

ENGINEERING MATERIAL SPECIFICATION

Material Name

Specification Number

**STRUCTURAL FOAM PERFORMANCE, CAVITY REINFORCING,
TWO COMPONENT PUMPABLE, ROOM TEMPERATURE CURING**

WSS-M99P35-A

1. SCOPE

This specification defines the material performance requirements for cavity reinforcing two component, room temperature curing structural foam materials applied after paint prior to the trim shop. These materials are used to improve localized joint stiffness and torsional rigidity.

2. APPLICATION

The specification was originally released for the two component, room temperature curing structural foam materials applied after paint prior to the trim shop. The materials are used to improve localized joint stiffness and torsional rigidity in applications such as pillar to roof, pillar to rocker, and rocker sections. Special consideration is required when evaluating the use of these materials in crash or crush sensitive locations.

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

The final performance of these materials is dependent on the processing parameters in the assembly plant. Prior to use, the materials must be evaluated under the intended application processing parameters. The choice of substrates, stamping and assembly plant processing conditions, dispensing system, and specific design application may affect engineered part performance. Compliance with this specification does not guarantee the materials 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
2002 07 31	Activated	J. Crist/N. Lindsay-Merte

Printed copies are uncontrolled

3.2 SYSTEM COMPATIBILITY

Initial material approval was based on a specific material system, which included the substrate, paint systems and material. The originally approved material system was room temperature cured using specific production process parameters. The choice of substrates, paint systems, stamping and assembly plant processing conditions, dispensing system and specific design application may affect the material performance. If any of these parameters are changed, the material performance must be validated using the new parameters.

3.3 ENGINEERING APPLICATION

Each application for these materials is unique to a specific design. The engineering drawing shall define the specific location, volume, compressive modulus, tensile modulus, compressive yield stress, ultimate tensile strength, and/or other parameters critical for the given application. The materials approved to this specification are initially flowable and may require baffles, plugs, and other engineered parts to contain the foam in the desired location until the material is gelled or fully cured. These baffles, plugs, and other engineered parts shall also be specified on the engineering drawing.

Compatibility, functional testing, and manufacturing feasibility for the materials, baffles, plugs, and other engineered parts for each application shall be accessed and validated prior to production release by the releasing activity. A signed functional report shall be supplied to materials engineering for each application.

3.4 MATERIAL PROPERTIES

All testing is conducted at maximum free volume expansion unless otherwise stated. Testing should be reported for each component and mixed material at agreed upon mix ratio.

3.4.1	Density (ISO 845/ASTM D 3574, Test A, interior density)	Report
-------	---	--------

The density variation for any one supplier shall be +/- 10 kg/m³, based on the recorded density of their original approved production sample. Aged density on each component shall not vary more than +/- 10 % when compared to initial density. Report for each component at 23 +/-2 °C and aged for 7 days at 40°C. Report for mixed material sample cured for 24 hours at 23 +/- 2 °C. Reference para 4.3.

- 3.4.2 Viscosity Report
(SAE J1524, 2.64mm)

The viscosity variation for any one supplier shall be +/- 10 kg/m³, based on the recorded viscosity of their original approved production sample. Aged viscosity on each component shall not vary more than +/- 10 % when compared to initial density. Report for each component at 23 +/- 2 °C and aged for 7 days at 40 °C. Report for mixed material sample cured for 24 hours at 23 +/- 2 °C. Reference para 4.4.

- 3.4.3 Free Volume Expansion Report
(Experimental Design)

Report the relationship between free volume expansion, cured material density, mass and material dispense temperature.

The free volume change variation for any one supplier shall be +/- 5 %, based on the recorded volume change of their original approved production sample. Reference para 4.5.

- 3.4.4 Volatile Organic Compounds (VOC) Content Report
(EPA Method 24)

The VOC Content variation for any one supplier shall be +/- 0.01 kg/L, based on the recorded VOC Content of their original approved production sample. Reference para 4.6.

- 3.4.5 Material Reactivity
(Experimental Design)

Report the relationship between material reactivity and material dispense temperature. Specific information with regard to material reactivity shall include, but is not limited to, the following:

Cure time
Peak material exotherm temperature vs mass
Material purge requirements

- 3.4.6 Process Operating Window Report
(Experimental Design)

Using production level dispensing equipment, conduct a design of experiments to define the operating parameters required to achieve the vehicle specific targets for compression modulus and volume fill. Requirements for scope of design of experiments as specified by Materials Engineering.

Report parameters used for design of experiments, measured response, and summarize the effects of each variable. Provide recommended operating parameters to Ford for specific dispensing equipment utilized.

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

Report onset of reaction

Report glass transition point of cured material at recommended mix ratio

3.5 MANUFACTURING PROPERTIES

All testing is conducted at maximum free volume expansion unless otherwise stated.

3.5.1 Material Consistency

Shall be a smooth homogenous mixture, free from entrapped air, foreign materials and any properties detrimental to normal production operation.

3.5.2 Color

Each component is distinctly different in color. The mixed material shall meet manufacturing process control requirements. Final approval of material color for production shipments shall be made by the affected manufacturing activity.

The material color for any one supplier shall not visually deviate from the originally approved production samples. Color shall be identified on the supplier control plan.

3.5.3 Odor

3.5.3.1 Odor (North American Production)

Shall be free from objectionable odors as determined by the manufacturing facility, both as received and after storage.

- 3.5.3.2 Odor (European Production), Rating 2 max.
(FLTM BO 131-01, cured material per 3.5)