THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT

The Aviation Point.

Shimming a Repair: Liquid, Peelable and Solid Shims

Solid · peelable · liquid · gap limits are the SRM's

1 Identification

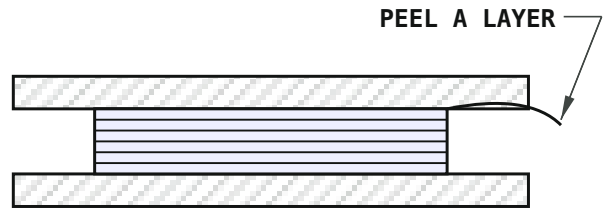
REFERENCE DRAWING — NOT APPROVED DATA · THE SRM ALWAYS GOVERNS

A · MEASURE THE GAP
FEELER GAUGE · AT EVERY FASTENER



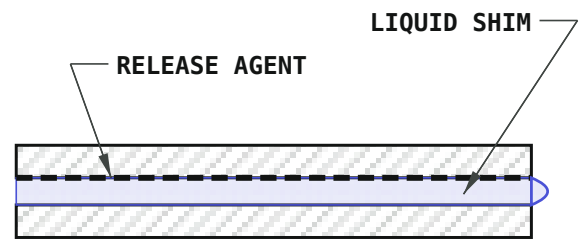
TAKE THE GAP AT EVERY FASTENER AND BETWEEN THEM; RECORD EACH

B · PEELABLE SHIM
LAMINATED · AMS-DTL-22499



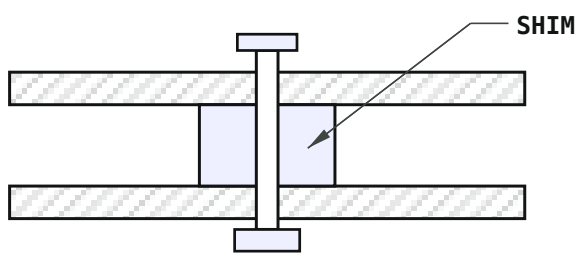
LAYERS 0.002 IN (CLASS 1) OR 0.003 IN (CLASS 2); PEEL BY HAND, NO HEAT

C · LIQUID SHIM
EPOXY PASTE · CURED IN PLACE



ON THE PART THAT COMES OFF; FASTENERS TO THE SRM, THEN CURE

D · SOLID SHIM
CUT TO THE FASTENER · ONE PER STATION



SHIM MATERIAL AND THICKNESS: THE SRM OR THE OEM'S ENGINEERING NAMES THEM

E · FITTING A LIQUID SHIM
MAKER'S DATA SHEET · SHOP PRACTICE

1. MEASURE THE GAP · CHECK IT AGAINST THE SRM
2. CLEAN AND PREPARE THE FAYING FACES
3. RELEASE AGENT ON THE PART THAT COMES OFF
4. MIX BY WEIGHT · APPLY INSIDE THE POT LIFE
5. ASSEMBLE AND FASTEN AS THE SRM SAYS
6. CURE TO DRILLING OR HANDLING STRENGTH
7. SEPARATE · TRIM SQUEEZE-OUT · CLEAN
8. REFIT · SEAL · RECORD

PARTS LIST

#	ITEM	RULE	SOURCE
A	Gap	Measure at every fastener and between; the limits are the SRM's	H-31B p. 7-51
B	Peelable shim	Type 1 all laminated, Type 2 half solid; Class 1 0.002 in, Class 2 0.003 in	AMS-DTL-22499
C	Liquid shim	Two-part epoxy paste; mix by weight; the maker states the cure	Henkel EA 9394 sheet
D	Solid shim	Machined or cut to the fastener; also a grip shim under a plate nut	AC 43.13-1B par. 7-37
E	Sequence	Release agent, apply inside the pot life, cure, separate, trim, record	Shop practice

NOTES

1. Dimensions in inches. Do not scale: the SRM sets the values.
2. For reference. The applicable manual always governs.
3. Based on AC 43.13-1B · H-8083-31B · makers' data.

REVISIONS

REV	DESCRIPTION	YEAR
A	First issue	2026

The Aviation Point.	Structural repair reference		
TITLE: Shimming			
DRAWING NO.: TAP-DWG-141	REV: A · 2026	SCALE: NTS	SHEET: 1 OF 1
APPLIES TO: Metal and composite			
DO NOT SCALE DRAWING			

After the makers' data sheets for AMS-DTL-22499 laminated shim, LOCTITE EA 9394 AERO and Scotch-Weld EC-7272, AC 43.13-1B par. 7-37 and FAA-H-8083-31B p. 7-51.

