

3M™ SA9816 Two Part Epoxy Adhesive

Automotive Structural Adhesive

Technical Data Sheet

Description

3M™ Automotive Two-Part Epoxy Adhesive SA9816 is formulated for galvanised steel or aluminium hem flange bonding applications involving very high draw lubricant coating weights with good induction reactivity, an important factor in achieving fast lock-up.

The adhesive can also offer a special feature of compatibility with dry film lubricants used on aluminium surfaces. It is particularly important that the adhesive has a long dwell time capability before E-coat bake. 3M™ SA9816 can offer the following additional features; low activation temperatures to minimize panel distortion, broad off-ratio and over-bake tolerance, spot cure capability, and structural bond strength, on as-received (draw lubricated) steel and aluminium.

This product facilitates geo-setting of automotive panels assemblies in the body construction facility, hence can offer the opportunity to eliminate the need for Body-in-White ovens and additional fixturing outside of the hemming cell

Product Construction

This is a two-component structural adhesive dispensed in the ratio of 4:1 by volume. Typical forms of packaging available for the product with both bulk and cartridge formats. Bulk application is typically by robotic applicator using a doser to accurately dispense the two-component adhesive through a static or dynamic mixing nozzle. The product is also suitable for hand held cartridge application.



Physical Properties

	Part A (accelerator)	Part B (base)	Mixed
Color	Light brown	black	black
Solids (%)	100	100	100
Density	1.04	0.88	0.91

Handling and Processing

Storage	Shelf Life* (minimum)	
	Part A (accelerator)	Part B (base)
Recommended Conditions: Transported and stored at average adhesive temperatures between 10°C and 30°C	6 months	6 months

* The shelf life as defined above remains indicative and maximum data, subject to external and non-controllable factors. It may not be interpreted as a warranty.

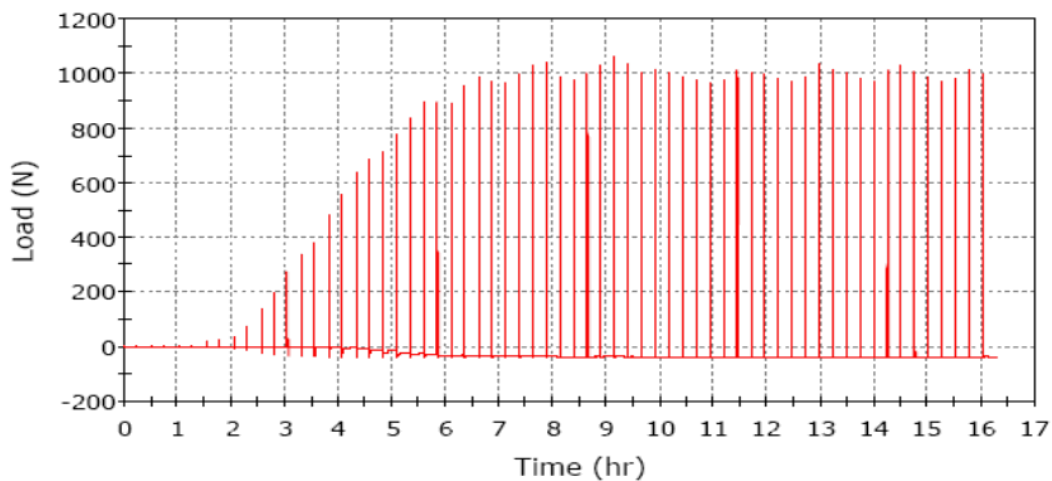
Dispensing	mixed adhesive
Mix ratio B:A <ul style="list-style-type: none"> • By weight • By volume 	3.45 B : 1.0 A 4.00 B : 1.0 A
Off Ratio Tolerance <ul style="list-style-type: none"> • By weight • By volume 	3.14 B – 3.83 B : 1.0A (±10% of A) 3.64 B – 4.44 B : 1.0A (±10% of A)
Open time at 23°C (maximum time from application to join closure)	120 minutes (this should be reduced for higher temperatures)

Curing:

3M SA9816 has a two-stage curing mechanism. Initial strength is achieved by either room temperature curing over a few hours or accelerated by induction curing; final strength is achieved through E-coat-bake.

Room Temperature Cure:

Strength Build-Up at Room Temperature (23°C): time to handling strength



This strength build up curve was developed using a 3M Test Procedure. The strength of the adhesive is measured by a regular small deflection on a shear sample this test uses the same sample throughout the

duration of the test. At regular intervals, the sample is pulled 0.25mm then returned to the starting position. In our experience comparing automotive panel handling strength with the results achieved in this test, good panel handling strength is achieved at around 200N in this test or 2h-3h at 23°C for 3M 9816. Higher temperatures will accelerate, and lower temperatures will reduce the rate of strength build-up.

Although there is a significant level of strength build up at room temperature and with induction, final structural strength is achieved during E-coat bake. Typical strengths after minimum and maximum E-coat bake cycles are shown in the following data.

Performance Data

6111 Aluminium, Siloxane Conversion Coating with dry-film lubricant (0.93mm)

Over-Lap Shear (SAE J1523)

Exposure	Over-Lap Shear Strength (MPa) (mean average of min/max bake)		Failure Mode (Cohesive/Adhesive/Substrate)
	Min bake	Max bake	
Room Temperature (23°C)	15.5	20.8	Cohesive
Elevated Temperature (82°C)	6.0	8.5	Cohesive
Low Temperature (-40°C)	16.6	22.2	Cohesive
2000hr Salt-Spray (ASTM B117)	14.9		Cohesive
Cyclic Corrosion (30 cycles) *****	13.7	19.5	Cohesive

***** 15 minutes salt water immersion (5% salt solution)
 105 minutes drip dry at 23 +/- 2 °C
 22 h at 50 +/- 2 °C and 90 +/- 5% RH

Peel Resistance (ASTM D1876)

Exposure	Over-Lap Shear Strength (N/25mm) (mean average of min/max bake)	Failure Mode (Cohesive/Adhesive/Substrate)
Room Temperature (23°C)	Average Plateau Load: 70.8	Cohesive

Galvanized Steel with stamping oil (0.8mm)

Over-Lap Shear (SAE J1523)

Exposure	Over-Lap Shear Strength (MPa) (mean average of min/max bake)		Failure Mode (Cohesive/Adhesive/Substrate)
	Min bake	Max bake	
Room Temperature (23°C)	16.69	16.79	Cohesive
Elevated Temperature (82°C)	10.54	6.53	Cohesive
Low Temperature (-40°C)	20.26	20.45	Cohesive
500hr Salt-Spray (ASTM B117)	12.77	13.85	Cohesive
Cyclic Corrosion (30 cycles) *****	12.79	14.41	Cohesive

***** 15 minutes salt water immersion (5% salt solution)
 105 minutes drip dry at 23 +/- 2 °C
 22 h at 50 +/- 2 °C and 90 +/- 5% RH

Peel Resistance (ASTM D1876)

Exposure	Over-Lap Shear Strength (N/25mm) (mean average of min/max bake)	Failure Mode (Cohesive/Adhesive/Substrate)
Room Temperature (23°C)	Average Plateau Load: 280	Cohesive

The values displayed are the result of illustrative lab test measures made according to the indicated external norm and shall not be considered as a commitment from 3M.

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