3M™ Scotch-Weld™ 7246-2 B/A FST

Two Part Structural Adhesive

Product Description

3M™ Scotch-Weld™ 7246-2 B/A FST is a two part structural flexible adhesive epoxy system. It is in conformance with flammability, smoke density and toxic gas emission (FST) requirements on standards FAR 25.853, JAR 25.853 and ABD0031. It is designed for aircraft interior bonding applications like corner splicing panel forming, insert bonding, thermoplastic bonding and bonding of tubular ducting. Room temperature cure from 20 – 25 °C is standard. Cure rate can be accelerated by application of mild heat.

Key Features

- Two part paste adhesive meeting requirements of FAR/JAR 25.853 and ABD0031
- Excellent adhesion characteristics to aircraft interior substrates including thermoplastics
- Availability in duo-pack cartridges or in bulk for machine dispensing
- Flow control for vertical applications
- Halogen and heavy metal compound free FST system

Product Characterization

The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

General properties	Part B	Part A
Colour	Off-white	Light Yellow
Base	Modified epoxy	Modified amine
Consistency	Thixotropic paste, low sag	Thixotropic paste, low sag
Brookfield viscosity SP7 - 20 RPM	100 Pas	109 Pas
Specific gravity	1.61 g/cm³	1.27 g/cm³
Mix ratio by volume (by weight)	100 (100)	100 (79)
Specific gravity (mix)	1.44 g/cm³ (calculated)	
Work life at 23 ± 2 °C	> 90 minutes for 20 g mix at 23 ± 2 °C	
Typical time to handling strength [(a)]	Around 5 hours at 23 ± 2 °C	
Cure cycle	7 days at 23 ± 2°C or 12 to 24 hours at RT followed by 60 min at 80 ± 5 °C. For further details see “Instructions for use” on page 4.	
Service temperature range	-55 °C to 80 °C	
Shelf life	12 months from date of shipment at 20 ± 5 °C	

[(a)] Time to reach 1 MPa overlap shear strength

Product Performance

The following product performance data were obtained using two different cure cycles:
Cure cycle 1: 12 to 24 h at 23 ± 2 °C; cure pressure 100 kPa during first 6 hours, followed by 60 to70 min at 80 ± 5 °C
Cure cycle 2: 7 days at 23 ± 2 °C; cure pressure 100 kPa during first 24 hours.

Mechanical properties	Test temperature	Cure cycle 1	Cure cycle 2	Test method
Overlap shear strength Al 2024 T3 clad, optimized. FPL [a] [b]	- 55 °C	24 MPa	23.7 MPa	EN 2243-1
	23 °C	14 MPa	17.1 MPa	EN 2243-1
	80 °C	3.4 MPa	3.3 MPa	EN 2243-1
Overlap shear strength PPSU 99490, 1.5 mm thick [c]	- 55 °C	-	7.5 MPa [d]	EN 2243-1
	23 °C	-	7.2 MPa	EN 2243-1
	80 °C	-	2.6 MPa	EN 2243-1
Overlap shear strength PEI, 1.35 mm thick [c]	- 55 °C	-	9.5 MPa [d]	EN 2243-1
	23 °C	-	8.1 MPa	EN 2243-1
	80 °C	-	2.7 MPa	EN 2243-1
Floating roller peel strength Al 2024 T3 clad, optimized. FPL [a]	23 °C	148 N / 25 mm	202 N / 25mm	EN 2243-2

[a] See "Instructions for use" on page 4 [b] 3 wt.% of glass microspheres (200 – 300 µm) were added to control the bond line thickness.

[c] Surface preparation: degrease with isopropyl alcohol, light abrasion using Scotch-Brite™ 7447, degrease with isopropyl alcohol.

[d] Substrate failure

Ageing properties

Overlap shear was measured after immersion in different media to determine the environmental resistance of 3M™ Scotch-Weld™ 7246-2 B/A FST. The following cure cycles were used:
Cure cycle 1: 7 days at 23 ± 2 °C; cure pressure 100 kPa during first 24 hours
Cure cycle 2: 24 h at 23 ± 2 °C; cure pressure 100 kPa during first 24 hours, followed by 60 min post-cure at 80 °C.