The shims you meet

Shim	What it is	Where the sources show it	Source
Solid shim	A flat piece of metal, composite or plastic cut or machined to the faying area or round each fastener	Splice repair on a float, shown between the spliced parts; plate nut with too short a grip, where the AC says add shims under the plate	H-31B p. 4-98 (Fig. 4-178); AC 43.13-1B par. 7-37
Laminated, peelable shim	Thin foils bonded into a stack; peel foils off until the thickness fits. Made to AMS-DTL-22499 (formerly MIL-S-22499)	Not shown in the AC or the Handbook; the specification and the makers' sheets describe it	AMS-DTL-22499 as printed in the maker's literature
Liquid shim	A two-part epoxy paste, thixotropic so it does not run, spread on one face and cured while the parts are assembled	Not in the AC or the Handbook; the paste adhesives' own data sheets name the use	Henkel EA 9394 sheet p. 1; 3M EC-7272 brochure
Tapered shim	A wedge that corrects an angle, not a gap	Wheel camber on spring-steel gear: tapered shims between the axle and the mounting flange; toe-in and toe-out by shims between the torque-link arms	H-31B p. 13-16 (Fig. 13-31)
Washer as a shim	A plain washer (AN960, AN970) used under a nut to set the grip	The AC says a plain washer acts as a shim to obtain the proper grip length. That is a grip shim, not a gap shim	AC 43.13-1B par. 7-86

Educational reference only, not approved data. Always consult the applicable SRM, AMM, or AC 43.13-1B and your certifying authority.

THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT

THE AVIATION POINT · THEAVIATIONPOINT.COM · THE AVIATION POINT · THEAVIATIONPOINT.COM

2 Allowable damage

Gap limits table

Question	Limit	Who sets it
Largest gap left with no shim	—	SRM or OEM engineering
Largest gap for a liquid shim	—	SRM or OEM engineering; the maker's figure (for example 3 mm for EC-7272) is product capability, not an allowable
Largest gap for a peelable shim	—	SRM or OEM engineering
Gap that needs a solid shim	—	SRM or OEM engineering
Largest total stack of shims at one station	—	SRM or OEM engineering
Gap that changes along the joint (a taper)	—	SRM or OEM engineering
Force or fastener pull-down allowed to close a gap	—	SRM or OEM engineering
Shim material against the parts either side	—	SRM

TAP ADVICE TYPICAL PRACTICE, NOT A PUBLISHED LIMIT — THE SRM GOVERNS

Gap and shim limits when no public document gives one

Largest gap to close with liquid shim alone, with no solid or peelable shim behind it — **0.118 in (3 mm)**
Maker application data · 3M Scotch-Weld Advanced Liquid Shim EC-7272 B/A brochure (2018): structural gap filling up to 3 mm. Henkel's EA 9394 sheet gives no figure.

Force locked into a flange that is pulled closed over a gap: the gap is a candidate for a solid or peelable shim when this force is more than the SRM lets the fasteners pull down — **1.9 lb per inch of width, for 0.010 in on a 0.063 in flange 1.5 in long (2024-T3)**
Own calculation · $F = 3 E I \delta / L^3$ with $I = b t^3 / 12$ (cantilever flange); $b = 1$ in, $t = 0.063$ in, $L = 1.5$ in, $\delta = 0.010$ in, $E = 10.5 \times 10^6$ psi (2024-T3, MIL-HDBK-5J chapter 3): $F = 3 \times 10.5e6 \times 2.08e{-5} \times 0.010 / 1.5^3 = 1.9$ lb

3 Repair

1. Measure the gap at each station.
2. Check it against the SRM.
3. Release agent; mix by weight; apply.
4. Assemble, fasten, cure.
5. Separate, trim, refit, record.

Key points

- **Three shims**: solid, laminated peelable (AMS-DTL-22499) and liquid (two-part epoxy paste).
- **Every gap limit is the SRM's.** No public document gives a generic value; the maker's 3 mm is product capability.
- **Measure at every fastener** and between them, parts seated, nothing lifted; do not close a gap with the fasteners.
- **Liquid shim**: release agent on the part that comes off, mix by weight (EA 9394: 100 A to 17 B), apply inside the pot life, cure, separate, trim.
- **Record** the stations, gaps, shim and product batch (14 CFR 43.9(a)).

MAIN SOURCES · FAA AC 43.13-1B CHG 1, Chapter 7 · FAA-H-8083-31B, Aviation Maintenance Technician Handbook: Airframe · Henkel, Technical Process Bulletin: LOCTITE EA 9394 AERO Epoxy Paste Adhesive · 3M, Scotch-Weld Advanced Liquid Shim EC-7272 B/A · AMS-DTL-22499, laminated shim stock · 14 CFR 43.9 · T.O. 1-1A-1, General Manual for Structural Repair · MMM-A-132, Adhesives, Heat Resistant, Airframe Structural, Metal to Metal · MIL-HDBK-5J, Metallic Materials and Elements for Aerospace Vehicle Structures, and its successor MMPDS

SCAN · OPEN THIS GUIDE
theaviationpoint.com/sheet-metal/shimming/

Educational reference only, not approved data. Always consult the applicable SRM, AMM, or AC 43.13-1B and your certifying authority.