Structural Adhesive 5027

Technical Data Sheet **April 2009**

Supersedes Technical Data Sheet dated December 2002

General Description

3M™ Structural Adhesive SA5027 is two-part epoxy formulated specifically for steel hem flange bonding applications involving very high draw lubricant coated weights with good induction reactivity to achieve quick lockup. It features low activation temperatures to minimize panel distortion, broad off-ratio and over-bake tolerance, spot cure capability, structural bond strength, even on as-received, draw lubricated steel.

Physical Properties

	Part A	Part B	Mixed Adhesive
Color	Amber	Black	Black
Viscosity at room temperature[1]	45,000 cps	180,000 cps	

[1] Rheometrics Dynamic Analyzer at 100sec.-1

Shelf Life

Store at room temperature for up to 6 months.

Storage and Handling

Storage	Part A	Part B
Container sizes (standard)		
- drums	113.5 L	208.2 L
- dual pack cartridges	150 mL	300 mL
Adhesive volume		
- drums	98.4 L	208.2 L
- dual pack cartridges	150 mL	300 mL

Dispensing	Mixed Adhesive
Mixed ratio (B:A)	
- by weight	1.65 B : 1.0 A
- by volume	2.0 B : 1.0 A
Off-ratio tolerance[1]	
- by weight	1.32 – 1.98 B ; 1.0 A (±20%)
- by volume	1.6 – 2.4 B : 1.0 A (±20%)
Open time	120 minutes
Induction cure	
Typical induction cycles	4-8 sec. at 79°-120°C[2]
Typical lock-up time	30 minutes
Final cure	
Cure temperature	Cures at paint bake oven conditions

[1] Maintaining 80% of performance properties at the target ratio

[2] Adhesive bondline temperature

Dispensing Equipment:

Drums can be dispensed through bulk equipment specifically designed for use with 2-part epoxy adhesives. Dual pack cartridges can be dispensed manually; follow instructions included.

Clean-Up:

Uncured adhesive can be removed by scraping with a putty knife or similar tool. For cured material, remove by cutting or sanding.

Performance Properties

Over-Lap Shear (OLS)[1] on draw lubricated 6111 aluminum	Value	Failure Mode
Room temperature plus RT cure[2]	4.97 MPa	Cohesive
Room temperature plus oven cure[3]	16.5 MPa	Cohesive
Induction plus 30 minutes RT cure[4]	0.69 MPa	N/A
Induction plus 60 minutes RT cure[4]	1.55 MPa	N/A
Induction plus 24 hours RT cure[3]	9.66 MPa	N/A
Induction plus oven cure[5]	16.5 MPa	Cohesive
1000 hours salt spray[6]	> 80% retention	Cohesive

Note: The draw lubricant tested was a difficult petroleum-based product which had been selected by one automotive OEM for its draw-lubricating properties, not its compatibility with the adhesive.

Creep resistance[7] on draw lubricated 6111 aluminum	Value
RT cure – 24 hours	4.54 kg
RT cure – 72 hours	6.80 kg
Induction plus 24 hours RT cure	11.34 kg
Induction plus 72 hours RT cure	20.41 kg

T- Peel on draw lubricated 6111 aluminum	Value
Room temperature plus oven cure	4.5 kg/cm width
Induction plus oven cure	5.4 kg/cm width

Note: These properties are representative of the product's performance on a specific aluminum draw lubricant, and not intended for specification purposes.

Over-Lap Shear (OLS)[1] on draw lubricated G60 HDG steel	Value	Failure Mode
Room temperature plus oven cure[8]	15.2 MPa	Cohesive

Note: These results were obtained using two different draw lubricants.

Notes

[1] Measured on 25.4 mm wide coupons using 12.7 mm over-lap bonds. Thickness of the bond line was 0.25 mm. Crosshead speed was 12.7 mm/min. Metal thickness was approximately 0.76 mm..

[2] After 24 hours at room temperature

[3] After 24 hours at room temperature followed by a multi-stage oven cure. See note 5.

[4] After 2 induction-cure cycles of 4 seconds each at 107°C bondline temperature followed by the time indicated at room temperature.

Notes (continued)

[5] After 2 induction-cure cycles of 4 seconds at 107°C bondline temperature followed by 24 hours at room temperature and a multi-stage heat cure of 30 minutes at 205°C, 1 hour at room temperature, 10 minutes at 163°C, 1 hour at room temperature, and 10 minutes at 130 °C. Other single or multi-stage cures will produce similar results, depending on the draw lubricant and induction cure conditions.

[6] After induction plus oven cure as in note 5 followed by 1000 hours 5% NaCl salt spray at 35°C.

[7] Maximum static load held by overlap shear bond for 40 minutes at 205°C.

[8] After 24 hours at room temperature followed by 30 minutes at 180°C. Crosshead speed was 12.7 mm/minute for aluminum testing and 50.8 mm/minute for steel.

Features, Advantages, Benefits

Product Features	Performance Advantages	Customer Benefits
Epoxy chemistry	• High bond strength (15 MPa psi OLS) with cohesive failure mode on hot dipped galvanized (HDG) steel • Compatible with significant coating weights of draw lubricants of several varieties • Excellent environmental durability (to heat, humidity, salt water, solvents)	• Robust, structural bonding performance even on untreated substrates • Very high draw lubricant coating weights can be tolerated
Two parts	• Extended shelf life • Controlled reactivity; balance of longer open time before induction with fast lock-up after induction • Room temperature strength build; permits spot induction cure with cohesive failure mode • Can be dispensed with commercially available dispensing systems; broad off ratio tolerance • Wash out resistance	• Broad handling and dispensing windows • Extended open time allows for greater processing latitude
Induction activation and cure	• Low temperature activation at or below 107°C depending on cycle time; reduced potential for panel distortion	• Broad curing windows; faster cycle times and low induction temperatures minimize risk of panel distortion
Final heat cure	• Broad over-bake tolerance	

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