

October, 2017

3M™ Scotch-Weld™ Toughened Epoxy Adhesive LSB60

Product Description

3M™ Scotch-Weld™ Toughened Epoxy Adhesive LSB60 is a high performance, two-part, toughened epoxy adhesive offering outstanding shear adhesion and very high levels of durability with a choice of flow characteristics. This epoxy has a 90 minute worklife and is a 1:1 mix ratio. Ideal for bulk application through meter mix dispensing equipment and the manufacture of large panel products.

Product Features

- Toughened
- High shear and peel
- 5 hour handling strength
- Flame, Smoke and Toxicity Tested*
- 90 minute work life
- 1:1 mix ratio and easy mixing

*LSB60 has been tested and meets surface flammability (ASTM E 162) and rate of smoke generation (ASTM E 662). This material also meets Bombardier requirements as they pertain to toxic gas production (Bombardier SMP 800-C). The adhesive was also tested to Boeing BSS 7239 requirements, although there is no specific pass criteria for this test.

NOTE: The following data is taken from tests conducted on limited production runs. 3M will continue to test samples from additional product runs and will issue a new data page if the test results change.



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Technical Information Note

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

Typical Uncured Physical Properties

Property	Values	Notes	Temp C	Temp F
Color	Gray	Colors may vary from nearly white to yellow/amber. Adhesive performance is not affected by color variation.		
Base Color	White			
Accelerator Color	Dark Gray			
Base Viscosity	17200 cP	Viscosity measured using Brookfield RTV, spindle #7, 20 RPM	27C	80F
Accelerator Viscosity	68200 cP	Viscosity measured using Brookfield RTV, spindle #7, 20 RPM	27C	80F
Base Resin	Epoxy			
Accelerator Resin	Amine			
Base Net Weight	10 lb/gal			
Accelerator Net Weight	9.8 lb/gal			
Mix Ratio by Volume (B:A)	1:1			
Mix Ratio by Weight (B:A)	1:1			

Typical Mixed Physical Properties

Property	Values	Notes	Temp C	Temp F
Worklife	90 min	Maximum time that adhesive can remain in a static mixing nozzle and still be expelled without undue force on the applicator. Cure times are approximate and depend on adhesive temperature.		

Table continued on next page

Typical Mixed Physical Properties (continued)

Property	Values	Notes	Temp C	Temp F
Open Time	90 min	Maximum time allowed after applying adhesive to one substrate before bond must be closed and fixed in place. Cure times are approximate and depend on adhesive temperature. For hotmelts: The approximate bonding range of a 1/8" bead of molten adhesive on a non-metallic surface.		
Time to Handling Strength	5 hr	Minimum time required to achieve 50 psi of overlap shear strength. Cure times are approximate and depend on adhesive temperature.	23C	73F
Time to Full Cure	7 day		23C	73F

Typical Physical Properties

Color: Gray

Conditions

Test Name: Cured

Typical Cured Characteristics

Shore D Hardness: 62

Conditions

Temp C: 23C

Temp F: 73F

Methods

ASTM D2240

Typical Performance Characteristics

Property	Values	Method	Test Name	Substrate	Failure Mode	Dwell Time	Dwell/ Cure Units	Temp C	Temp F	Environment	Substrate Notes	Surface Preparation	Notes
90° Peel Adhesion Cushioned Sleeve A	3700 N/cm	ASTM D3330 (modified)	90° Peel Adhesion	Cushioned Sleeve A	CF/AF								

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Typical Performance Characteristics (continued)

Property	Values	Method	Test Name	Substrate	Failure Mode	Dwell Time	Dwell Time Units	Temp C	Temp F	Environment	Substrate Notes	Surface Preparation	Notes
Overlap Shear Strength 7day Aluminum	3600 lb/in ²	ASTM D1002	Overlap Shear Strength	Aluminum	CF	7	day	23C	73F	50%RH	0.005-0.008in	-MEK/bondline	Overlap/MEK (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. These bonds were made individually using 1 in. x 4 in. pieces of substrate except for aluminum. Two panels 0.063 in. thick, 4 in. x 7 in. of 2024T-3 clad aluminum were bonded and cut into 1 in. wide samples after 24 hour. The separation rate of the testing jaws was 0.1 in. per minute for metals, 2 in. per minute for plastics and 20 in. per minute for rubbers. The thickness of the substrates were: steel, 0.060 in.; other metals, 0.05-0.064 in.; rubbers, 0.125 in.; plastics, 0.125 in. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)
Overlap Shear Strength 7day Cold Rolled Steel	3200 lb/in ²	ASTM D1002	Overlap Shear Strength	Cold Rolled Steel	CF/AF	7	day	23C	73F	50%RH	0.005-0.008in	-MEK/bondline	Overlap/MEK (OLS) strengths were measured on 1 in. wide 1/2 in. overlap specimens. These bonds were made individually using 1 in. x 4 in. pieces of substrate except for aluminum. Two panels 0.063 in. thick, 4 in. x 7 in. of 2024T-3 clad aluminum were bonded and cut into 1 in. wide samples after 24 hour. The separation rate of the testing jaws was 0.1 in. per minute for metals, 2 in. per minute for plastics and 20 in. per minute for rubbers. The thickness of the substrates were: steel, 0.060 in.; other metals, 0.05-0.064 in.; rubbers, 0.125 in.; plastics, 0.125 in. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)

