FUEL, WEATHER AND HIGH-TEMPERATURE SEALING - MAINTENANCE PRACTICES

1. General

A. This section provides instructions and details for various sealing applications. This section is generic to many Cessna products and may cover applications which are not used on the Model 208. Refer to specific maintenance practices to determine sealing applicability.

B. Sealing is intended to prevent the leakage of liquids, vapors or air pressure through airframe structure. Sealing is required for protection of personnel and equipment.

2. Tools and Equipment

NOTE: Specified sealants, cleaning solvents, parting agents, adhesion inhibitors and equipment are listed for use. Suitable substitutes may be used for sealing equipment only.

Table 201. Sealants Type I, Class A-1/2, or A-2 - AMS-S-8802

NAME	NUMBER	MANUFACTURER	USE
Sealants	P/S 890 Class A-2	PRC-DeSoto International 5426 San Fernando Rd. Glendale, CA 91209	Fuel, pressure and weather sealant brush application.
	PR-1440 Class A-1/2 Class A-2	PRC-DeSoto International	
	AC-236	Advanced Chemistry Technology Garden Grove, CA 92641	

Table 202. Sealants Type I, Quick Repair - MIL-S-83318

NAME	NUMBER	MANUFACTURER	USE
Sealants	PS 860 Class B-1/6	PRC-DeSoto International	Fuel, pressure and weather sealant. For limited repairs requiring rapid curing sealant.

Table 203. Sealants Type I, Class B-1/2, B-2 or B-4 - AMS-S-8802

NAME	NUMBER	MANUFACTURER	USE
Sealants	Pro-Seal 890 Class B-1/2 Class B-2 Class B-4	PRC-DeSoto International	Fuel, pressure and weather sealant spatula, faying seals application.
	PR-1440 Class B-2 Class B-4	PRC-DeSoto International	
	AC-236 Class B-2 Class B-4	Advanced Chemistry Technology	

Table 204. Sealants Type I, Class C-20, C-48 or C-80

NAME	NUMBER	MANUFACTURER	USE
Sealant	Pro-Seal 890 Class C-20 Class C-48 Class C-80	PRC-DeSoto International	Fuel, pressure and weather sealant. Suitable for faying surface sealing.
	PR-1440 Class C-20	PRC-DeSoto International	

Table 205. Sealants Type II

NAME	NUMBER	MANUFACTURER	USE
Sealant	PR1448 Class B-2	PRC-DeSoto International	Void/hole filling compound.

Table 206. Sealant Type III

NAME	NUMBER	MANUFACTURER	USE
Sealant	PR-810	PRC-DeSoto International	High temperature sealing.

Table 207. Sealants Type IV

NAME	NUMBER	MANUFACTURER	USE
Sealants	Dapco 2100	D. Aircraft Inc. Anaheim, CA 92807	Firewall sealing.

Table 208. Sealants Type V

NAME	NUMBER	MANUFACTURER	USE
Sealant	RTV106	General Electric Co. Silicone Products Dept. Waterford, NY 12301	Extreme high temperature sealing.
Sealant	RTV162 Class E	General Electric Co. Silicone Products Business Dept.	High temperature and very strong bond and sealant.

Table 209. Sealants Type VI

NAME	NUMBER	MANUFACTURER	USE
Sealant (Acrylic Latex)	FA-0606 125	H. B. Fuller Company St. Paul, MN 55116	Water and weathertight sealing.
	SM8500	Schnee-Moorehead Irving, TX 75017	Water and weathertight sealing.

Table 210. Sealants Type VII

NAME	NUMBER	MANUFACTURER	USE
Sealant	Pro-Seal 895	PRC-DeSoto International	Aerodynamic smoothing compound.

Table 211. Sealant Type VIII

NAME	NUMBER	MANUFACTURER	USE
Sealant	PR-1428 Class B-1/2 Class B-2	PRC-DeSoto International	Used in areas for access.
Sealant	FR-1081 Class B-1/2 Class B-2	Fiber Resin Corporation Burbank, CA 91502	Used in areas for access.
Sealant	CS3330 Class B-1/2 Class B-2	Flamemaster Corporation Chem Seal Division Sun Valley, CA 91352	Used to seal the wing inspection panels on TKS equipped Airplanes.
Sealant	PR-1773 Class B-1/2 Class B-2	PRC-DeSoto Mojave, CA 93501	Used to seal the wing inspection panels on TKS equipped Airplanes.

Table 212. Sealants Type IX

NAME	NUMBER	MANUFACTURER	USE

Sealant	Fluorosilicone RTV 730	Dow Corning Corp. Midland, MI 48686	Used in areas exposed to fuel.

Table 213. Sealants Type X

NAME	NUMBER	MANUFACTURER	USE
Sealant	Pro-Seal 870 Class A Type I Class B Type II Class C Type IV	PRC-DeSoto International	Corrosion-inhibitive sealant.
	AC-635 Class B Type II Class C Type IV	Advanced Chemistry Technology	Corrosion-inhibitive sealant.

Table 214. Sealants Type XI

NAME	NUMBER	MANUFACTURER	USE
Sealant Tape	EP-7191 T-0877 (0.062 inch x 0.50 inch)	Fiber Resin Corp.	Weather-tight window sealant tape.

Table 215. Sealants Type XII

NAME	NUMBER	MANUFACTURER	USE
Sealant	PR-1829	PRC-DeSoto International	Windshield and window sealant requires PR-142 adhesion promoter.
	PR-1425	PRC-DeSoto International	

Table 216. Sealants Type XIII

NAME	NUMBER	MANUFACTURER	USE
Sealant	PR-1776 Class B-1/2 Class B-2	PRC-DeSoto International	Low density fuel tank sealant.

Table 217. Sealants Type XIV Fast Cure, Intermediate Density, Fuel Tank and Fuselage Sealant

Name	Number	Manufacturer	Use
Sealant	AC-350 Class B	3M Garden Grove, CA 92841	To use as a fast cure, intermediate-density, fuel tank and fuselage sealant.
Sealant	WS-8020RC Class B		To use as a fast cure, intermediate-density, fuel tank and fuselage sealant.

Table 218. Sealants Type XV

NAME	NUMBER	MANUFACTURER	USE
Sealant	Chem Seal 3209 Class B	Flamemaster Chem Seal Division Sun Valley, CA 91352	To be used as a sealant for electrically conductive sealant applications.

Table 219. Cleaning Solvents

NAME	NUMBER	MANUFACTURER	USE
Methyl n-Propyl Ketone		Commercially Available	Cleaning organic coating.
Naphtha Type III	MIL-PRF-680	Commercially Available	Presealing cleaning.

Desoclean 110		PRC-DeSoto International	Presealing cleaning.
Isopropyl alcohol	TT-I-735	Commercially Available	Cleaning plastic transparencies.

Table 220. Parting Agents

NAME	NUMBER	MANUFACTURER	USE
Silicone compound	AS 8660	Commercially available	Prevent sealant sticking.
Petrolatum technical	Federal Specification VV-P-236	Commercially available	Prevent sealant sticking.
Paintable Lecithin Release Agent Aerosol	S00314	Sprayon Products Cleveland, OH 44115	Mold Release.
Crown Dry Film Lubricant	6075	Aervoe Industries Incorporated Gardnerville, NV 89410	Mold Release.

Table 221. Equipment

NAME	NUMBER	MANUFACTURER	USE
Pneumatic sealing gun	Semco No. 250 with accessories (or equivalent)	PRC-DeSoto International	Injection sealing.
Hand-operated sealing gun	Semco No. 850	PRC-DeSoto International	Injection sealing.
Nozzles,		PRC-DeSoto International	Application of sealant.
Round 1/16 orifice	Semco No. 420		
Round 1/8 orifice	Semco No. 440		
Duckbill	Semco No. 8615		
Duckbill	Semco No. 8648		
Comb	Semco No. 8646		
Polyethylene cartridges with plungers and caps for sealant gun		Commercially available	Application of sealant.
Metal spatulas with either stainless steel or glass plates		Commercially available	Mixing sealant.
Plastic lined cups, wax-free with caps		Commercially available	Mixing sealant.
Sealant fairing tools		Commercially available	To fair-in sealant.
Cheesecloth, lint-free		Commercially available	Cleaning.
Plastic scraper, 45-degree cutting edge		Commercially available	Removing old sealant.
Durometer	Rex Model 1500 (or equivalent)	Rex Gauge Company, Inc. 3230 West Lake Avenue P.O. Box 46 Glenview, IL 60025	Testing cure of sealant.
Gloves, lightweight lint-free white cotton		Commercially available	Removing old sealant.
Nylon bristle brushes		Commercially available	Removing old sealant.
Pipe cleaners		Commercially available	Cleaning

Funnel brushes		Commercially available	Cleaning.

3. Definition of Sealing Terms

A. The following definitions are included to provide a basic concept of the special terms used in sealing. This list is not all inclusive but the more common terms are listed.

(1) Absolute Sealing - There can be no leakage allowed. All openings of any nature through the seal plane are positively sealed. This is the first level of sealing. (All holes, slots, joggles, fasteners and seams must be sealed.)

(2) Accelerator (Activator) - Curing agent for sealants.

(3) Application Time - The length of time sealant remains workable or suitable for application to structure by brush, extrusion gun, spatula or roller.

(4) Base Compound - The major component of a two-part sealing compound which is mixed with the accelerator prior to application to produce a fuel, temperature, pressure, weather and/or firewall sealing material.

(5) Brush Coat - Apply an over coating or continuous film of appropriate sealing compound by use of a brush.

(6) Electrical Seal Fitting - A device used for sealing electrical wires which pass through bulkheads, etc. Not to be used through the integral fuel tank wall.

(7) Fay Seal or Faying Surface Seal - A seal barrier created by the sandwiching of sealant between mating surfaces of structure. Special attention must be taken to avoid metal chips or dirt at the faying surface.

(8) Fillet Seal - Applying a bead of sealant to a seam, joint or fastener after the assembly has all permanent fasteners installed.

(9) Hole - An opening that has no appreciable depth, such as a tool hole. Holes that penetrate the seal plane must be metal filled with a fastener, gusset or patch.

(10) Injection Seal - Filling of channels by forcing sealant into a void or cavity after assembly.

(11) Integral Tank - Composition of structure and sealant material which forms a tank that is capable of containing fuel without a bladder.