Mechanical Properties	Medium and temperature	Cure cycle 1	Cure cycle 2
Overlap shear strength after ageing The standard samples were exposed to the environments for 1000 hours. Al 2024 T3 clad, optimized. FPL [a] [b]. Overlap shear according to EN 2243-1 was measured at 23 ± 2 °C.	Demineralised water at 23 ± 2 °C	8.7 MPa	8.4 MPa
	5 % NaCl salt spray at 35 °C	6.8 MPa	6.9 MPa
	Hydraulic fluid Skydrol 500B at 23 °C	14.8 MPa	15.8 MPa
	85 % relative humidity at 70 °C	12.1 MPa	12.2 MPa
	Lubricating oil NATO O-160 at 23 °C	14.4 MPa	15.4 MPa
	Jet fuel NATO F-35 at 23 °C	16.4 MPa	17.3 MPa
	Tributyl phosphate at 23 °C	15.0 MPa	15.4 MPa

[a] All clad 2024 T3 substrates were etched with sulfochromic acid.

[b] 3 wt.% of glass microspheres (200 – 300 µm) were added to control the bond line thickness.

Mechanical Strength – Insert Bonding

The mechanical resistance of insert bonding has been evaluated for the shear mode. Data below have been established using a cure cycle of 7 days at 23 ± 2 °C.

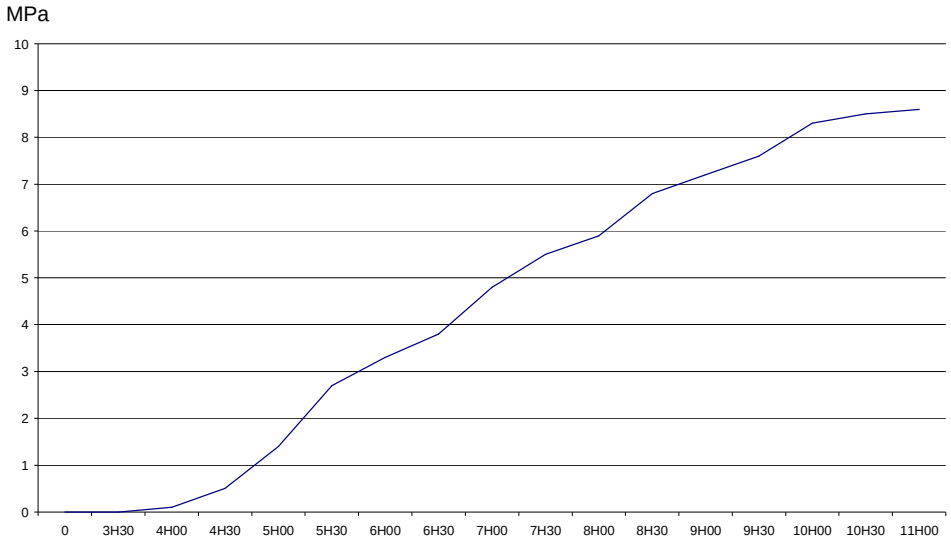
Mechanical Properties	Test temperature	Result
Insert pull out performance [a] [b]	23 ± 2 °C	875 N
Insert shear performance [a] [b]	23 ± 2 °C	1700 N

[a] NAS 1836-C08-08 inserts

[b] 10 mm thick sandwich panels using single layer glass phenolic fabric (43 % resin) and Nomex™ hexagonal core of 4.8 mm cell size and a density of 0.032 g/cm³

Strength build-up

Typical overlap shear strength build-up at 23 ± 2 °C. For substrates and surface preparation see tables on page 2.



