

ENGINEERING MATERIAL SPECIFICATION

Material Name

Specification Number

ADHESIVE TAPE, RIVETABLE, THERMAL CURE, STRUCTURAL

WSS-M18P18-A

1. SCOPE

This specification defines the material performance requirements for expanding and non-expanding structural tape adhesives. The tapes may be used on aluminum and steel and are rivetable. They will cure at electrocoat oven temperatures.

2. APPLICATION

The specification was released originally for materials used to structurally bond body components such as top rails, rear sills, and cross members to floor pans and inner to outer in a wheel house. These adhesive tapes can be used to bond oily, unclean mill finish and pretreated aluminum sheet and oily, unclean steel for body-in-white applications.

The use of pretreated aluminum sheet or galvanized steel provides optimal adhesion performance for long term durability. Optimal adhesion strengths are achieved with adhesive bondlines of 0.25 mm. The materials are cured in the electrocoat oven.

The Manufacturing Properties and Engineering Performance requirements defined in this specification are based on laboratory sample testing and define the minimum acceptance criteria for adhesive performance. The function and design requirements for the application are defined by the Sub-system Design Specification (SDS), key life test requirements, or vehicle program requirements.

Prior to use, the adhesive must be evaluated under the production parameters. The choice of substrates, stamping lubricants, stamping plant processing conditions, assembly plant processing conditions and specific design application may affect adhesive performance. Compliance with this specification does not guarantee the adhesive will function for all potential applications on a vehicle.

3. REQUIREMENTS

3.1 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

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

Date	Action	Revisions
2003 03 28	Activated	J. Crist/N. Lindsay-Merte

Printed copies are uncontrolled

3.2 SYSTEM COMPATIBILITY

Initial adhesive approval was based on a specific material system which included the substrate, stamping lubricants and adhesive. The material system was oven cured using specific production process parameters. Substrate choice, stamping lubricants, stamping plant processing conditions and assembly plant processing conditions may affect adhesive performance. If any of these parameters are changed, the adhesive performance must be validated using the new parameters.

3.3 DIMENSIONS

Cross sections/dimensions for tape shall be specified on the engineering drawing.

3.4 MATERIAL PROPERTIES

3.4.1 Weight Per Volume +/- 0.1
(ASTM D 816)

The weight tolerance for any one supplier shall be +/- 0.1 kg/L, based on the recorded weight of their original approved production sample. Reference para 4.1.

3.4.2 Volatile Organic Compounds (VOC) Content +/- 0.05 kg/L
(EPA Method 24, Procedure B)

The VOC Content variation for any one supplier shall be +/- 0.05 kg/L, based on the recorded VOC Content of their original approved production sample. Reference para 4.2.

3.4.3 Cure Requirements Report
(Define the process cure window for material cure, Report minimum and maximum time at temperature requirements to define performance boundaries)

Critical performance characteristics shall include, but are not limited to, the following:

- Stress Durability, para 3.6.2
- Fracture Toughness, para 3.6.4
- Fatigue, para 3.6.5
- Tensile Properties, para 4.3

3.4.4	Volume Change (FLTM BV 108-02, material cure para 4.5, min. and max. bake)	Not to exceed a 25% difference between minimum and maximum bake
-------	--	--

The volume change variation for any one supplier shall be +/- 10 %, based on the recorded volume change of their original approved production sample. Application specific requirements are stated on the Engineering Drawing and shall be controlled per the supplier's control plan.

3.4.5	Vertical Expansion Adhesion (Expandable Materials only)	90 -100% cohesive failure to both panels, Report
-------	--	--

Test Method:

- Apply a 10.0 x 200 mm strip of tape at production tape thickness to the center of a 100 x 300 mm oily panel per para 4.4.
- Position a spacer at the midpoint of each side of the panel. Place a second oily metal panel on the spacers and secure the assembly with clamps.
- Bake the assemblies in the horizontal position according to the bake schedule in para 4.5.
- Allow the assemblies to cool to 23 +/- 2 °C and remove the clamps and spacers.
- Separate the panels in a cleavage manner to fail the bond.
- Begin with a spacer equal to the tape thickness and repeat test increasing spacer height in multiples of tape thickness until failure mode reaches 60-70% cohesive failure mode on both panels.
- Report the failure mode for each sample and graphically summarize the data.

3.5 MANUFACTURING PROPERTIES

3.5.1	Differential Scanning Calorimetry (20 +/- 1 mg sample size, 10 °C/min heating rate, 25 - 250 °C temperature range, submit Heat Flow vs. Temperature curve)
-------	---

Onset of reaction, min	80 °C
Glass Transition Temperature	Report

3.5.2 Uncured Adhesion

The uncured material shall not peel at the edges or fall off the panel.

Test Method:

Prepare four panels for each substrate per para 4.4.

Cut four 10.0 x 200 mm strips at production tape thickness and apply to four 100 x 300 mm panels prepared for each substrate per para 4.4.

Pass a 2.2 kg roller over samples per ASTM D1000.

Invert two panels immediately after material application and condition for 72 h at 40 °C. Observe for peeling or lifting of adhesive from panel or slump or sag.

Stand the remaining two panels vertically immediately after material application and condition for 72 h at 40 °C. Observe for peeling or lifting of material from panel or slump or sag.

3.5.3 Release Paper Adherence and Removal

The release paper must remain attached to the adhesive during shipment and handling. It must be easily removed from the adhesive/polymer without part distortion or paper tear at ambient plant conditions (7 to 38 °C). Final approval for the release paper may be part and plant specific. Release paper information shall be noted in the supplier control plan.

3.5.4 Sag Resistance

(FLTM BV 118-01, 10.0 x 200 mm strips at production tape thickness, substrates per para 5.4, condition for 24 h at 40 °C, oven schedule per para 5.5, one panel each bake)

- | | |
|--------------|------------------------|
| • Horizontal | No measurable movement |
| • Vertical | No measurable movement |
| • Inverted | No loss of material |

3.5.5 Slump Resistance, max 3 mm

- Assembly aged 30 days at 50 +/- 1 °C

Test Assembly: Two 25 x 100 mm coupons, prepared per para 4.4, with two 38 x 12 x 3 mm spacers. The spacers are placed at each end of one of the coupons, and sufficient adhesive is applied between the spacers to fill the gap. The second coupon is placed on top of the adhesive and spacers (Figure 1). Clamp the assembly with spring clips at each end. Remove excess adhesive from all exterior edges with a spatula.

Test Method:

- Prepare 3 assemblies per substrate.
- Subject one assembly per substrate to exposures.
- After exposure, condition assemblies at 23 +/- 2 °C for 24 hours, then bake at minimum bake per para 5.5.
- Determine the slump by measuring adhesive loss from the bottom of the assembly.
- Photograph and record observations of any adhesive loss after exposure and after bake.
- Repeat the above procedures for maximum bake per para 4.5.

3.5.6 Bridging, max 3 mm
(SAE J243 ADS-9, Section 3.3, Method D, nonflow fixture, substrates per para 5.4, photograph after exposure and after material cure bake conditions per para 4.5)

- Assembly aged 30 days at 50 +/- 1 °C

3.5.7 Wash Resistance

No measurable movement, displacement or wash-off.

3.5.7.1 Jaguar Production
(JNS 30.03.24)