(12) Intermediate Seal - The second level of sealing. All holes, slots, joggles and seams in the seal plane must be sealed. A minor amount of leakage is tolerable and permanent fasteners are not required to be sealed.

(13) Post-assembly Seal - A seal that is applied after the structure is assembled. (Fillet and injection seals.)

(14) Pre-assembly Seal - Sealant material that must be applied during or prior to the assembly of the structure. (Faying surface and prepack seals.)

(15) Prepack Seal - A pre-assembly seal used to fill voids and cavities; can be a primary seal used to provide seal continuity when used in conjunction with a fillet seal. It can be used as a backup seal to support a fillet across a void. Fill the entire cavity to be pre-packed. Usage as a primary seal should be kept to a minimum.

(16) Primary Seal - Sealant material that prevents leakage and forms a continuous seal plane. This seal is in direct contact with the fuel, vapor, air and acid. With few exceptions, it is in the form of a fillet seal.

(17) Sealant - A compound applied to form a seal barrier.

(18) Seal Plane - A surface composed of structure, sealant and fasteners on which the continuity of seal is established.

(19) Shank Sealing - Sealant compound shall be applied to the hole or to both the shank and the under head area of the fastener in sufficient quantity that the entire shank is coated and a small continuous bead of sealant is extruded out around the complete periphery of each end of the fastener when installed. The fastener shall be installed within the application time of the sealing compound used.

(20) Squeeze-Out Life - Length of time sealant remains suitable for structure assembly in faying surface seal application.

(21) Tack-Free Time - Tack-free time is a stage, during the cure of the sealant compound, after which the sealant compound is no longer tacky. When the sealant compound is pressed firmly with the knuckles, but no longer adheres to the knuckles, the sealant compound is tack-free.

4. Materials

A. Type of Sealants - Sealants are categorized by type of usage. Type I sealants are separated by class to differentiate the material to use by method of application. Dash numbers following the class designation indicate the minimum application time (in hours) for Class A and Class B and minimum work life (in hours) for Class C. Reference Table 220 for application time and curing rate for Type I sealants.

(1) Type I - Fuel, pressure and weather sealant.

(a) Class A - Sealant which is suitable for brush application.

(b) Class B - Sealant which is suitable for application by extrusion gun, spatula, etc.

(c) Class C- Sealant which is suitable in faying surface applications.

(d) Quick Repair Sealant - This material is for use only in making repairs when an extremely rapid curing sealant is required. A possible application includes sealing a leaking fuel tank on an airplane which must be dispatched within a few hours.

Table 222. Curing Properties of Type I Sealant

CLASS	APPLICATION TIME (HOURS, MINIMUM)	WORK LIFE (HOURS, MINIMUM)	TACK-FREE TIME (HOURS, MAXIMUM)	CURING RATE (HOURS, MAXIMUM)
A-1/2	1/2		10	40
A-2	2		40	72
B-1/2	1/2		4	6
B-2	2		40	72
B-4	4		48	90
C-24	8	24	96	168 (7 days)
C-48	8	48	110	336 (14 days)
C-80	8	80	120	504 (21 days)

NOTE 1:

Time periods are based on a temperature of 77°F and 50 percent relative humidity. Any increase in either temperature or relative humidity may shorten these time periods and accelerate the sealant cure.

(2) Type II - Hole filling compound. This material is for holes and slots that cannot be filled with one application of Type I; Class B sealant. Type II sealant shall not be used for the sealing of an integral fuel tank.

(3) Type III - High-temperature sealant. This material is for use where exposure to fuel is moderate and for intermittent exposures up to 450°F, but is not suitable for pressure sealing.

(4) Type IV - Firewall sealant. This material is for use when exposure to fuel is minimal and for intermittent temperature exposures up to 500°F, but is not suitable for pressure sealing.

(5) Type V - Extreme high-temperature sealant. This material is for use where exposure to fuel is minimal and for intermittent exposures up to 600°F, and is also suitable for pressure sealing.

(6) Type VI - Watertight and weather tight sealant. This material is for use where there is no exposure to fuel, high temperature or pressure.

(7) Type VII - Aerodynamic Smoothing Compound. This material is used for filling skin gaps to obtain a smooth aerodynamic surface.

(8) Type VIII - Low Adhesion Access Sealant. This Class B material is designed for sealing faying surfaces where easy separation of the joined surfaces is required. The sealant has low adhesion and forms a gasket that molds itself to fill all irregularities between two surfaces. It is exceptionally resistant to fuels, greases, water, most solvents and oils, including red hydraulic oil.

(9) Type IX Fluorosilicone RTV Sealant. This sealant is a room temperature vulcanizing sealant that will withstand fuel.

(10) Type X - Corrosion Inhibitive Sealant. These materials are 2-part, room temperature curing, synthetic rubber compounds used in the sealing and coating of metal components for protection against corrosion.

NOTE: Type X may be used in all applications where Type I is used except that it shall not be used for fuel tank sealing.

(11) Type XI - Sealant Tape. These materials are permanently pliable and can be used to set windshields before sealing or to seal covers.

(12) Type XII - Windshield and Window Sealant. These materials are 2-part, room temperature curing synthetic rubber compounds used to seal glass, polycarbonate, or acrylic transparencies.

(13) Type XIII - Low-Density (1.35 sp gr max) Fuel Tank Sealant. This material is manganese dioxide cured, for applications at service temperatures of -65° to 250°F (-54 to 121°C).

(14) Type XV - Electrically Conductive Sealant. This sealant is used to seal between electrical components and aluminum substrate where electrical bonding is necessary.

CAUTION: Quick repair sealant must be applied within its working life of 15 minutes. Attempts to work quick repair sealant beyond working life will result in incomplete wetting of surface and will result in a failed seal.

5. General Requirements

A. When working with sealants, observe the following requirements.

(1) Unmixed sealants shall not be more than two months old when received. These sealants shall not be more than six months old when used.

(2) Unmixed sealants stored at temperatures exceeding 80°F shall be used within five weeks.

(3) Sealants which have been pre-mixed, degassed and flash frozen shall be maintained at -40°F or lower and shall not be received more than two weeks beyond the date of mixing. These sealants shall not be used more than six weeks after the date of mixing.

(4) Frozen sealant shall be thawed before being used. If sealant were applied at a temperature below 60°F, it would not be sufficiently pliable for proper application and adhesion could be critically reduced by condensation of moisture. On the other hand, although sealant must extrude freely for proper application, it would be subject to excessive slumping if applied at a temperature above 80°F. Frozen sealant may be thawed by any suitable means which does not cause contamination or overheating of the sealant and does not shorten the application time of the sealant to an impractical period. Examples: Thawing by exposure to ambient air temperature, accelerated thawing by exposure in a constant temperature bath (using clean, hot water), accelerated thawing in a microwave oven. In any case, thawing temperature and time shall be adjusted to give a thawed sealant temperature between 60°F and 80°F at the time the sealant is applied.

(5) Mixed, frozen sealants which have thawed shall not be refrozen.

(6) Complete pre-assembly operations, such as fitting, filing, drilling, countersinking, dimpling and deburring, prior to cleaning and sealant application.

(7) Surfaces must be clean and dry, free from dust, lint, grease, chips, oil, condensation or other moisture, and all other contaminating substances prior to the application of sealant.

(8) Naphtha Type II or Isopropyl Alcohol (TT-I-735) are the only cleaners which may be used on plastic transparencies.

(9) Sealant materials may be applied to unprimed or primed surfaces. Nonchromated or epoxy primers shall have good adhesion to the substrate material and shall have aged at least 48 hours prior to sealant application.

(10) Sealants shall not be applied when the temperature of either the sealant or the structure is below 60°F.

(11) The sealants Pro-Seal 890 B-1/2, B-2 or B-4 are the only sealants which may be used on plastic transparencies.

(12) Sealant applied by the fillet or brush coat methods shall always be applied to the pressure side of a joint if possible.

(13) After application, sealants shall be free of entrapped air bubbles and shall not exhibit poor adhesion. All fillets shall be smoothed down and pressed into the seam or joint with a filleting tool before sealant application time has expired.

(14) Where fasteners have been sunk or under-head sealed, extruded sealant shall be evident around the complete periphery of the fastener to indicate adequate sealing. Sealant extruded through a hole by a rivet shall be wiped from the end of the rivet before bucking. Threaded fasteners which have been shank or under-head sealed shall not be retorqued after expiration of the application time of sealant. In torquing, turn the nut rather than the bolt if possible.

(15) Pressure testing shall not be accomplished until the sealant is cured.

(16) Sealant shall not be applied over ink, pencil or wax pencil marks. If these materials extend into the sealing area, they must be removed.

(17) If sealing is to be accomplished over primer and the primer is removed during the cleaning process, it is permissible to seal directly over the cleaned area and then touch up the exposed areas after the sealant has been applied and is tack free.

(18) Sealed structure shall not be handled or moved until sealant is tack free (sealant may be dislodged or have the adhesion damaged). Excessive vibration of structure, such as riveting and engine run up, is not permitted.

(19) Drilling holes and installing fasteners through a fay sealed area shall be performed during the working life of faying sealant, or the entire shank and area under fastener head shall be fay sealed.

6. Sealant Curing

A. Room Temperature.

(1) Room temperature curing properties are based on a temperature of 75°F, +5° or -5°F, and a relative humidity of 50 percent. Curing times of two-part sealants will shorten with increased temperature and/or relative humidities.

(2) Room temperature curing properties of Type I sealants are given in Table 201.

(3) Room temperature curing properties of Type II sealant are: Application Time 2 Hours (Minimum); Tack- Free Time 20 Hours (Maximum); Curing Rate 40 Hours (Maximum).

(4) Room temperature curing properties of Type III sealant are dependent on solvent release. Type III sealant should cure for a minimum of 17 days at room temperature before being subjected to temperatures as high as 400°F.

(5) Room temperature curing properties of Type IV sealant are: Application Time 1-1/2 Hours (Minimum); Tack-Free Time 24 Hours (Maximum); Curing Rate 48 Hours (Maximum). Type IV sealant should cure for a minimum of 72 hours at room temperature before being subjected to temperatures as high as 400°F.

(6) Room temperature curing properties of Type V sealant are: Tack-Free Time 1/2 Hour (Maximum); Curing Rate 24 Hours (Maximum). Type V sealant should cure for a minimum of 48 hours at room temperature before being subjected to temperatures as high as 400°F.