Flammability, Smoke Density and Toxic Gas Emission

Flammability properties		Requirements	Results
Flammability (60 s vertical, stand alone)	Flame extinguishing time	≤ 15 s	0 s
FAR/JAR/CS 25.853(a), App. F part I(a)(1)(i)	Burn length time	≤ 152 mm	124 mm
Sample size: 0.5 x 325 x 75 mm³	Drip flame time	≤ 3 s	0 s
Flammability (60 s vertical, adhesive on aluminium)	Flame extinguishing time	≤ 15 s	0 s
FAR/JAR/CS 25.853(a), App. F part I(a)(1)(i)	Burn length time	≤ 152 mm	10.2 mm
Sample size: 3.2 x 325 x 75 mm³ (aluminium)	Drip flame time	≤ 3 s	0 s
0.8 x 325 x 75 mm³ (adhesive)			
Smoke emission (flaming mode)	DS_{max}[(a)] in 4 min	≤ 200	50
FAR/JAR/CS 25.853(d) App. F part V(b)			
Sample size: 2.5 x 75 x 75 mm³			
Toxic gas emission (flaming mode)	CO	≤ 1000 ppm	250 ppm
Airbus ABD0031	HCN	≤ 150 ppm	28 ppm
Boeing D6-51377	HF	≤ 100 ppm	23 ppm
Sample size: 2.5 x 75 x 75 mm³	HCl	≤ 150 ppm	3 ppm
	SO_2	≤ 100 ppm	< 10 ppm
	NO_x	≤ 100 ppm	55 ppm

(a) DS_{max}: maximum optical smoke density

Handling, Application, Storage

Precautionary Information

Refer to product label and Material Safety Data Sheet (MSDS) for health and safety information before using this product. For MSDS visit our website www.3M.com/msds.

Instructions for use

Process step	Instruction
Surface preparation	A thoroughly cleaned, dry, grease-free surface is essential for maximum performance. Cleaning methods, which will produce a continuous water film on a metal surface are generally satisfactory. However, the necessary amount of surface preparation depends on the user's required bond strength and environmental ageing resistance. The results given in this data sheet were determined using an optimized FPL etching process: 1) Degrease with methyl ethyl ketone. 2) Immerse 10 to 20 minutes in alkaline degreasing 8 % Oakite 164 solution at 85 ± 5 °C. 3) Rinse in tap water. 4) Sulfochromic immersion (10 minutes) at 70 ± 2 °C: 27.5 wt.% of H_2SO_4; 7.5 wt.% of $Na_2Cr_2O_7 \cdot 2\ H_2O$; 65 wt.% of demineralised water; 0.5 g/l aluminium; 1.5 g/l $CuSO_4 \cdot 5\ H_2O$. 5) Rinse in tap water. 6) Dry 15 minutes at 23 ± 2 °C. 7) Dry 10 minutes at 70 ± 2 °C. **Caution:** *Use adequate respiratory, eye and skin protection when using etch solutions.*
Application	This product consists of two parts. Mix part B and part A thoroughly manually or automatically by weight or volume in the proportions specified on the product. Mix manually approximately 15 seconds after a uniform colour is obtained. **Caution:** The work life differs according to pot size and temperature. Larger quantities and higher temperatures create faster reaction times. Heat is generated during cure. For maximum bond strength apply the product evenly to both surfaces to be joined. Optimum processing temperatures for adhesive and substrate are between 20 – 25 °C. The adhesive can be applied manually, e. g. by a spatula, or semi- to full automatic. Maximum strength is obtained with 0.10 – 0.25 mm bond line thickness. For repeatable performance keep the mix ratio in a range of ± 5 %. Scotch-Weld™ 7246-2 B/A FST is supplied in 200 ml duo-pack cartridges. Cartridge material should be used in combination with 3M manual dispenser ref. 08117 or with 3M pneumatic dispenser 09930. For high quality mixing results it is also recommended to use static mixing nozzles ref. 08193. Spatula and/or trowel may also be used for applications on larger surfaces.
Curing	Larger quantities and/or higher temperatures will reduce the work life. Join the surfaces coated with adhesive and cure the material according to mentioned cure cycles. Avoid moving of parts until handling strength is reached. Contact pressure is necessary. The following times and temperatures will result in a full cure: ▪ 7 days at 23 ± 2 °C; cure pressure 100 kPa during the first 24 hours ▪ 12 to 24 h at 23 ± 2 °C; cure pressure 100 kPa during the 6 first hours, followed by 60 to 70 min at 80 ± 5 °C.
Cleaning	Excess uncured adhesive can be cleaned with ketone type solvents. After cure the adhesive can be removed mechanically. **Note:** When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and instructions for use.
Storage	Store the product at room temperature or below. Shelf life at 15 – 25 °C is 12 months from date of shipment in the original unopened containers or used cartridges.

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Reference: 114