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Typical Performance Characteristics (continued)

Property	Values	Method	Test Name	Substrate	Failure Mode	Dwell Time	Dwell Time Units	Temp C	Temp F	Environment	Substrate Notes	Surface Preparation	Notes
Overlap Shear Strength 7day Polycarbonate (PC)	480 lb/in ²	ASTM D1002	Overlap Shear Strength	Polycarbonate (PC)	AF	7	day	23C	73F	50%RH	0.005-0.008 in bondline	-IPA Wipe	Overlap shear (OLS) strengths were measured on 1 in. wide lap specimens. These bonds were made individually using 1 in. x 4 in. pieces of substrate except for aluminum. Two panels 0.063 in. thick, 4 in. x 7 in. of 2024T-3 clad aluminum were bonded and cut into 1 in. wide samples after 24 hour. The separation rate of the testing jaws was 0.1 in. per minute for metals, 2 in. per minute for plastics and 20 in. per minute for rubbers. The thickness of the substrates were: steel, 0.060 in.; other metals, 0.05-0.064 in.; rubbers, 0.125 in.; plastics, 0.125 in. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)
Overlap Shear Strength 7day Fiber-Reinforced Plastic	2000 lb/in ²	ASTM D1002	Overlap Shear Strength	Fiber-Reinforced Plastic	CF	7	day	23C	73F	50%RH	0.005-0.008 in bondline	-IPA Wipe	Overlap shear (OLS) strengths were measured on 1 in. wide lap specimens. These bonds were made individually using 1 in. x 4 in. pieces of substrate except for aluminum. Two panels 0.063 in. thick, 4 in. x 7 in. of 2024T-3 clad aluminum were bonded and cut into 1 in. wide samples after 24 hour. The separation rate of the testing jaws was 0.1 in. per minute for metals, 2 in. per minute for plastics and 20 in. per minute for rubbers. The thickness of the substrates were: steel, 0.060 in.; other metals, 0.05-0.064 in.; rubbers, 0.125 in.; plastics, 0.125 in. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)
Overlap Shear Strength 7day Galvanized Steel	3400 lb/in ²	ASTM D1002	Overlap Shear Strength	Galvanized Steel	AF	7	day	23C	73F	50%RH	0.010 in bondline	MEK/Wipe	Overlap shear (OLS) strengths were measured on 1 in. wide lap specimens. These bonds were made individually using 1 in. x 4 in. pieces of substrate except for aluminum. Two panels 0.063 in. thick, 4 in. x 7 in. of 2024T-3 clad aluminum were bonded and cut into 1 in. wide samples after 24 hour. The separation rate of the testing jaws was 0.1 in. per minute for metals and 2 in. per minute for plastics; all surfaces prepared with light abrasion and solvent clean; substrates used were 1/16" thick aluminum and 1/8" thick plastics; composites varied. SF: Substrate Failure AF: Adhesive Failure CF: Cohesive Failure MF: Mixed failure modes

Table continued on next page

Typical Performance Characteristics (continued)

Property	Values		Test Method	Test Name	Substrate	Failure Mode	Dwell Time	Dwell Time Units	Temp C	Temp F	Environment	Substrate Notes	Surface Preparation	Notes
Overlap Shear Strength 7day FRP (Epoxy)	2000 lb/in ²		ASTM D1002	Overlap Shear Strength	FRP (Epoxy)	CF	7	day	23C	73F		0.005 in bondline	IPA Wipe/Alkane Wipe	Overlap shear (OLS) strengths were measured on 1 in. wide 2-side overlap specimens. These bonds were made individually using 1 in. x 4 in. pieces of substrate except for aluminum. Two panels 0.063 in. thick, 4 in. x 7 in. of 2024T-3 clad aluminum were bonded and cut into 1 in. wide samples after 24 hour. The separation rate of the testing jaws was 0.1 in. per minute for metals, 2 in. per minute for plastics and 20 in. per minute for rubbers. The thickness of the substrates were: steel, 0.060 in.; other metals, 0.05-0.064 in.; rubbers, 0.125 in.; plastics, 0.125 in. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)
Overlap Shear Strength 7day FRP (Polyester)	2700 lb/in ²		ASTM D1002	Overlap Shear Strength	FRP (Polyester)	SF	7	day	23C	73F		0.005 in bondline	IPA Wipe/Alkane Wipe	Overlap shear (OLS) strengths were measured on 1 in. wide 2-side overlap specimens. These bonds were made individually using 1 in. x 4 in. pieces of substrate except for aluminum. Two panels 0.063 in. thick, 4 in. x 7 in. of 2024T-3 clad aluminum were bonded and cut into 1 in. wide samples after 24 hour. The separation rate of the testing jaws was 0.1 in. per minute for metals, 2 in. per minute for plastics and 20 in. per minute for rubbers. The thickness of the substrates were: steel, 0.060 in.; other metals, 0.05-0.064 in.; rubbers, 0.125 in.; plastics, 0.125 in. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)
Honeycomb Climbing Drum Peel	16.5 lbf-in/in	15.9 lbf-in/in	ASTM D1781		Aluminum to Aluminum								MEK/Alkane	MEK (partial core failure)