(7) Room temperature curing properties of Type VI sealant are: Tack-Free Time 2 Hours (Maximum); Curing Rate 16 Hours (Maximum).

(8) Room temperature curing properties of Type VII sealant are: Class B-1/2 Application Time 1/2 Hour; Tack-Free Time 10 Hours; Cure Time 24/35R Hours/Hardness. Class B-2 Application Time 2 Hours; Tack-Free Time 24 Hours; Cure Time 48/35R Hours/Hardness.

(9) Curing properties of Type VIII, Class B sealants are the same as for Type I, Class B. Adhesion to aluminum should be (peel) less than 2 pounds/inch width.

B. Accelerated Curing.

(1) Accelerated curing of sealant can be accomplished in several ways. The procedure to be used is dependent on the type of sealant and other factors.

(2) The cure of Type I and Type II sealants can be accelerated by an increase in temperature and/or relative humidity. Warm circulating air at a temperature not to exceed 120°F may be used to accelerate cure. Heat lamps may be used if the surface temperature of the sealant does not exceed 140°F. At temperatures above 120°F, the relative humidity will normally be so low (below 40 percent) that sealant curing will be retarded. If necessary, the relative humidity may be increased by the use of water containing less than 100 parts per million total solids and less than 10 parts per million chlorides.

(3) The cure of Type III sealants can be accelerated after first curing for a minimum of 72 hours at room temperature by heating for 8 hours with warm circulating air or heat lamps in such a manner that the surface temperature of the sealant does not exceed 120°F. (Lowered relative humidity is helpful.) Curing should be completed before the sealant is subjected to temperatures as high as 400°F.

(4) The cure of Type IV sealants can be accelerated by reducing the relative humidity. However, the sealants should be cured for a minimum of 72 hours at room temperature before being subjected to temperatures as high as 400°F.

(5) The cure of Type V and Type VI sealants can be accelerated by the same procedures given for Type I or Type II sealants.

7. Mixing of Sealants

A. Requirements.

(1) Sealants shall be mixed or thinned in accordance with the manufacturer's recommendations and thoroughly blended prior to application. All mixed sealant shall be as void free as possible.

(2) Prior to mixing, the sealing compound base and its curing agent, both in their respective original unopened containers, shall be brought to a temperature between 75°F and 90°F. All required mixing equipment should also be brought to a temperature between 75°F and 90°F.

B. Hand Mixing of Sealant.

(1) The correct amount of base and curing agent, per manufacturer's instructions, shall be weighed in a clean, wax-free container immediately prior to mixing. An alternate method is to mix the sealant on a flat plate with a spatula. The scales and weighing process must be controlled within +2 or -2 percent to ensure good quality.

(2) Do not allow the accelerator to come in contact with the sides of the container.

(3) Materials shall be accurately weighed on scales that are calibrated and maintained for required accuracy.

(4) Mix the components until the color is uniform taking care not to trap air in the sealant.

(5) Transfer the sealant to another clean container and complete the mix.

C. Mixing Two-Part Sealant Cartridges. Refer to Figure 201.

WARNING: The cartridge should be held firmly, but must not be squeezed, as the dasher blades may penetrate the cartridge and injure the hand.

(1) Pull dasher rod to the FULL OUT position, so the dasher is at the nozzle end of cartridge.

(2) Insert ramrod in the center of dasher rod against the piston and push the piston in approximately 1 inch.

NOTE: Extra force will be needed on the ramrod at the beginning of accelerator injection into the base material.

(3) Move the dasher rod in approximately 1 inch, then push piston in another inch. Repeat this action until accelerator is distributed along the entire length of the cartridge.

NOTE: The accelerator has been fully injected into the cartridge when the ramrod is fully inserted into the dasher rod.

(4) Remove and properly discard the ramrod.

NOTE: Mixing the accelerator and base material can be accomplished manually, or as an alternate method, with the use of a drill motor.

(5) Manual Mixing.

(a) Begin mixing operation by rotating the dasher rod in a clockwise direction while slowly moving it to the FULL OUT position.

NOTE: Do not rotate the dasher rod counterclockwise; the four-blade dasher inside the cartridge will unscrew and separate from the dasher rod.

(b) Continue clockwise rotation and slowly move the dasher rod to the FULL IN position.

1 A minimum of five full clockwise revolutions must be made for each full-out stroke and for each full-in stroke of the dasher rod. Approximately sixty strokes are necessary for a complete mix.

NOTE: If streaks are present in the sealant (viewing through the side of the cartridge), the sealant is not completely mixed.

(c) End mixing operation with the four-blade dasher at the bottom of the cartridge.

(d) Hold cartridge upright; unscrew dasher rod from the four-blade dasher by gripping the cartridge at the four-blade dasher and turn the dasher rod counterclockwise. Remove dasher rod.

(e) Screw appropriate nozzle into the cartridge. If sealant gun is to be used, install cartridge in gun.

(6) Drill Motor Mixing.

NOTE: A tapered rotary file or a 25/64 inch drill bit may be used with a drill motor to turn the dasher rod.

(a) Insert the rotary file/drill bit into dasher rod approximately 0.5 inch.

WARNING: The cartridge should be held firmly, but not squeezed, as the dasher blades may penetrate the cartridge and injure the hand.

(b) Verify the drill motor will rotate the dasher rod clockwise (looking toward the nozzle end of the cartridge).

(c) With the cartridge held firmly in one hand and the drill motor in the other, rotate the dasher rod at approximately 50 revolutions-per-minute while moving the dasher rod to FULL IN and FULL OUT positions.

1 Mix sealant for at least 50 strokes (a stroke is one complete full-in and full-out stroke of the dasher rod).

NOTE: If streaks are present in the sealant (viewing through the side of the cartridge), the sealant is not completely mixed.

(d) End mixing operation with the four-blade dasher at the bottom of the cartridge.

(e) Hold cartridge upright; remove drill motor and rotary file/drill bit from the dasher rod; unscrew dasher rod from the four-blade dasher by gripping the cartridge at the four-blade dasher and turn the dasher rod counterclockwise. Remove dasher rod.

(f) Screw appropriate nozzle into the cartridge. If sealant gun is to be used, install cartridge in gun.

8. Cleaning

A. All surfaces to which sealant is to be applied shall be clean and dry.

B. Remove all dust, lint, chips and shavings with a vacuum cleaner where necessary.

C. Cleaning shall be accomplished by scrubbing the surface with clean cheesecloth moistened with solvent. The cloth shall not be saturated to the point where dripping will occur. For channels and joggles, pipe cleaners and/or funnel brushes may be used instead of cheesecloth.

(1) Scotch Brite pads should be used to clean all nutplates (except domed nutplates) and all exposed bonding primer on all bonded assemblies.

(2) The solvents to be used on all surfaces to be sealed, except the integral fuel tank and on plastic transparencies, shall be A-A-59281, cleaning compound, ASTM D4126, 1, 1, 1 - Trichloroethane, Technical, Inhibited.

(3) The solvents to be used for the cleaning in the integral fuel tank are A-A-59281 for the first or preliminary cleaning. For the final cleaning, ASTM D4126 only must be used.

(4) The only solvent to be used on plastic transparencies shall be TT-I-735, isopropyl alcohol.

D. The cleaning solvent should never be poured or sprayed on the structure.

E. The cleaning solvent shall be wiped from the surfaces before evaporation using a piece of clean, dry cheesecloth so oils, grease, wax etc. will not be redeposited.

F. It is essential that only clean cheesecloth and clean solvent be used in the cleaning operations. Solvents shall be kept in safety containers and shall be poured on the cheesecloth. The cheesecloth shall not be dipped in the solvent containers and contaminated solvents shall not be returned to the clean solvent containers.

G. Final cleaning shall be accomplished immediately prior to sealant application by the person who is going to apply the sealant.

(1) The area which is to be sealed shall be thoroughly cleaned. A small clean paint brush may be needed to clean corners, gaps, etc. Always clean an area larger than the area where the sealant is to be applied. Never clean an area larger than 30 inches (0.76 meter) in length when practical. When the area is being scrubbed with a moistened cloth in one hand, another clean dry cloth shall be held in the other hand and shall be used to dry the structure. The solvent must be wiped from the surfaces before it evaporates.

(2) The above procedure shall be repeated until there is no discoloration on the clean drying cloth. Marks resulting from wax or grease pencils must be removed from parts prior to sealing.

H. Allow all cleaned surfaces to dry a minimum of 5 minutes before application of sealant materials.

I. Sealant shall be applied as soon as possible after cleaning and drying the surfaces to be sealed. Do not handle the parts between the cleaning and sealing operations. Sealant application personnel handling cleaned surfaces shall wear clean white gloves to prevent surface contamination. In the event contamination does occur, the surfaces shall be recleaned.

J. Safety precautions should be observed during the cleaning and sealing operation. Cleaning solvents are toxic and flammable in most cases. Fresh air masks and/or adequate ventilation are required for all closed areas. The structure shall be electrically grounded before starting any cleaning or sealing operation.

9. Sealing Application

A. General.

(1) All new sealing shall be accomplished using the type of sealing material required for the area being sealed. All sealant repairs shall be accomplished using the same type of sealing material as that being repaired.

(2) Application time of the sealing compound shall be strictly observed. Material which becomes too stiff and difficult to work or which does not wet the surface properly shall be discarded even though the application time has not expired.

(3) Prior to sealant application, all surfaces to be sealed shall be cleaned per Cleaning.

B. Faying Surface Sealing - The application of a faying surface seal shall be made only when new structure is being added to the airplane and requires a faying surface seal or when the structure and/or parts have been disassembled for reasons

other than a faulty seal.

(1) Immediately prior to final closure of the joint, sealant shall be applied to one mating surface of the joint with a sealant gun, spatula, roller or other suitable tool. Sufficient sealant shall be applied so the space between the assembled faying surfaces is completely filled with sealant and a small excess is squeezed out in a continuous bead around the periphery of the joint when the joint is secured. Refer to Figure 202.

(2) Place parts in assembly position and install the fasteners within the application time of the faying surface sealant. When assembly with permanent type fasteners is not feasible, temporary fasteners (clecos or bolts) may be used, but when the temporary fasteners are used, they must be replaced by permanent type fasteners prior to the expiration of the work life of the faying surface sealant. Removal of each individual temporary fastener shall be followed immediately by the installation of the permanent fastener.

