

3M™ SA9816 Two Part Epoxy Adhesive

Automotive Structural Adhesive

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 aluminum 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 2-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 2 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
Colour	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.		

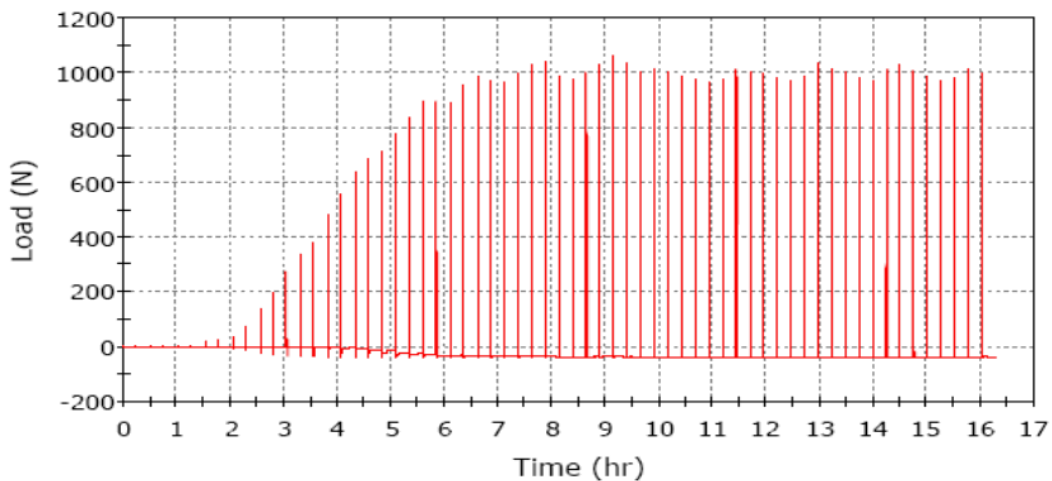
Dispensing	mixed adhesive
Mix ratio B:A <ul style="list-style-type: none"> • By weight • By volume 	3.45 B :1.0 A 4.00 B: 1.0 A
Off Ratio Tolerance <ul style="list-style-type: none"> • By weight • By volume 	3.14 B – 3.83 B: 1.0A (±10% of A) 3.64 B – 4.44 B: 1.0A (±10% of A)
Open time (at 23°C) (maximum time from application to joint 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 minute salt water immersion (5% salt solution)
1 h and 45 minute 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 minute salt water immersion (5% salt solution)
1 h and 45 minute 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

Health and Safety Information: Read all Health Hazard, Precautionary, and First Aid statements found in the Material Safety Data Sheets and/or product label prior to handling or use. Material Safety Data Sheet for this product is available from www.3m.co.uk/msds

Technical Information: The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use: Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

Warranty, Limited Remedy, and Disclaimer: This 3M product is sold or made available "AS IS." 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY OR CONDITION ARISING OUT OF A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE.

Limitation of Liability: Except where prohibited by law, 3M will not be liable for any loss or damage arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.



Automotive Division
3M United Kingdom PLC
3M Centre
Cain Road
Bracknell
RG12 8HT
www.3M.co.uk

SA9816
Issue date: September 2016
Revision: JK02
3M is a trademark of 3M Company
© 3M 2016. All rights reserved.