Typical Performance Characteristics (continued)

Bell Peel	Temp C	Temp F	Failure mode	Dwell/Cure Time	Dwell Time Units
3.6 lb/in width	-55C	-67F	CF		
13.3 lb/in width	23C	72F	AF		
15.9 lb/in width	82C	180F	AF	4	hr

Property: Bell Peel

Method: ASTM D3167

Substrate: Etched Aluminum

Substrate Notes: 0.02in thick; 0.065in bondline

notes: Bell peel strengths were measured on 1 in. wide bonds at the temperatures noted. The testing jaw separation rate was 6 in. per minute. AF: adhesive failure

CF: cohesive failure SF: substrate failure

Handling/Application Information

Directions for Use

1. For highest strength structural bonds, paint, oxide films, oils, dust, mold release agents and all other surface contaminants must be completely removed. The amount of surface preparation depends on the required bond strength, environmental aging resistance desired by user. For suggested surface preparations on common substrates, see the section on surface preparation.
 2. Mix thoroughly by weight or volume in the proportions specified on the product label or in the typical uncured properties section. Mix approximately 15 seconds after a uniform color is obtained.
 3. For maximum bond strength, apply adhesive evenly to both surfaces to be joined.
 4. Application to the substrates should be made within 60-90 minutes. Larger quantities and/or higher temperatures will reduce this working time.
 5. Join the adhesive coated surfaces and allow to cure at 60oF (16oC) or above until completely firm. Heat up to 120oF - 150oF (49oC - 66oC) will speed curing.
 6. Keep parts from moving during cure. Apply contact pressure if necessary. Maximum shear strength is obtained with a 3-5 mil bond line.
 7. Excess uncured adhesive can be cleaned up with ketone type solvents*.
- *Note: when using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer’s precautions and directions for use.

Surface Preparation

3M™ Scotch-Weld™ Toughened Epoxy Adhesives LSB60 and LSB60NS is designed to be used on plastic or metal surfaces. For high strength structural bonds, paint, oxide films, oils, dust, mold release agents and all other surface contaminants must be completely removed. The amount of surface preparation depends on the required bond strength, environmental aging resistance desired by the user. The following cleaning methods are suggested for common surfaces:

Steel:

1. Wipe free of dust with oil-free solvent such as acetone or isopropyl alcohol solvents*.
2. Sandblast or abrade using clean fine grit abrasives.
3. Wipe again with solvent to remove loose particles*.
4. If a primer is used, it should be applied within 4 hours after surface preparation.

Aluminum:

1. Wipe free of dust with oil-free solvent such as acetone or isopropyl alcohol solvents*.
2. Sandblast or abrade using clean fine grit abrasives
3. Wipe again with oil-free solvent such as acetone or isopropyl alcohol solvents*

Plastics/Rubber:

1. Wipe with isopropyl alcohol*.
2. Abrade using fine grit abrasives.
3. Wipe with isopropyl alcohol*

Glass:

1. Solvent wipe surface using acetone or MEK*.
2. Apply a thin coating (0.0001 in. or less) of 3M™ Scotch-Weld™ Metal Primer EC3901 to the glass surfaces to be bonded and allow the primer to dry before bonding.

*Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer’s precautions and directions for use.

3M™ Scotch-Weld™ Toughened Epoxy Adhesive LSB60

Storage and Shelf Life

Store products at 60-80°F (15-27°C) for maximum shelf life.
These products have a shelf life of 18 months from date of manufacture.

Industry Specifications

Bombardier SMP 800-C
BSS 7239
NFPA 130 test report for details (ASTM E162, ASTM E662, SMP 800-C, BSS 7239)
NFPA 130 test report for details (ASTM E1354)

Trademarks

3M, Scotch-Weld and EPX are trademarks of 3M Company.

References

Property	Values
3m.com Product Page	https://www.3m.com/3M/en_US/company-us/all-3m-products/~ /3M-Scotch-Weld-Toughened-Epoxy-Adhesive-LSB60/?N=5002385+3293242456&rt=rud
Safety Data Sheet SDS	https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&msdsLocale=en_US&co=ptn&q=LSB60

Family Group

	LSB60	LSB60NS
Color Test Name: Cured	Gray	Gray
Worklife (min)	90	90
Open Time (min)	90	90

For Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-362-3550 or visit www.3M.com/structuraladhesives.

Precautionary Information

Refer to Product Label and Material Safety Data Sheet for health and safety information before using this product. For additional health and safety information, call 1-800-364-3577 or 651-737-6501.

Information

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