(3) When a fillet seal is required around the periphery of a fay sealed joint, it is not necessary to remove the sealant squeeze-out where the fillet is to be applied, provided the material which was squeezed out has been shaped into a small fillet configuration prior to expiration of the application time. When the squeeze-out has been shaped, a final or full bodied seal can be applied over the shaped squeeze-out without waiting for the squeeze-out to cure. If the squeezed out material was not shaped before expiration of its application time, it shall be cured to a tack-free condition and then removed, by use of a plastic tool, from locations where a fillet is to be applied.

(4) Immediately after assembly is completed and all permanent type fasteners have been installed, remove uncured sealant, which extrudes on the exterior of the airplane, using clean rags moistened Methyl n- Propyl Ketone (MPK).

C. Injection Sealing

(1) Sealant shall be injected in the channel, joggle, void or cavity from one point only, using a sealant gun. No air shall be entrapped, the channel, joggle, void or cavity shall be completely filled, and sealant shall emerge from the prescribed opening. Refer to Figure 203. If multiple exits or channels exist, block each channel exit after it is filled, without stopping the injection, so that sealant extrudes into all necessary channels.

(2) Remove excess sealant before expiration of its application time, and, using a suitable tool, smooth flush with the surface.

D. Fillet Sealing.

(1) Fastener considerations:

(a) Do not fillet seal any parts until they are held completely together by permanent fasteners.

(b) Prior to filleting the periphery of bolted structure and fittings, it is necessary that all bolts, accomplishing the attachment, be properly torqued.

(2) The sealant shall be applied using a sealant gun or spatula.

(3) When using a sealant gun for fillet sealing, the nozzle tip shall be pointed in the seam or joint and shall be maintained nearly perpendicular to the line of travel. A continuous bead of sealant shall precede the tip and the tip size, shape and rate of travel shall be such that sufficient sealant is applied to produce the required fillet.

(4) Fillets shall be shaped or formed to meet the size and shape requirements as shown in applicable figures using the nozzle tip and/or fairing tools to press against the sealant while moving parallel to the bead. Exercise caution to prevent folds and entrapment of air during application and shaping of the fillet and work out any visible air bubbles. The fillet shall be formed so the highest portion of the fillet is centered over the edge of the structure or fitting. Lubrication in any form shall not be used for smoothing purposes. In all cases, fillet size shall be kept as near minimum as practical.

(5) Where it is more convenient or fillet slumping is encountered, the fillet may be applied in two stages. A small first fillet shall be applied and allowed to cure to a tack-free state, and then followed by a second application of sealant sufficient to form the final fillet conforming to the specified dimensions for a fillet seal. If the first fillet has cured, it must be cleaned before the second application of sealant is made. If the fillet has only cured to a tack-free state, it shall be wiped lightly with a gauze pad or cheesecloth pad dampened with cleaning solvent.

(6) Allow the sealant to cure to a tack-free condition prior to the airplane being moved, handled and/or worked on.

(7) In cases where a fillet seal connects to an injection seal, the full bodied fillet shall extend past the end of the injection and then taper out.

(8) Seal lap joints and seam fillets. Refer to Figure 204.

(9) Seal butt joint fillets. Refer to Figure 205.

(10) Fillet seal bolts. Refer to Figure 206. The area for sealing shall consist of the area of the structure surrounding the base of the fastener end, plus the entire exposed area of the fastener. An optional method of sealing threaded fasteners is to apply a brush coat of Type I, Class A sealant. Where brush coating is used as the method of sealing threaded fasteners, the sealant must be worked around each fastener with a stiff brush and considerable care for effective sealing. A simple pass of the brush with the sealant is not sufficient to produce an effective seal.

(11) Fillet seal dome-type nutplates. Refer to Figure 207. The area for sealing shall consist of the area of the structure surrounding the base of the fastener and from there up over the rivets to the dome.

(12) Rivetless, self-sealing nutplates requiring sealing for lightning protection should be brush coated over the entire surface and mating structure.

(13) Fill holes and fillet seal slots. Refer to Figure 208.

NOTE: A hole or slot through the wall of an integral fuel tank must not be sealed by this method.

(a) Holes and slots that are too large to be filled with one application of Type I, Class B sealant shall be filled with Type II sealant. Large holes or slots may be backed with masking tape to prevent excessive extrusion of sealant through the holes or slots, but the masking tape shall be removed after the sealant has cured to a tack-free condition.

(b) In all locations where Type II sealant has been applied, after the Type II sealant has cured to a tack-free condition it shall be brush coated with Type I, Class A sealant. The brush coat shall overlap the edge of the Type II sealant sufficiently to ensure complete coverage.

(c) Tooling holes shall be plugged with a shank sealed soft rivet and then brush coated with Type I, Class A sealant. Refer to Figure 209.

E. Firewall Sealing - The engine firewall shall be sealed to an intermediate level of sealing using Type IV sealant.

(1) Clean the areas to be sealed per Cleaning.

(2) Mix, by weight, 1 part of curing agent with 100 parts of Type IV (Coast Pro-Seal #700) sealant.

NOTE: Sealant should be mixed by weight. It is important that accelerator be completely and uniformly dispersed throughout the base compound.

(3) Using a spatula and fairing tool, apply a fillet of sealer along all cracks, seams, joints and also over all fasteners in the firewall.

(4) Type IV sealant shall be cured for a minimum of 72 hours at room temperature before being subjected to temperatures of 400°F.

10. Sealant Repair

A. Materials - Repairs, in general, shall be accomplished with the same type of material as that being repaired.

NOTE: Type I, Class B-1/2 is recommended for use during cold weather to obtain an accelerated cure.

NOTE: Type I, Quick Repair sealant may be used as a repair for sealant in pressure vessels and fuel tanks if desired for fast cure and rapid dispatch.

B. Temperature Requirements.

(1) The structure shall be above 60°F before the sealant is applied and shall remain above 60°F until the sealant is tack- free.

NOTE: For outside operations only, the temperature of the structure may be allowed to drop below 60°F but not below 58°F after application and for a period of time not to exceed 48 hours; however, the structure must be subsequently heated to above 60°F and the sealant allowed to become tack-free before the tanks are refueled.

(2) The maximum air temperature allowed to come in contact with the curing sealant is 120°F.

C. Fillet and Fastener Sealing Repairs.

(1) Repair of damaged or faulty sealant applications shall be accomplished as follows:

(a) Remove all damaged or faulty sealant to ensure solid residual material.

(b) Sealant shall be cut so as to produce a smooth continuous scarfed face. Refer to Figure 210. The sealant shall be completely removed in the affected areas. The cutting tools should only be made from nonmetallic materials that are softer than aluminum.

(c) Inspect repair areas for clean and smooth cuts. Loose chunks or flaps of sealant on the cut areas shall be

removed.

(d) Clean the area to be sealed, including the scarfed face of the old seal, per Cleaning.

(e) Apply new fillet seals per Sealing Application, Fillet Sealing. Slight overlapping of the fresh material over the existing fillet is permissible. A large buildup of sealant shall not be allowed. Type VI sealant may be used over Type I, II and III sealant except in the integral fuel tank sealing. Type VI will cure more rapidly for weather and pressurization repairs.

(f) Rework of a fillet which has been over sprayed or brushed with primer shall be accomplished by a scarfed joint and removal of the fillet having primer on it, in the area of the repair. The primer shall not be sandwiched in between the old and new sealants.

(g) If the primer is removed during the cleaning operation, it is permissible to apply the new fillet seal directly over the clean bare metal and then touch up all exposed areas of bare metal with the proper primer after the sealant has been applied.

D. Faying Surface Sealing Repair - After determining the area which contains the faulty and/or leaking faying surface seal, the repair shall be accomplished by applying a fillet seal along the edge of the part adjacent to the faying surface seal long enough to fully cover the area of the faulty and/or leaking seal.

E. Brush Coat Sealing Repair - Repair of damaged or leaking brush coat seals shall be accomplished by removing the discrepant brush coat. Clean the area of sealant removal and the surrounding structure and sealant per Cleaning. Apply a new brush coat of sealant.

11. Integral Fuel Tank Sealing

NOTE: For complete fuel tank sealing procedures, refer to Chapter 28, Fuel Tank Sealing - Maintenance Practices.

A. Integral wing fuel tank sealing is a refinement of fuel sealing process. With an integral fuel tank, the fuel is confined in a sealed cavity in the wing structure.

(1) All damaged or leak areas must be completely and carefully repaired.

(2) Cleaning shall be performed with a clean cheesecloth dampened with solvent. Brush or pipe cleaners may be used to clean corners, gaps, joggles and channels.

(3) After application, the sealant must be free of entrapped air bubbles.

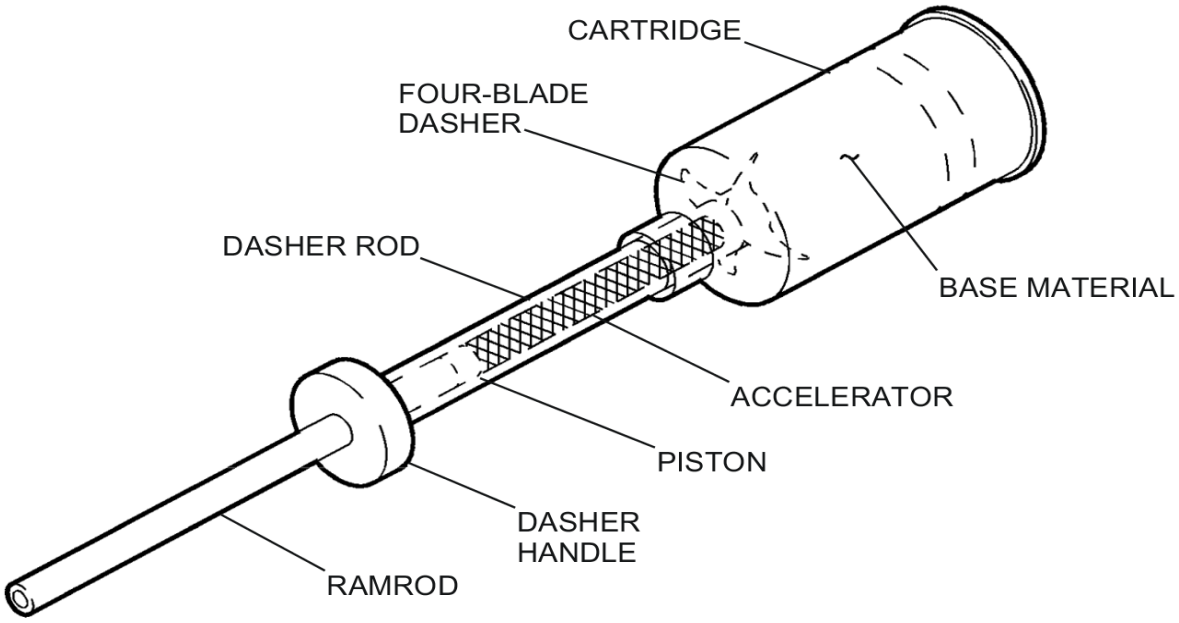
(4) All fillets are to be smoothed down and pressed into the seam or joint with a filleting tool.

