3M™ Scotch-Weld™ 3450 FST Void Filler

Introductory Technical Datasheet

Effective October 17,2006
Supersedes June 13th, 2006

Introduction

Scotch-Weld™ 3450 FST is a one part, extrudable, heat curable, low density void filling compound.

It offers the following advantages:

Very low cured density high performance from -55°C to + 80°C
Full stand-alone FST properties according to Standard **FAR 25.853 / JAR 25.853** and the Airbus Directive ABD 0031
High extrusion rate under manual or automatic condition
Essentially halogen and heavy metal free product.

- Cures at 125°C to 180°C in one hour
- Non flow for ease of application
- Low volatiles loss during cure
- Excellent water and chemical resistance

Description (not for specification purposes)

Colour:	Brown
Chemistry:	Epoxy and Anhydride
Viscosity:	Low flow, high viscous paste
Cured density:	Average density 0.57 ± 0.02 g/ml
Volatiles loss on cure:	Less than 1.5 % (1 hour at 165 ± 2°C)
Cure cycle :	Heat-up rate of 2–5°C per minute from room temp. to 125°C , then keep at 125°C for 60 minutes. Higher curing temperatures up to 180°C also possible , by same heat-up rate.
Shop Life:	5 days at 15-30°C

Applications

- Designed for honeycomb sandwich constructions for all interior panels as well as hat-racks
- Honeycomb core reinforcement and edge sealing
- Mismatch areas filling
- Inserts bonding

Product performance

Compressive strength:

(12.5 x 12.5 x 25.0) mm samples were cut from a cured test block of Scotch-Weld™ 3450 FST with an accuracy of +/- 0.2 mm. Compression was run with the force applied to the 12.5 mm square surface at a rate of 0.5 mm/minute crosshead approach rate.

Cure cycle:

The results reported below are average of five individual specimens. Following cure cycles have been tested:

1. 125 ± 5°C, 60 minutes, 3.0°C/minute heat-up rate, atmospheric pressure
2. 125 ± 5°C, 120 minutes , 3.0°C/minute heat-up rate, atmospheric pressure
3. 140 ± 5°C, 60 minutes, 3.0°C/minute heat-up rate, atmospheric pressure

Test temperatures	Compressive strength (a) (125°C cure during 60 min)	Compressive strength (a) (125°C cure during 120 min)	Compressive strength (a) (140°C cure during 60 min)
+ 23 ± 2°C	24 MPa	25 MPa	24 MPa
+ 80 ± 2°C	9 MPa	12 MPa	11 MPa

(a) Average cured density of above specimens: 0.56 g/cm^3

Exothermic reaction:

The exothermic heat during cure of 100 g sample of the void filler was reported. The void filler was filled in stainless steel round bottom cup (100 mm diameter). An electrical thermocouple was placed in the center of the core filler. The Core filler was cured for 60 min at 125 °C as well as for 60 min at 175 °C. The temperature of the Oven and that of the core filler were monitored and reported during each curing cycle. The peak exotherm is different between max recorded core filler temperature minus oven temperature.

Peak Exotherm after 125 °C/60 min curing cycle	Peak Exotherm after 175 °C/ 60 min Curing cycle
40 °C	20.5 °C

Volatile Contents:

12 g (+/2) void filler (initial mass) were weighed in crucible and dried in air circulating oven for 60 min at a temperature of 165 (+/-2) °C. After cooling down the sample in desiccators the weight of the sample was determined (dry mass). The volatile content in percent per weight was calculated as follow:

100 x (Initial mass – dry mass)/initial mass

The volatile content of SW 3450 FST was calculated and found to be 1.5 (±0.2) %

Fluid resistance: Compressive strength specimens of cured Scotch-Weld™ 3450 FST were prepared with 125°C/120 min cure cycle in accordance with the above-described conditions. The specimens were immersed in the following environments for a period of 30 days (unless otherwise stated). The % weight increase was recorded on the compressive specimens whilst the compressive strength specimens were tested at 0.5 mm/minute crosshead approach rate.

Exposures	Compressive strengths [(a)] 23 +/- 2°C	% Mass absorption[(a)]
Control	30 MPa	--
Demineralized water, +23± 2°C, 30 days	28 MPa	1.4%
Jet Fuel F34, +23± 2°C, 30 days	30 MPa	1.34%
Jet Fuel F35 +23± 2°C, 30 days	20 MPa	1.35 %
Hydraulic oil (Skydrol 500 B4), +23± 2°C, 30 days	30 MPa	1.43%
Dry heat 80 °C, 30 days	32 MPa	--

(a) Average cured density of above specimens: 0.56 g/cm^3

Hot wet conditions resistance: Compressive strength specimens of cured Scotch-Weld™ 3450 FST were prepared with 125°C/120 min cure cycle in accordance with the above-described conditions. The specimens were exposed for a period of 30 days at 70°C, 85% RH. The compressive strength specimens were tested at 0.5 mm/minute crosshead approach rate at 23°C.

