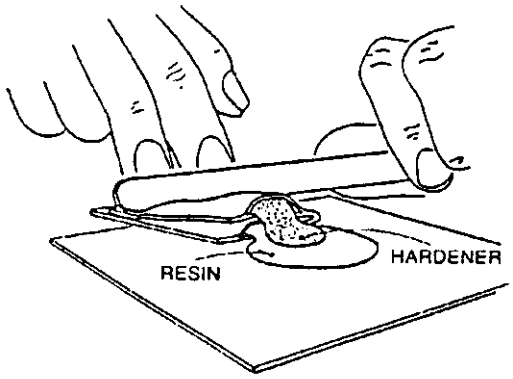
Step 1. Use the mixing stick to flatten one end of the packet to move the contents to the opposite end.

Step 2. Tear off a strip from the flattened end to open both compartments of the packet.

Step 3. Fold the packet in half lengthwise so that the adhesive components overlap each other.

Step 4. Lay the folded packet on a clean plastic mixing sheet.

Step 5. Push out the entire contents of the packet by pressing down hard with the edge of the mixing stick. Make sure all of both components are forced out of the compartments of the packet.



Step 6. Quickly examine the component material to ensure that the components have an even consistency and are free of lumps and striations.

Step 7. Mix the components thoroughly until the mixture is a uniform colour. Wipe the mixing stick against the plastic sheet several times during mixing to get all of the clinging components mixed in.

5.3.2 When using the CB200-40 adhesive cartridge/dispensing tool with a static mixing tip, prepare the adhesive as follows:

Step 1. Place the cartridge into the retaining lip of the dispensing tool.

Step 2. Remove the cartridge end cap.

Step 3. Activate the tool slightly to extrude a small amount of adhesive onto a scrap piece of material to ensure adequate flow of both components.

Step 4. Attach the static mixing tip.

Step 5. Dispense a small line of adhesive onto a piece of scrap material to ensure adequate mixing.

5.3.3 When using DHMS A6.12 adhesive, prepare the adhesive according to PPS 25.52.

5.3.4 When using Lord 201/19 acrylic adhesive, prepare the adhesive as follows:

Step 1. Add Accelerator 19 to Lord 201 acrylic adhesive with a mixing ratio of 10 parts Lord 201 acrylic adhesive to 5 parts Accelerator 19. Use of pre-measured mixing kits is recommended.

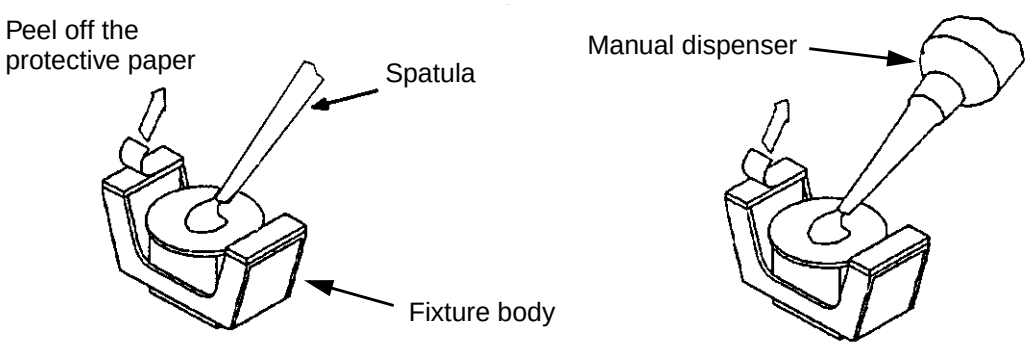
Step 2. Mix thoroughly to an even consistency.

Step 3. Apply the adhesive within its working life (approximately 5 - 8 minutes at 75°F (24°C)).