(5) The sealant shall be tack-free and additional 50 percent of normal cure time shall be allowed prior to refueling.

(6) Before pressure testing, the sealant must be cured.

Figure 201 : Sheet 1 : Two-Part Sealant Cartridge

A2895



NOTE: CARTRIDGE IS DISPOSABLE AFTER USE.

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Figure 202 : Sheet 1 : Fay Sealing

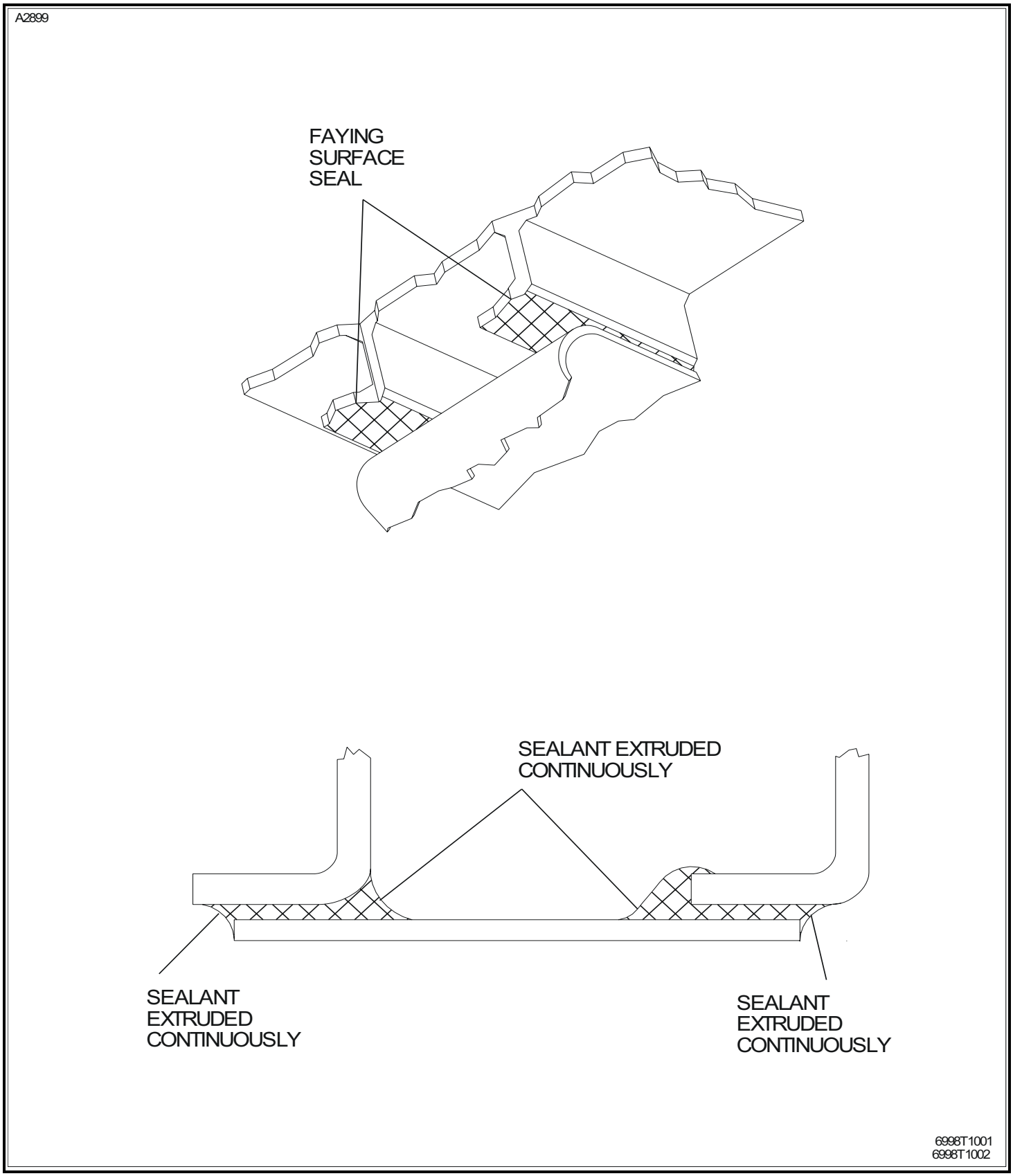


Figure 202 : Sheet 2 : Fay Sealing

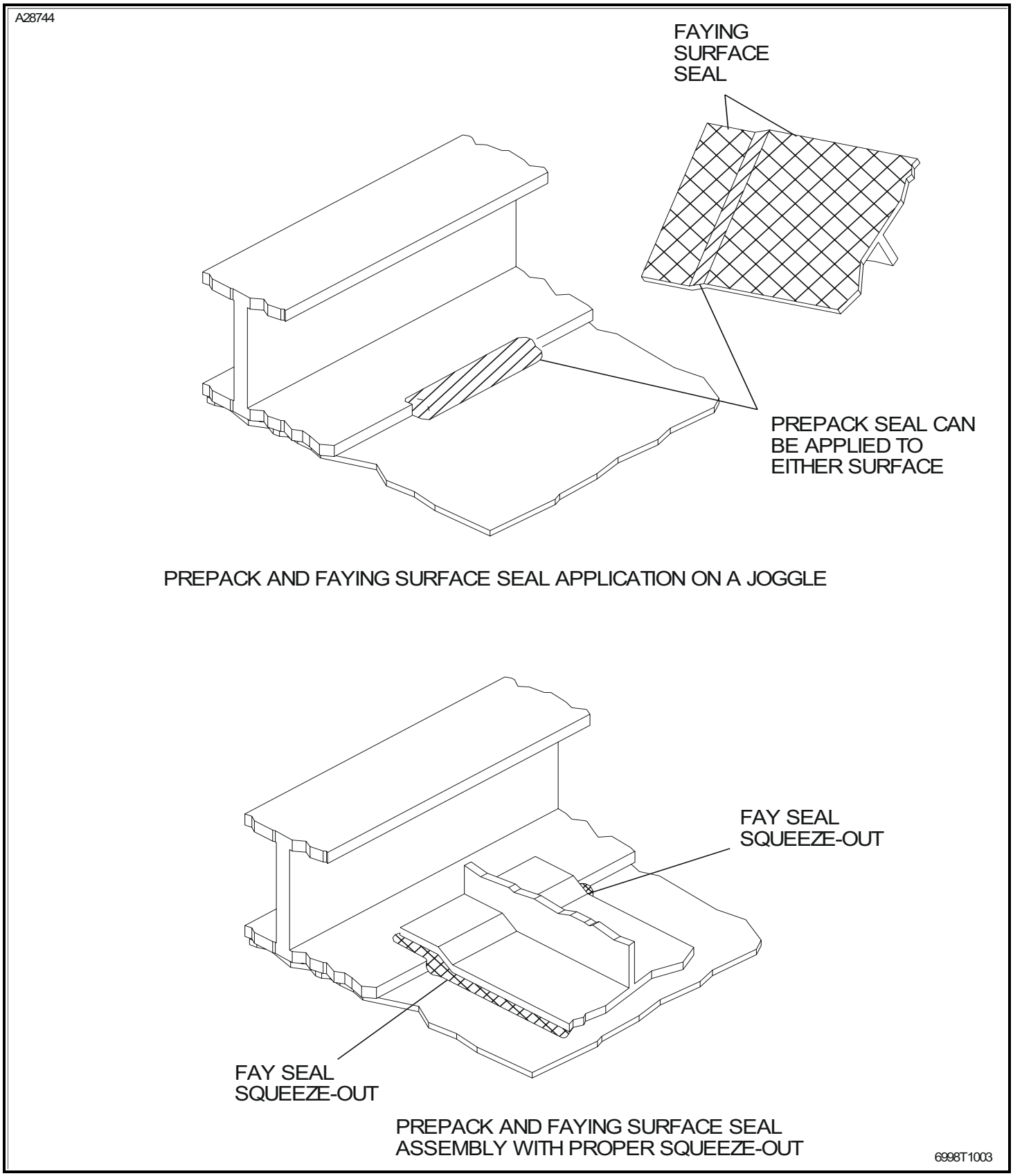


Figure 203 : Sheet 1 : Injection Sealing

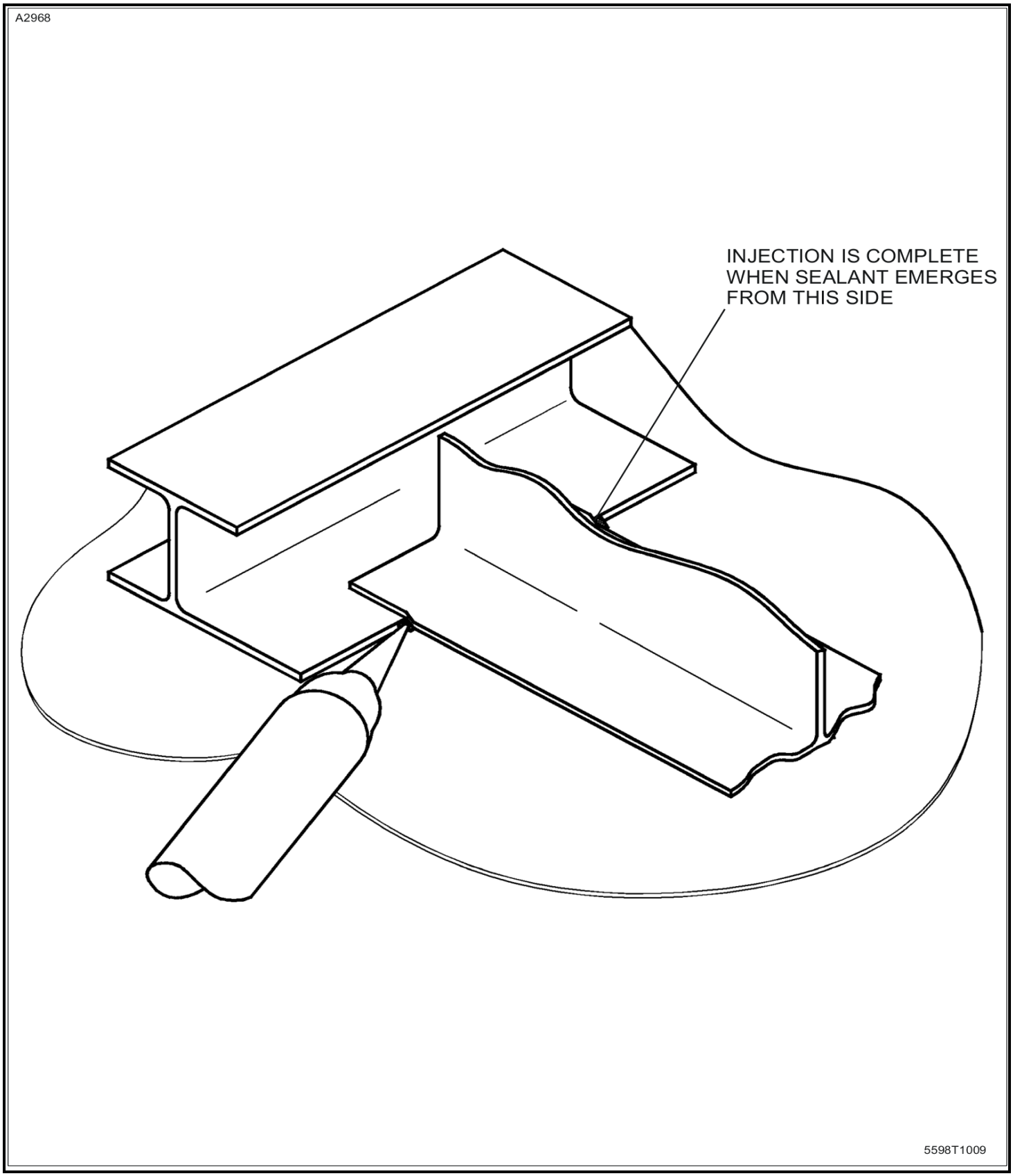
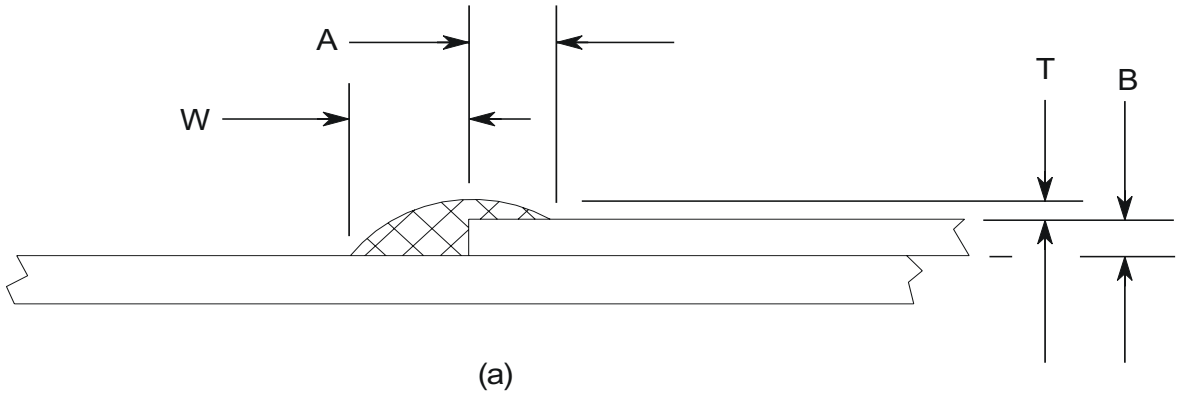
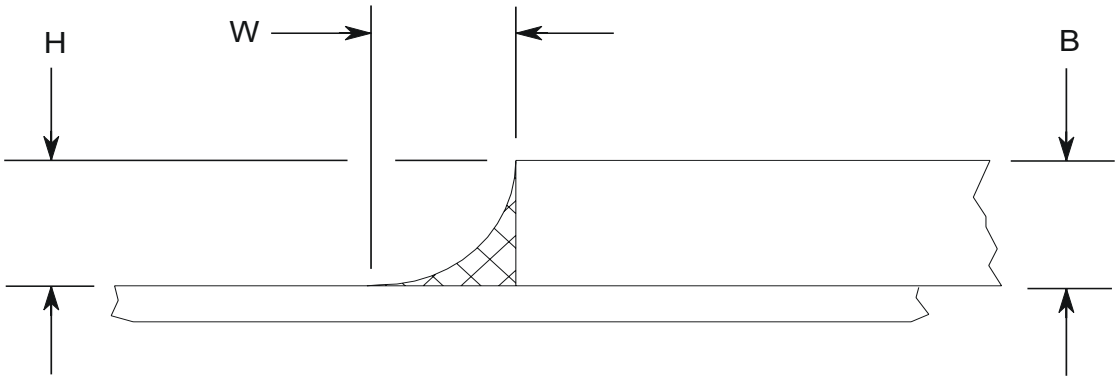


Figure 204 : Sheet 1 : Lap Joint and Seam Fillets

A2905



(a)



(b)

FIGURE	B	T	A	W	H
(a)	0.149 INCH (3.78 mm) MAX.	0.020-0.040 INCH (0.51-1.01mm)	0.125-0.25 INCH (3.2 - 6.4 mm)	0.250-0.375 INCH (6.4 - 9.5 mm)	-
