



ENGINEERING MATERIAL SPECIFICATION

Material Name

Specification Number

SEALER, VINYL BASED, SELF-LEVELING, HEAT CURE
PAINTABLE, PUMPABLE, MILDEW RESISTANT

ESB-M4G177-B3

1. SCOPE

The material defined by this specification is a vinyl based, self-leveling, paintable, heat curing sealer. This specification has been advanced to include the addition of biocide.

2. APPLICATION

This specification was released originally for sealing exterior body seams, such as drip rail to roof ditch, and is intended for use over freshly baked electrocoat primer. Acceptable paintability is achieved with or without primer surfacer on sealer. The material has improved resistance to mildew growth.

3. REQUIREMENTS

3.1 STATISTICAL PROCESS

Suppliers must conform to the requirements of Ford Quality System Standard Q-101. A mutually acceptable Control Plan as described therein is required for material/source approval. Appropriate statistical tools must be used to analyze process/product data so that variation in the final product is continuously reduced.

3.2 INFRARED SPECTROPHOTOMETRY AND/OR THERMAL ANALYSIS

Ford Motor Company, at its option, may conduct infrared and/or thermal analysis of material/parts supplied to this specification. The IR spectra and thermograms established for initial approval shall constitute the reference standard and shall be kept on file at the designated material laboratory. All samples shall produce IR spectra and thermograms that correspond to the reference standard when tested under the same conditions.

3.3 CONDITIONING AND TEST CONDITIONS

All test values indicated herein are based on material conditioned in a controlled atmosphere of 23 +/- 2 C and 50 +/- 5 % relative humidity for not less than 24 h prior to testing and tested under the same conditions unless otherwise specified.

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3.4 RHEOLOGY

Suppliers must submit flow characterization data to Ford Motor Company for flow modeling and process window determination. For a specified temperature range, the requested properties include, but are not limited to, viscosity, yield stress, apparent activation energy for viscosity and apparent activation energy for yield stress. This data constitutes the reference standard and shall be kept on file at the designated material laboratory.

- 3.5 SOLIDS, min 97 %
(ASTM D 2834, except heat at
102 +/- 1 C for 3 h in a mechanical
convectional oven. Save sample for
next test, para 3.6)

- 3.6 ASH (Based on solids weight) +/- 5 %
(Ref. para 5.1)

The ash content tolerance for any one supplier shall be +/- 5 % based on the recorded ash content for their originally approved production sample.

Test Method: Place the crucible containing the solids residue in a cool muffle furnace. Slowly heat to and maintain at 760 +/- 30 C for 1 h, cool in a desiccator and weigh.

- 3.7 WEIGHT PER VOLUME +/- 0.02 kg/L
(ASTM D 816)

The weight tolerance for any one supplier shall be +/- 0.02 kg/L, based on the recorded weight of their original approved production sample (refer to para 5.2).

- 3.8 VISCOSITY at 77 C
(SAE J1524, VIS-2, 1.32 mm orifice,
280 kPa)

The viscosity tolerance for any one supplier shall be +/- 10 s, based on the recorded viscosity of the original approved production sample. Reference para 5.3.

Final approval of a specific material viscosity for production shipments shall be made by the affected manufacturing activity. In all cases, the viscosity shall be within process limits as identified on the material control plan.

- 3.8.1 As Received +/- 10 s
(Conditioning Method A)



- 3.8.2 Aged, max
(Material aged in closed
container for 72 h at 40 +/-
1 C, conditioning Method A)
- No more than 60 %
increase from
original approval

3.9 FLOW RATE 25 - 500 mm

Test Method:

- . Block the 6.4 mm groove in the flow rate fixture (Fig. 1) 150 mm from the top edge.
- . Fill the 150 mm upper portion of the groove with material specified in this specification.
- . Remove the block, allow material to flow for 30 minutes, then subject the test assembly to the minimum bake per para 5.5.
- . Remove test assembly from heat exposure and measure the total amount of flow.
- . Final approval of a specific material flow rate for production shipments shall be made by the affected manufacturing activity. In all cases, the flow rate shall be within limits identified on the Material Control Plan.

3.10 ADHESION

Shall not be peeled off in a continuous film.

Test Method:

- . Apply a ribbon of material, 25 x 200 x 3 mm on two electrocoated panels, identified per para 5.4.
- . Subject one test panel to the minimum bake schedule and the other test panel to the maximum bake schedule identified per para 5.5.
- . Evaluate adhesion by cutting a 25 mm wide strip across the ribbon. Using the tip of a square spatula, lift the material, then attempt to hand peel material at 90 deg from substrate.
- . Save test panels for heat resistance test, para 3.11, and corrosion resistance test, para 3.12.

3.11 HEAT RESISTANCE TEST

No evidence of blistering,
cracking, charring or other
deleterious effects



Test Method:

- . Examine the test material prepared for Adhesion Test, para 3.10, for any of the above conditions.

3.12 CORROSION RESISTANCE TEST

No corrosion or
adhesion loss

Test Method:

- . Expose the panels prepared in para 3.10 for 240 h in the salt spray cabinet described per ASTM B 117.
- . Condition the test panels after exposure at 23 +/- 2 C for 24 h.
- . Evaluate material adhesion as described in para 3.10. Observe for any evidence of corrosion originating directly under material.

3.13 MANDREL BEND TEST

(FLTM BV 22-1, substrates per
para 5.4, material bake schedule
per para 5.5, heat age test specimen
14 days at 70 +/- 1 C before test)

No cracking or
adhesion failure

3.13.1 Test at 23 +/- 2 C

3.14 COMPATIBILITY WITH PRODUCTION PAINTS

No tackiness, staining, discoloration, or other deleterious effects
on topcoats.

Test Method:

- . Prepare 20 test panels per SAE J1800, Method #1 (10 panels white and 10 panels silver, 5 panels will be baked at the minimum bake schedule and 5 at the maximum bake for each color per para. 5.6). Apply current production primers in a 0.005 to 0.03 mm wedge. Apply current production topcoats at 0.013 mm thickness for monocoats and 0.013/0.025 mm thickness for BC/CC systems. Paints shall be identified by the Body Engineering Office. (Panels shall be kept horizontal prior to baking, during the painting operation and during cure.)
- . Condition painted panels at 23 +/- 2 C for 72 h.
- . Subject one panel for each paint/bake condition to each exposure listed below. Retain extra panel as control.