5.4 Installation of Click Bonds

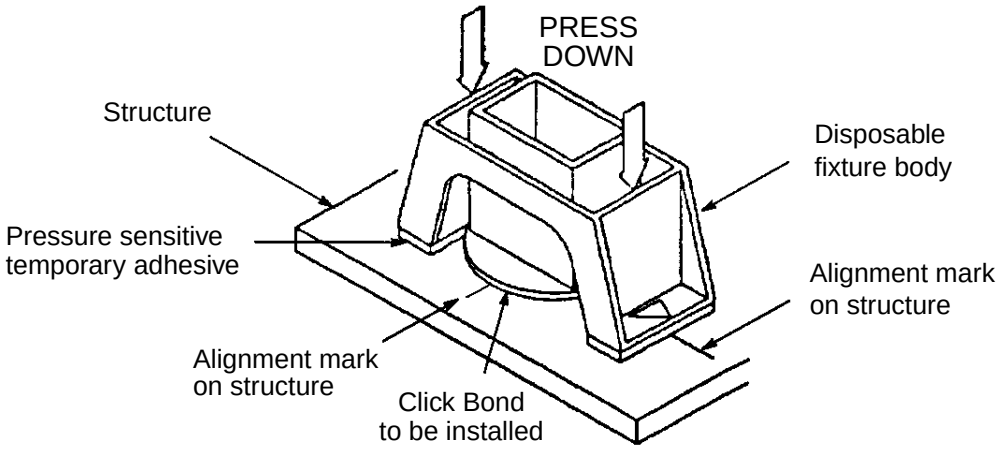
5.4.1 Install Click Bonds (see para. 4.1.1) as follows:

Step 1. Apply a spot of mixed adhesive (CB200, CB200-40, DHMS A6.12 Type I or Lord 201/19) approximately 5/8" in diameter to the base plate of the Click Bond. Apply sufficient adhesive to ensure 100% joint fill between the mating surfaces when parts are mated.



Step 2. Peel off the protective paper from the base of the fixture body.

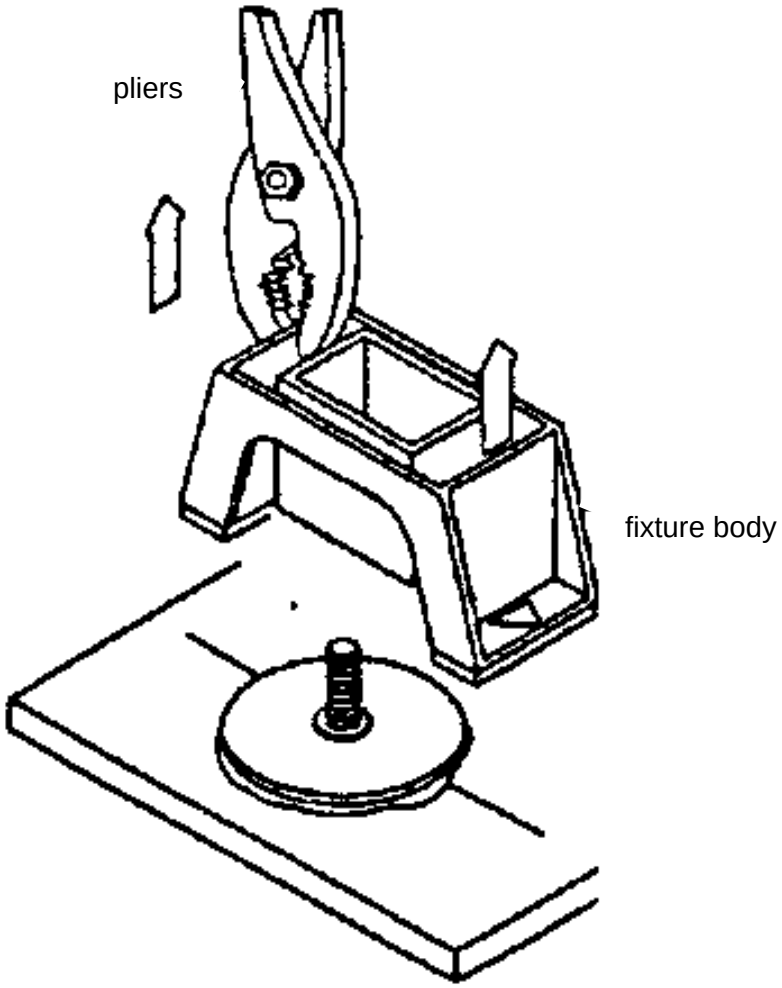
Step 3. Place the Click Bond assembly at the location marked and press the outer edge against the structure, ensuring that the Click Bond assembly is correctly aligned against the marks on the structure.



Step 4. Press down firmly on the centre of the Click Bond fixture assembly until it toggles (clicks). When installing Click Bond Adhesive bonded fasteners, do **not** press on the protruding fastener.

Step 5. Allow the adhesive to cure. If DHMS A6.12 Type I adhesive was used, refer to PPS 25.52 for the cure requirements (full cure required before removing the disposable fixture body). If CB200, CB200-40 or Lord 201/19 adhesive was used, allow a minimum of 15 minutes before any further handling and at least 2 full hours before removing the disposable fixture body.