(b)	0.150 INCH (3.81 mm) MIN.	-	-	0.250-3.25 INCH (6.4 - 9.5 mm)	APPROXIMATELY B .375 MAX (9.5 mm)

NOTE: ALL FILLETS MUST BE KEPT TO THE MINIMUM DIMENSIONS IF POSSIBLE.

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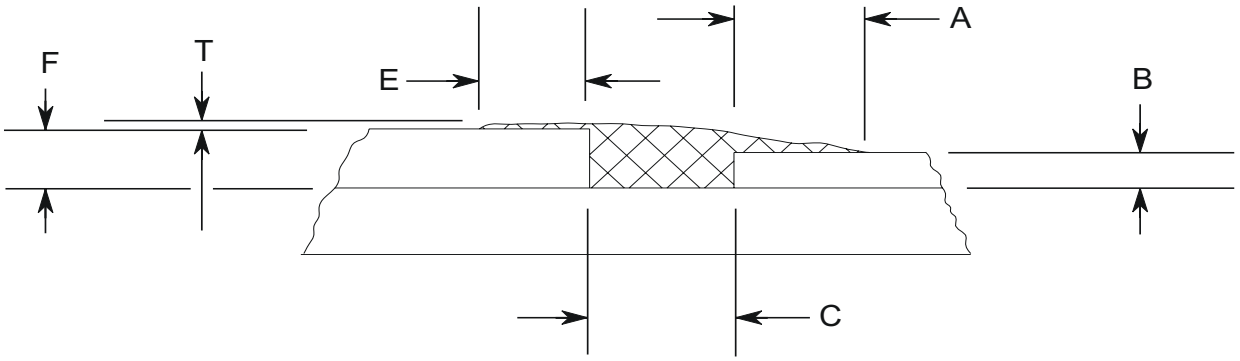
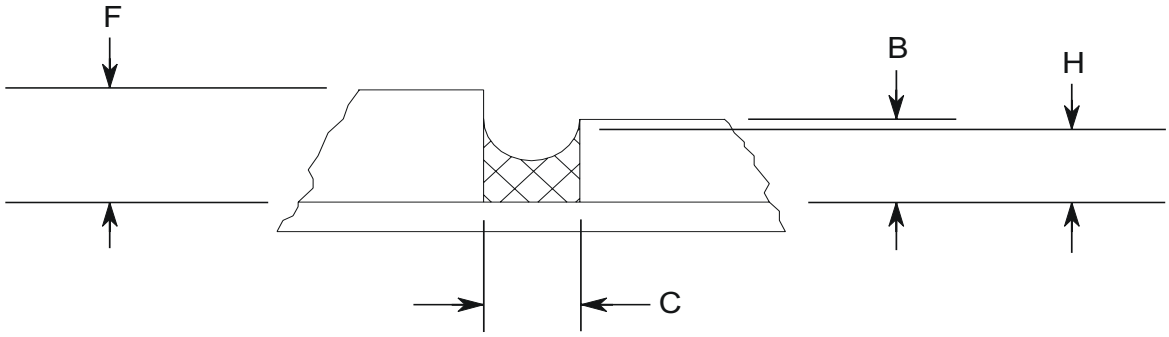
Figure 205 : Sheet 1 : Butt Joint Fillets

A13558



(a)



(b)

FIGURE	B	A	F	E
(a)	0.149 INCH MAX (3.78 mm)	0.125 - 0.25 INCH (3.2 - 6.4 mm)	0.149 INCH MAX (3.78 mm)	0.125 - 0.25 INCH (3.2 - 6.4 mm)
(b)	0.150 INCH MAX (3.81 mm)	-	0.150 INCH MIN (3.81 mm)	-

FIGURE	T	C	H
(a)	0.02 - 0.04 INCH (0.5 - 1.0 mm)	0.50 INCH MAX (12.7 mm)	-
(b)	-	0.50 INCH MAX (12.7 mm)	APPROXIMATELY B 0.25 INCH MAX (6.35 mm)

NOTE: IN ALL CASES, MINIMUM FILLET DIMENSIONS ARE SHOWN. FILLET SIZE MUST BE KEPT TO THE MINIMUM DIMENSIONS IF POSSIBLE.