125°C cure cycle	Compressive strengths [(a)] 23 +/- 2°C	% Mass absorption [(a)]
Control		---
30 days 70°C, 85% RH	17 MPa	1.1%

(a) Average cured density of above specimens: 0.56 g/cm^3

Fire Smoke and Toxicity:

Individual specimens (300 X 75 X 3.0) mm for flammability test were cut from (400 X 400 X 3.0) mm block of core filler cured between 2 silicone foils. The core filler was extruded in place in the foil from a 300 ml Semco™ cartridge. This was then cured in platen press for 60 min at 125 °C with a heat-up rate 3 °C / min. The individual specimens were then tested at Airbus Bremen Flammability test chamber to the 60 seconds as well as 12 seconds vertical Bunsen burner tests. After flame time, burn length and drip time were determined for 3 individual specimens per test.
For optical smoke density tests three individual specimens (75X75X3.0) mm were prepared by extruding the core filler from a cartridge in an aluminum frame and the cured as described in above mentioned fire resistance test. The specimens were test at Airbus Bremen in the flaming smoke emission mode.

	ABD0031 Limit	SW 3450 FST
	Vertical Bunsen Burner 12s:	
Burn length [mm]	203	16
After flame time [s]	15	3
After flame time of drip [s]	5	0
	Vertical Bunsen Burner 60s:	
Burn length [mm]	152	127
After flame time [s]	15	0
After flame time of drip [s]	3	0
	Optical smoke density	
4 minutes	200	118

Toxic gas emission in ppm						
	HCN	**CO**	**NO_x**	**SO_2**	**HF**	**HCl**
Mean value	5	412	29	1	0	0
ABD 0031	150	1000	100	100	100	150

Product Application

Surface preparation:
A thoroughly cleaned, dry, grease-free surface is essential for maximum performance.

Void Filler application:
Scotch-Weld™ 3450 FST should be permitted to warm thoroughly to room temperature before using in order to prevent moisture condensation on the adhesive surface and to permit ease of application. Product may be then applied by spatula, trowel or extruded in place with a manual / automatic extrusion gun or a pumping unit. The most appropriate work temperature for the workshop and the product is comprised between 20 and 30°C.

Recommended cure cycle:
Scotch-Weld™ 3450 FST will cure in one hour from 125°C to 180°C under atmospheric pressure.

Clean up :
Excess adhesive and equipment can be cleaned with a solvent like Methyl-Ethyl-Ketone (M.E.K.).[1)]
When using solvents, extinguish all ignition sources in the area and observe precautionary measures.

Storage stability	Refrigerated storage at -18°C or below is recommended for maximum storage life. Storage life at -18°C is 3 months from date of shipment . Rotate stock on a "first in - first out" basis.
Precautionary Information	**See Material Safety Data Sheet for precautionary information.**
Important notice to purchaser	All statements, technical information and recommendations in this Data Sheet are based on tests 3M believes to be reliable, but the accuracy or completeness of those tests is not guaranteed. The following is made in lieu of all warranties, express or implied. The seller's and manufacturers only obligation will be to replace the quantity of the product proved to be defective. Neither the seller nor 3M will be liable for any injury, loss or damage, direct or consequential, arising out of the use of or the inability to use the product. Before using, the user must determine the suitability of the product for his or her intended use. The user assumes all risk and liability in connection with the use of the product.

Product Information Source	Transportation EBU Customer Technical Center Aerospace Materials, Germany Phone 49 / 2131 14- 3244	
Reasons for change	Text changes in the description of the curing cycle to avoid misinterpretation of the conditions.	
Issued by:	S. Elgimiabi / D. Lacave	on January 20th ,2006, changed June 13th,2006
Approved by:	M.Lofgren	
3M Reference	XA 9355	

Notes:

Important Notice	The statements and technical information contained herein are based on tests and data which 3M believes to be reliable, but the accuracy or completeness of such statements and technical information is not guaranteed. User is responsible for determining whether a specific 3M product is fit for a particular purpose and suitable for user's method of application. Please remember that many factors can affect the use and performance of a 3M product in a particular application. The materials to be bonded with the product, the surface preparation of those materials, the product selected for use, the conditions in which the product is used, and the time and environmental conditions in which the product is expected to perform are among the many factors that can affect the use and performance of a 3M product. Given the variety of factors that can affect the use and performance of a 3M product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine

3M

3M Österreich GmbH
Aerospace Department
www.3m.com/at
Brunner Feldstrasse 63, 2380 Perchtoldsdorf
Telefon 01/86 686-278 od. 495
Telefax 01/86 686-229