Automotive Structural Adhesives

Scotch-Grip™ Fastener Adhesives 2353, 4844 (Normal Temp Formula)

Data Sheet **June 2000**

General Description

3M Scotch-Grip™ Fastener Adhesives are microencapsulated, room temperature curing adhesives which enhance the anchorage of threaded fasteners. The adhesives are designed to be coated on the fasteners and dried; they remain dormant until the shearing action of engaging the fastener into a nut or threaded cavity breaks the capsules and allows the adhesive to cure. Typical applications are fasteners for the engine compartment or safety-related parts.

Product Features	Performance Advantages	Customer Benefits
Epoxy chemistry	High torque values on coated fasteners Environmental resistance (to heat, automotive fluids, vibration, thermal and mechanical shock)	Robust, structural bonding performance
2-part (microencapsulated)	Extended shelf life (bulk adhesive and coated fasteners) Controlled reactivity (adhesive activates and cures upon insertion) Reusability (additional capsules break with each re-insertion)	Convenient handling by the end-users
Flow coatable formula	Allows controlled application to fasteners; viscosity can be adjusted to achieve target coating weights Penetrates oil coatings Fast drying Bonds to a broad range of fastener finishes	Broad handling, dispensing and drying windows for the applicators

Product Descriptions

2353 (blue) 4844 (yellow)	**Normal Temp Formula.** Designed for applications where the service temperature will not exceed 240°F (116°C)*.
2510 (orange) 2510N (neutral)	**High Temp Formula**. Designed for applications where the service temperature might reach continuously up to 300°F (149°C), or intermittently up to 400°F (204°C). Refer to separate data page.

** While the functional service temperature upper limit for 2353/4844 is 240°F (116°C) the product can be exposed to temperatures as high as 350°F (177°C). At the higher temperatures there will be loss of adhesion but no damage to the adhesive. When temperature is lowered again, adhesion will be regained.*

Physical Properties

Bulk adhesive	**2353/4844**
Density	8.6 lbs/gallon (1030 kg/m^3)
% solids	59%
Viscosity[1]	1600-2400 cps
Solvent base	Toluene

[1]Brookfield viscometer, RVF #4 spindle at 20 rpm.

Handling/ Process Properties

Bulk adhesive	**2353/4844**
Container sizes	5 gal (18.9 l) pails
Shelf life	6 months from date of receipt by customer Shelf life can be extended by re-mixing the adhesive regularly so that capsules do not coagulate on the bottom of the pails. Adhesive which is more than 6 months from the date of receipt should be checked for performance prior to application on fasteners.
Storage conditions	Store pails at 40°-100°F (4°-38°C) **PROTECT FROM FREEZING**; storage below 32°F (0°C) for extended periods will freeze the adhesive and make it totally unusable. Storage above 120°F (49°C) will shorten the shelf life of the adhesive. Inventory should be rotated on a FIFO (first in, first out) basis.

Coated fasteners	
Shelf life	1 year from date of adhesive application Shelf life can be as long as 4 years, depending on the storage conditions. Fasteners which are more than 1 year from the date of adhesive application should be checked for performance prior to use.
Storage conditions	Store coated fasteners at 40°-100°F (4°-38°C)

Performance Properties

Prevailing In Torque (PIT)	**2353/4844**
initial[1]	1 ft-lb (1.4 Nm)
Break-Loose Torque (BLT)	
initial[1]	41 ft-lbs (55.8 Nm)
Break-Away Torque (BAT)	
initial[1]	14 ft-lbs (19.0 Nm)
heat aging[2]	No change (±10% of initial value)
cycles[3]	No change (±10% of initial value)
water immersion[4]	No change (±10% of initial value)
gasoline immersion[5]	No change (±10% of initial value)
hot motor oil immersion[6]	No change (±10% of initial value)
transmission fluid immersion[7]	No change (±10% of initial value)
anti-freeze immersion[8]	No change (±10% of initial value)
Prevailing Out Torque (POT)	
initial[1]	11 ft-lbs (15.0 Nm)

NOTE: These properties are representative of the products' performance, and are supported by laboratory test data. However, the values reported are not intended to be used for specification purposes.

[1] 24 hours at room temperature

[2] 3 weeks at 220°F (104°C)

[3] Conditioned under 3 of the following cycles: 1 1/2 hours at -68°F (-56°C), 1 hour at 350°F (177°C), and 1 1/2 hours at 75°F (24°C)

[4] Immersion in distilled water for 1 week at 75°F (24°C)

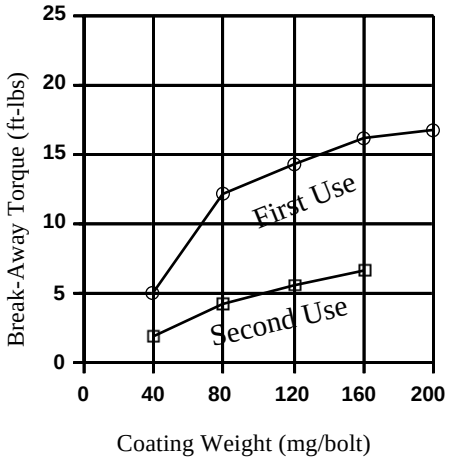
[5] Immersion in regular, unleaded gasoline for 1 week at 75°F (24°C)

[6] Immersion in SAE 30 motor oil for 1 week at 220°F (24°C)

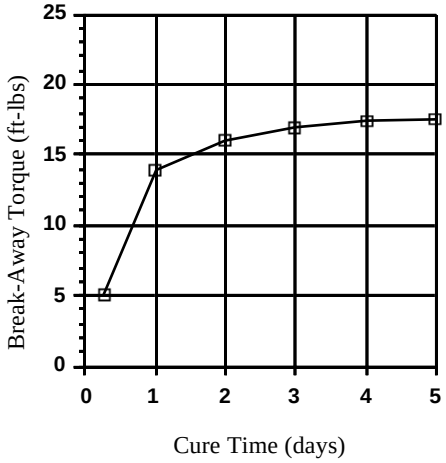
[7] Immersion in transmission fluid for 1 week at 75°F (24°C)

[8] Immersion in a 50% solution of ethylene glycol in water for 1 week at 120°F (49°C)

Break-Away Torque (initial) vs Adhesive Coating Weight



Break-Away Torque vs Cure Time (at room temperature)



Definition of Terms

Prevailing In Torque (PIT): The maximum torque reading obtained during insertion of a bolt into a nut prior to seating, i.e., before fully torqueing the bolt into place.

Break-Loose Torque (BLT): The initial torque reading obtained when a bolt is unscrewed after it has been seated, i.e., fully torqued into place.

Break-Away Torque (BAT): The initial torque reading obtained when a bolt is unscrewed after it has NOT been seated.

Prevailing Out Torque (POT): The maximum torque reading obtained when a bolt is being removed, excluding the BLT value; typically the value during the first full rotation of the bolt.

OEM Approvals

2353 meets the requirements of IFI 125 and the following automotive specifications:

General Motors	6175M
Ford	ESA-M2G200-A ESS-M11P24-A2 WX-200[1]
Chrysler	PF-6616 MS-CC76

[1] Except for 1 hour Break-Loose Torque values on M5 and M6 bolts; however, 2353 has been approved to the WX-200 specification.

Health and Safety

Health and Safety Information: Read all Health Hazard, Precautionary, and First Aid statements found in the Material Safety Data Sheet and/or product label prior to handling or use.

** Performance tests are run using standard test procedures. The values presented are typical values not to be used for specification purposes.

3M

Automotive Division

3M Center, Building 223-1S-02
St. Paul, MN 55144-1000

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