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Figure 206 : Sheet 1 : Bolt Head, Nut and Thread Sealing

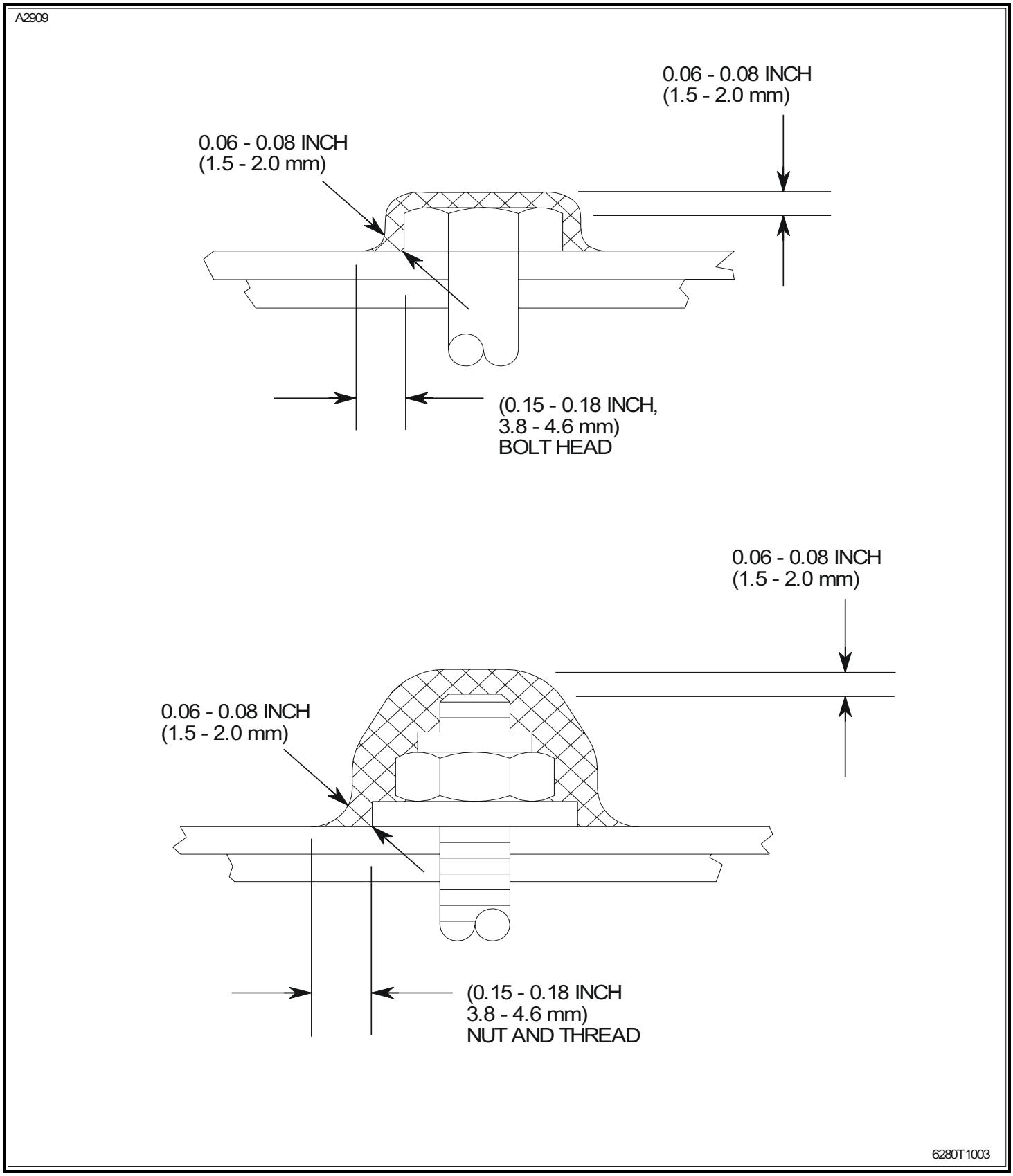
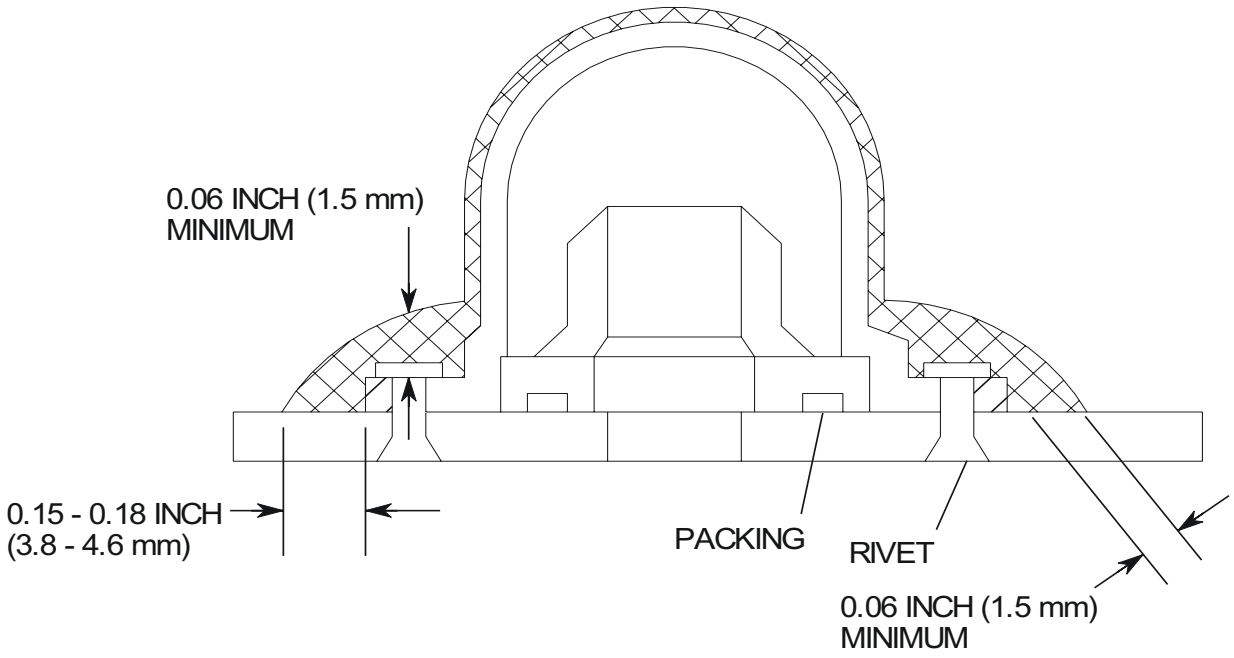


Figure 207 : Sheet 1 : Dome Type Fillets

A2910



NOTE: IN ALL CASES, MINIMUM FILLET DIMENSIONS ARE SHOWN. FILLET SIZE MUST BE THE MINIMUM DIMENSIONS, IF POSSIBLE.

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Figure 208 : Sheet 1 : Slot, Hole and Mismatch Sealing