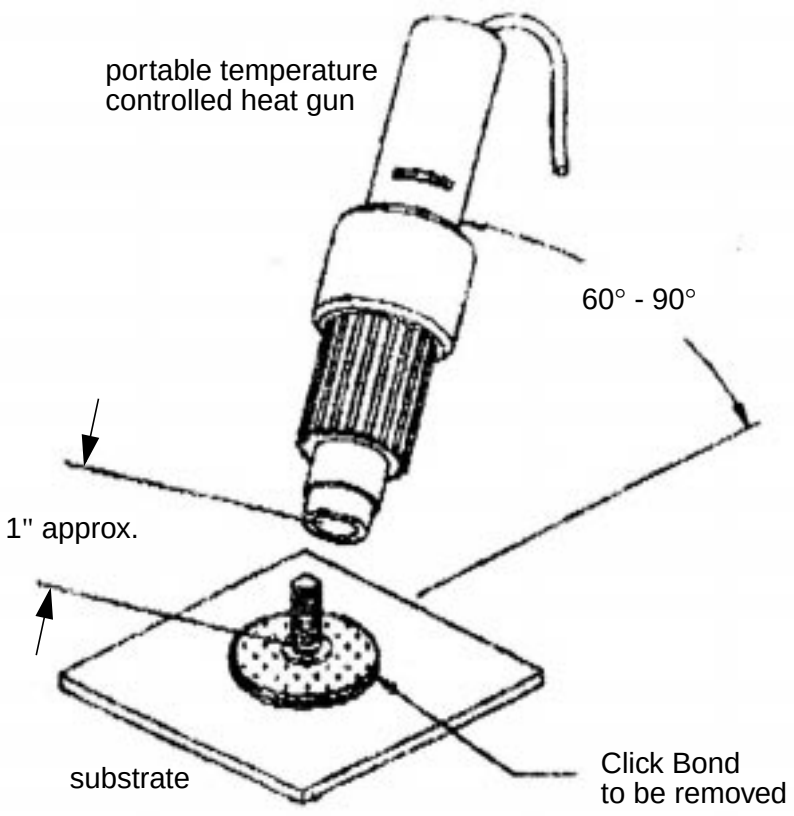
Step 6. Remove the disposable fixture body using pliers as shown below and discard.



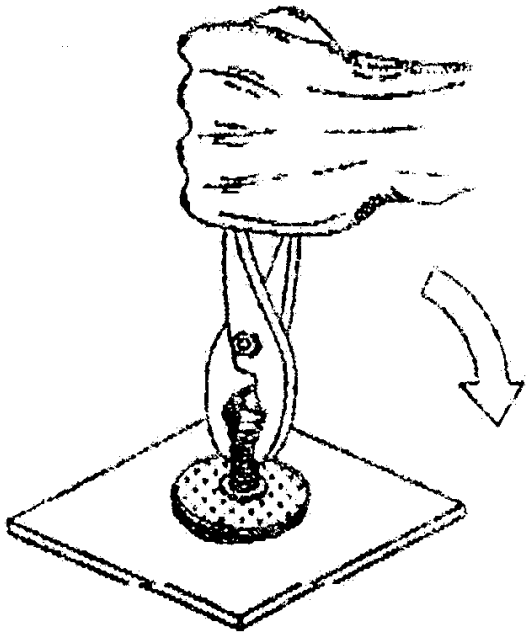
5.5 Removal of Installed Click Bonds

5.5.1 Only if authorized in writing (e.g., via NCR) by Liaison Engineering or by engineering drawing notation, remove bonded Click Bonds as follows:

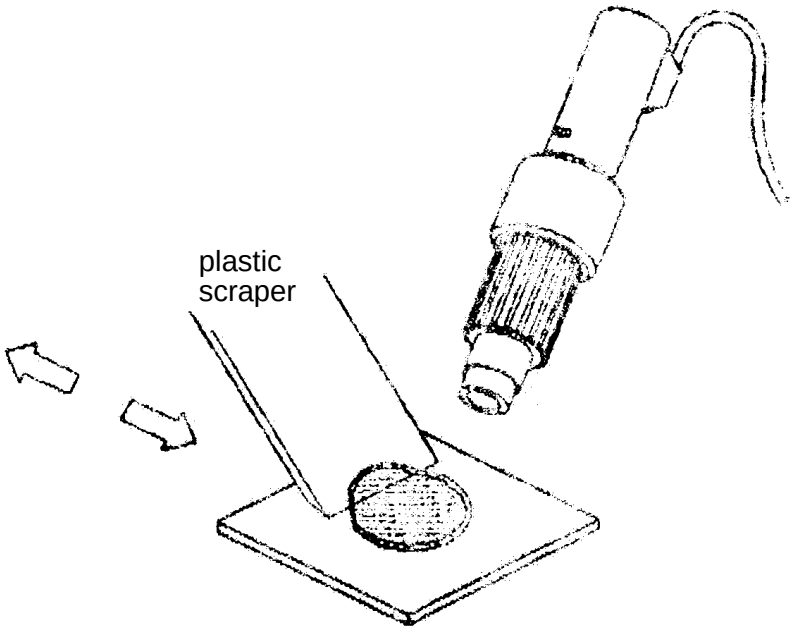
Step 1. Using a portable temperature controlled heat gun (ref. para. 4.2.2), apply heat directly to the installed Click Bond. Set the portable temperature controlled heat gun to no more than 180°F (82°C). Mark the immediate area of the surrounding structure with a 182°F (83°C) rated Tempilstik (ref. para. 4.2.4) or use some other suitable temperature indicating device to ensure that the surrounding structure is not heated over 180°F (82°C); if the structure is heated over 180°F (82°C), indicated by melting of the Tempilstik marking, refer to Liaison Engineering for disposition. If necessary, protect adjacent heat sensitive components by covering with a conformal mask cut from silicone rubber sheet that can be draped over the parts with a hole cut into it to expose the Click Bond. In order to minimize heating of the substrate, hold the heat gun so that the air stream on the Click Bond is as near to a right angle to the substrate as possible. Position the tip of the heat gun so that it is centred on the Click Bond and about one inch away from the base plate. Apply heat to the Click Bond for 30 - 45 seconds to soften the adhesive.



Step 2. Once the adhesive has been softened by heating, promptly grasp the Click Bond using pliers and tip it off the surface such that bond stress is maximized at the bond line and, using steady pressure, pull the Click Bond free.



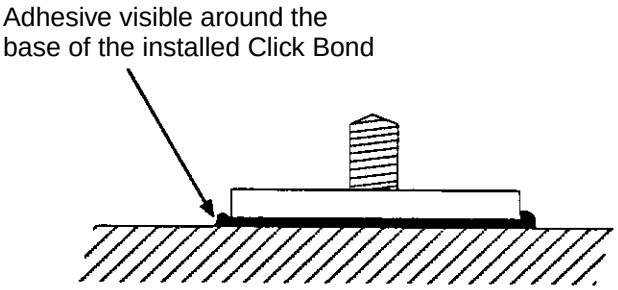
Step 3. Remove residual adhesive from the structure by again applying heat for a short time (10 - 15 seconds) using a portable temperature controlled heat gun set to a temperature of no more than 180°F (82°C) and then scraping using a flat **plastic** scraper, working circumferentially around the edge of the adhesive. **DO NOT** use metallic tools as damage to the structure may result. Take care not to damage or scratch the structure; if the structure is damaged or heated above 180°F (82°C), refer to Liaison Engineering for disposition.



Step 4. If a Tempilstik has been used to ensure that the surrounding structure has not been heated over 180°F (82°C), use a damp cloth (ref. para. 4.2.5) to remove the Tempilstik markings.

6 Requirements

6.1 A continuous adhesive bead must be visible around the base of the installed Click Bond.



6.2 Except as noted in para. 6.2.1, bonding areas must meet the clean area requirements specified in PPS 25.66.

6.2.1 If possible, for optimum bonding, Click Bonds should be installed when the ambient temperature is between 65°F and 85°F (18°C - 29°C) and the relative humidity is below 60%. Reasonable care must be taken to avoid installing Click Bonds when the optimum conditions can not be met.

7 Safety Precautions

7.1 Observe general shop safety precautions when performing the procedure specified herein.

7.2 Wear protective neoprene or rubber gloves when handling adhesives.

7.3 Avoid skin contact with adhesive components. If contact occurs, wash the contact area thoroughly with soap and water. If skin irritation occurs, contact the Health Centre and a physician.

7.4 Avoid eye contact with adhesive components. If contact occurs, flush eyes immediately with large quantities of water at an eye wash station and report to the Health Centre.

7.5 Keep all adhesive components away from fire and other sources of ignition.

7.6 Dispose of used rags, mixing tips, adhesive cartridges and any unused mixed adhesive in specially marked containers.

7.7 Ensure that sufficient ventilation is supplied when using adhesive in confined areas. Avoid inhalation of vapors from mixed adhesive and its components. Use of personal protective respiratory equipment as specified in PPS 13.13 is recommended.

8 Personnel Requirements

8.1 This PPS has been categorized as a “Controlled Special Process” by PPS 13.39. Refer to PPS 13.39 for personnel requirements.