

ENGINEERING MATERIAL SPECIFICATION

Material Name

Specification Number

ADHESIVE, EPOXY – MICROENCAPSULATED

ESA-M2G200-A

1. SCOPE

The material defined by this specification is a microencapsulated epoxy adhesive that develops a prevailing torque between mating threaded fasteners after assembly. Prevailing torques are developed on all fastener coatings and finishes, and are redeveloped with only a moderate loss after removal and reinstallation.

2. APPLICATION

This specification was released originally as a material for use on strut to crossmember attachment.

3. REQUIREMENTS

3.0 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

3.1 APPEARANCE

Blue, opaque,
viscous liquid

3.2 WEIGHT PER VOLUME (ASTM D 891, Method "A")

8.6 +/- 0.2 lb/gal
(1.03 +/- 0.02 kg/L)

3.3 VISCOSITY (Brookfield RVF, number 4 spindle at 20 rpm, at 23 +/- 2 °C)

3.3.1 As received

1,600 – 2,400 cP
(mPa-s)

3.3.2 Aged - 7 days at 50 +/- 2 °C, max

3,000 cP (mPa-s)

3.4 SOLIDS

59.5 +/- 2.5%

Test Method: Heat 1 - 2 g weighed sample in a vacuum oven (10 mm Hg (1.3 kPa) or less) at 54 +/- 2 °C for 4 h. Allow sample to cool and determine weight loss in percent. Report percent solid as 100-% weight loss.

Date	Action	Revisions
2003 01 31	Revised	Para 3.0 inserted ; Para 3.6 & 4 deleted
1979 01 10		Metricated and Retyped CAH2 823385
1973 05 24		Released AC2-52

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3.5 TORQUE

Test Method: Eight grade 5 cap screws (3/8-16 x 1-1/4) are weighed to 2 decimal places and then dipped into a freshly mixed, homogeneous batch of adhesive so that all of the thread area is covered with adhesive. The screws are removed and held at a 45 ° angle to the horizontal with the head up, while the excess adhesive drains for about 10 s, then the lower edge of the screw is scraped on the top of the adhesive container to remove the excess drop of adhesive. The screws are arranged vertically, standing on the head of the screw in a 71 +/- 2 °C oven for 4 h to remove solvent. After this period, they are removed from the oven and cooled to room temperature, then reweighed to determine the weight of adhesive. A minimum of 0.15 g of adhesive and a maximum of 0.25 g should be on each of the screws.

The screws are inserted through a hardened washer and then a spacer made by drilling a 0.375 -0 + 0.015 in (9.53 -0 + 0.38 mm) hole in a 1/2 in (13 mm) thick steel plate. After inserting a second washer over the exposed thread area, a Grade 5 nut is fitted to the screw and the maximum prevailing in torque (the torque required to drive the screw into the nut), is measured with a torque wrench. This torque wrench should have a sensitivity of 2 lb-in (0.23 N·m). The screw is then seated to the nut with 31 lb-ft (42.0 N·m) using a larger torque wrench which has a sensitivity of 2 lb- ft (2.7 N·m). The assembly is allowed to stand for 24 h at room temperature, then the break loose torque is measured by placing the head of the screw in a vise and measuring the amount of torque necessary to loosen the nut with a torque wrench. The torque wrench should be pulled smoothly at a rate of about one revolution in 2 s. After the nut has been turned off 1/4 turn from the seated position, the amount of torque necessary to keep the nut coming off for the next full revolution is read. The minimum torque reading noted during this first revolution off when the wrench is operated smoothly at this one revolution/2 s rate is the prevailing out torque.

- (1) All torque measurements are made by clamping the head of the screw in the vise and using the torque wrench on the nut.

3.5.1	Prevailing in Torque, max	25 lb-in (2.8 N·m)
3.5.2	Break Loose, Torque, min	40 lb-ft (54.2 N·m)
3.5.3	Prevailing Out Torque, min	7 lb-ft (9.5 N·m)