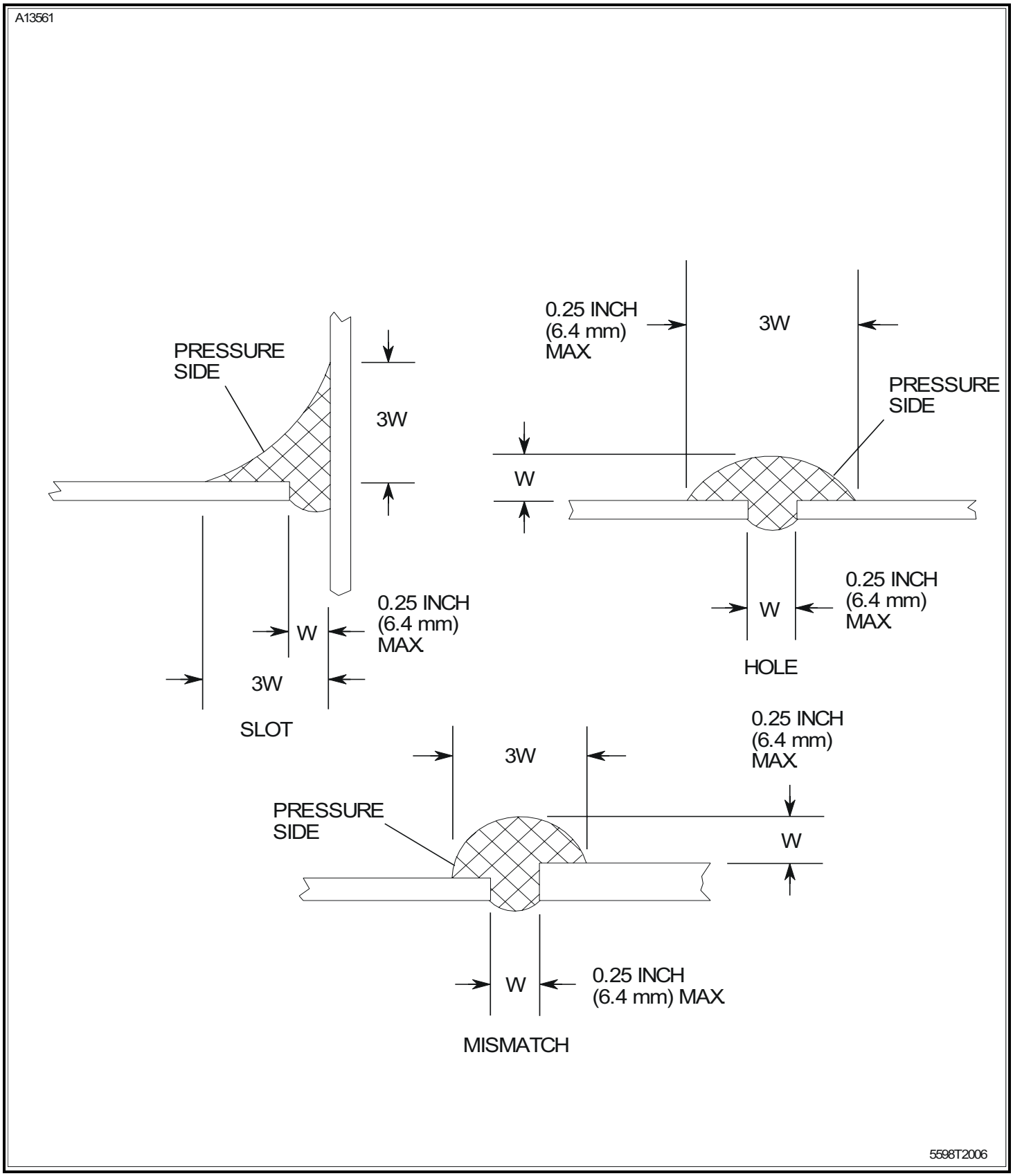


Figure 209 : Sheet 1 : Shank Sealing

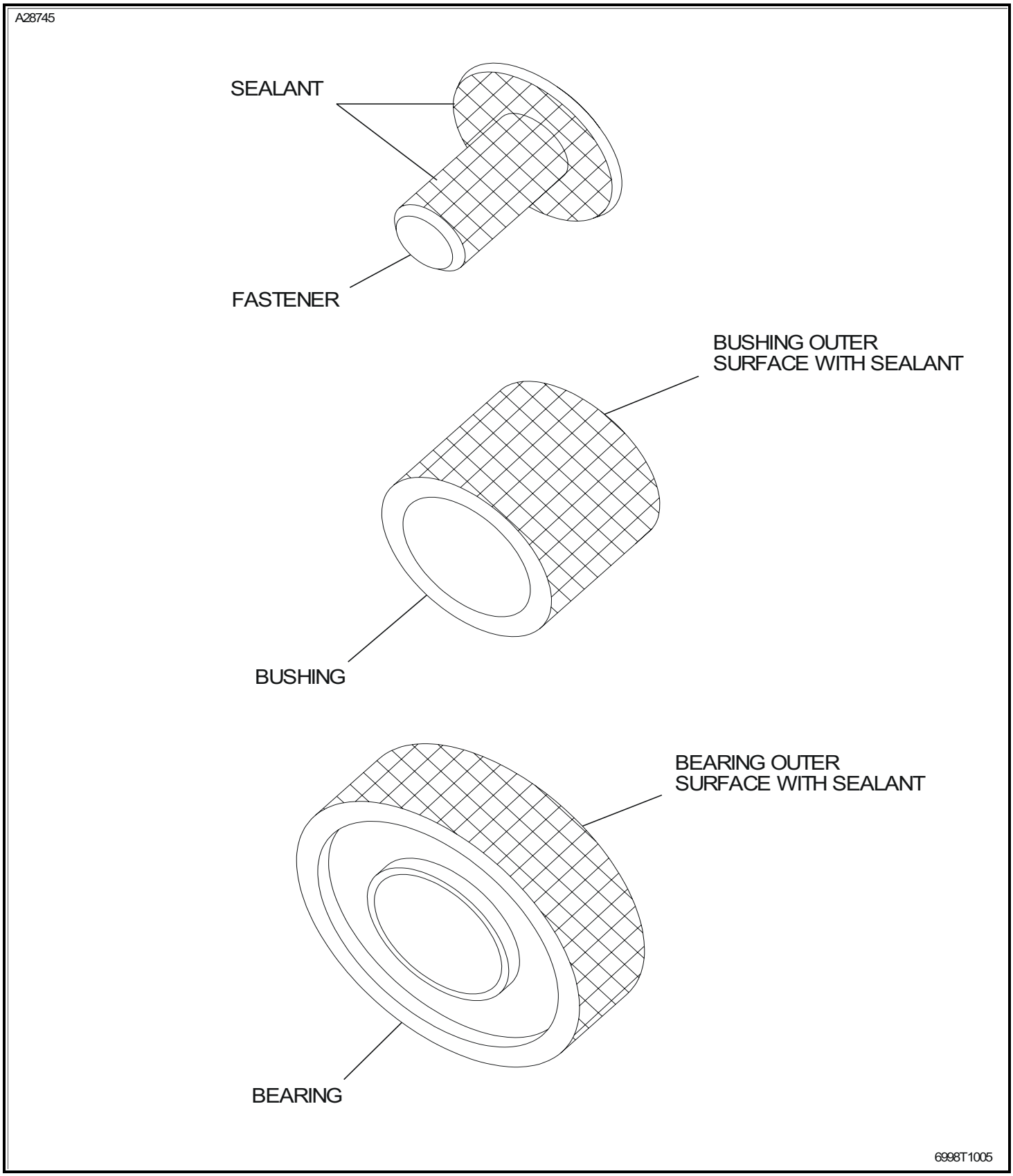


Figure 210 : Sheet 1 : Cutaway View of Sealing Bead

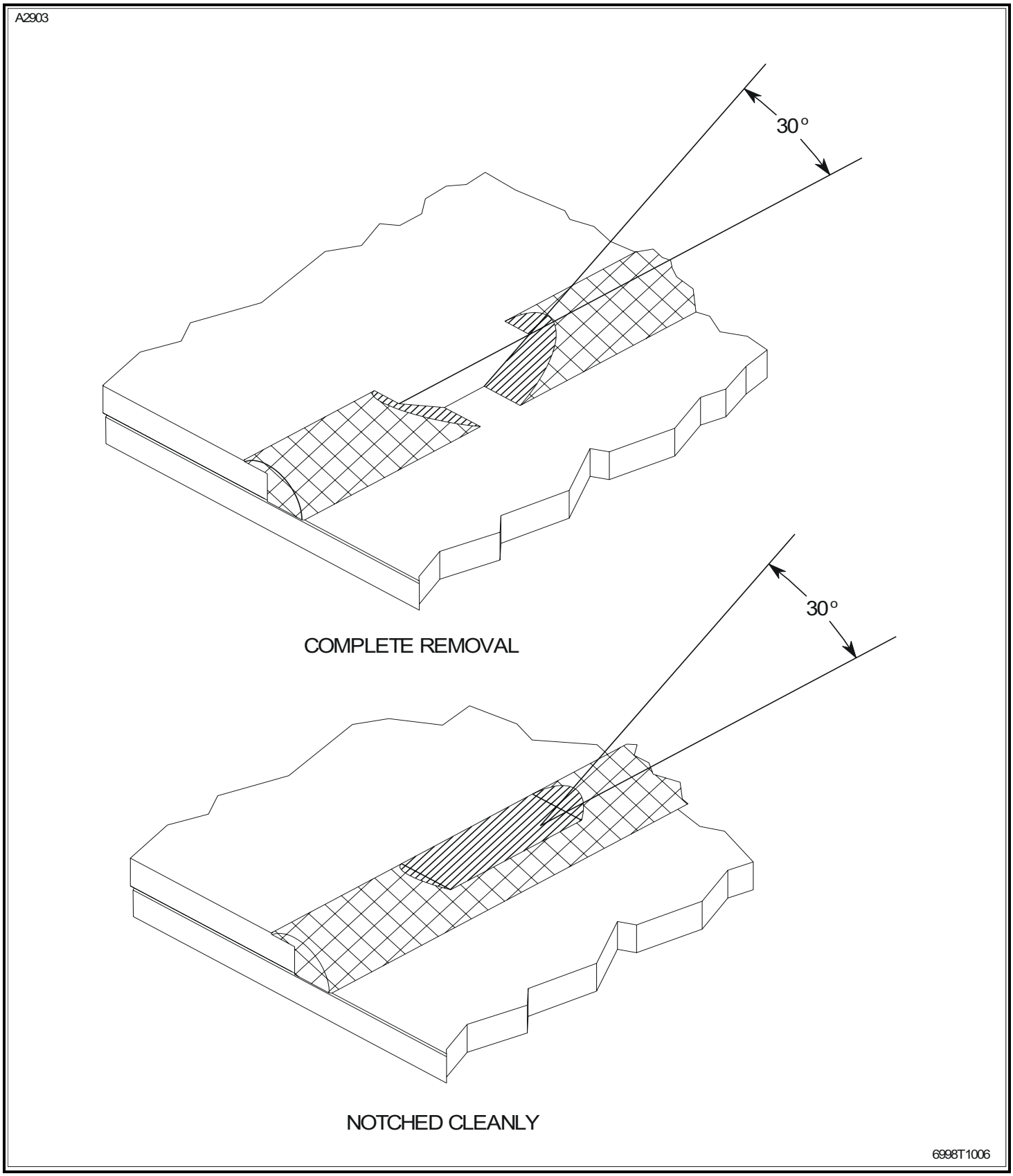
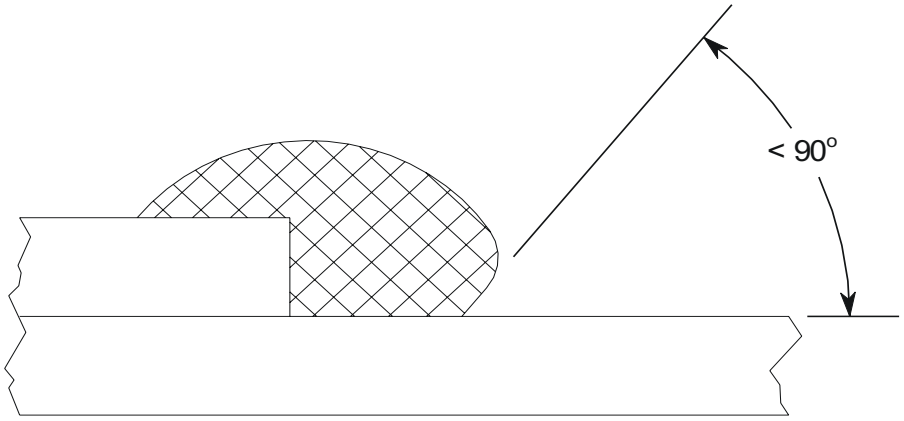
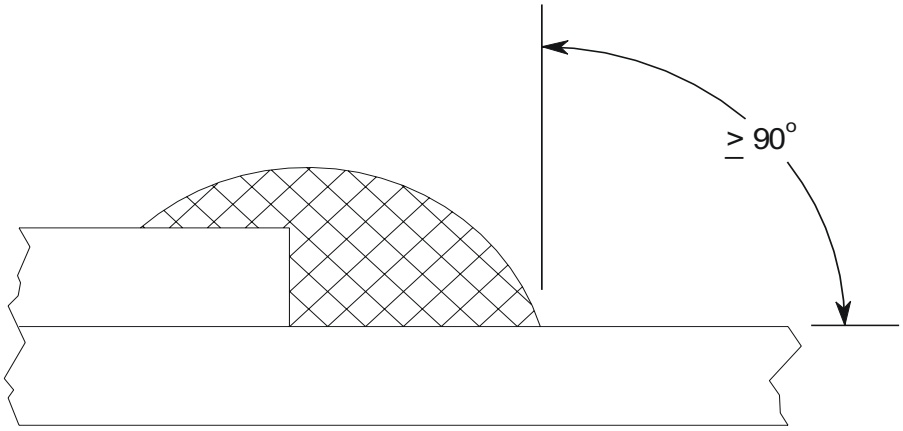


Figure 210 : Sheet 2 : Cutaway View of Sealing Bead

A28746



INCORRECT FILLET EDGE - REENTRANT EDGE



CORRECT FILLET EDGE - NON-REENTRANT EDGE

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