Material Name	Specification Number
PERFORMANCE, STRUCT, ADHESIVE; 1 COMP., PUR; STANDARD	WSK-M11P57-A1
PERFORMANCE, STRUCT, ADHESIVE; 1 COMP., PUR; HIGH MODULUS	WSK-M11P57-A2
PERFORMANCE, STRUCT, ADHESIVE; 1 COMP., PUR; FAST FIX	WSK-M11P57-A3
PERFORMANCE, STRUCT, ADHESIVE; 1 COMP., PUR; NON CONDUCTIVE	WSK-M11P57-A4

1. SCOPE

These specifications define the performance requirements for solvent free, polyurethane based, structural metal-to-metal respectively semistructural metal-to-glass adhesives as follows (see also 5.1)

WSK-M11P57-A1: One component material and moisture curing at ambient temperatures, with standard fix behavior,

WSK-M11P57-A2: One component material and moisture curing at ambient temperatures with a high shear modulus behaviour after complete curing,

WSK-M11P57-A3: One component material, warm bead applied and moisture curing at ambient temperatures, with a fast fix behaviour,

WSK-M11P57-A4: One component material and moisture curing at ambient temperatures, with standard fix and non conductive behaviour.

2. APPLICATION

The specifications WSK-M11P57-A1, -A2, -A3, -A4 were released originally to provide life time semistructural bonding of windshields, backlights and quarter windows in connection with adhesion promoter and adhesion primer for glass or for bonding painted parts without any adhesion promoter or primer.

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 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.

Date	Action	Changes
1994 07 08	EP00E10422649000	Released B. Lange

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3.3 SYSTEMS COMPONENTS

3.3.1 Substrates and Compatability

The adhesive must be compatable with all related materials, e.g. top coat, clear coat, glass, ceramic ink, polyurethane, EC, primer surfacer, etc. or as specified on Engineering Drawing.

Note: If any other substrate gets relevant for manufacturing, the adhesive has to be tested according to this specification on this substrate. The adhesive supplier must certify compliance to all requirements of relevant adhesive and/or performance specification (test values, not nominal values).

3.4 PERFORMANCE PROPERTIES

3.4.1	Green Strength, min (FLTM BV 154-03)	WSK-M11P57-A1, -A2, -A4:	0.1 MPa
		WSK-M11P57-A3:	0.4 MPa

Test Method

- Prepare test specimens (see section 3.3.1 of specification) according to section B, para 1 & 2 of FLTM BV 154-03.
- Cure test specimens for 3 h at 23 +/- 2 C and 50 +/- 5 % r.h.
- Determine shear strength according to Method B of FLTM BV 154-03.

3.4.2 Shrinkage After Curing, max 5 %

Test Method:

- Apply to a release paper two beads of material under test in dimensions of 50 x 8 x 5 mm and determine exact volume by water displacement method immediately after material application.
- Age test samples at 80 +/- 2 C for 14 days.
- Determine exact volume of material under test once again and calculate volume shrinkage.

3.5 SHEAR STRENGTH, min 2.5 MPa
(except 3.5.1: at 90 +/- 2 C
except 3.5.8: < 2.5 MPa accepted
if paint delamination occures)

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Test Method

- Test panels are to be prepared for the tests according to FLTM BV 103-02, B, using production as well as repair enamel.

- Dimension of test specimens: 80 x 30 x 4 mm heat treated safety glass (DELTA WSK-M28G21/22-A) with ceramic coating (DELTA WSK-M99G109-D/E/F) and 80 x 30 x 5 mm laminated safety glass (DELTA WSK-M28G23-A) with ceramic (DELTA WSB-M99G109-D/E/F) or safety glass coated with polyurethane according to WSD-M2D404-A1/A2. Body steel specimens: 100 x 25 x 1.3 (+/- 0.5 mm).

- Clean ceramic surface of glass specimen using adhesion promoter WSK-M2G342-A and wipe off with a clean and dry cloth.

- After 5 minutes conditioning at 23 +/- 2 C prime glass bonding surface with primer according to WSK-M2G343-A respectively WSK-M2G377-A1. Condition for 5 minutes at 23 +/- 2 C.

- Apply adhesive to painted surface. After 5 minutes at 23 +/- 2 C assemble with adhesion promoter cleaned glass or primed polyurethane specimen according to Figure 1 to reach a right angled bead form of 5 x 8 mm.

- Allow adhesive to cure for 7 d at standard atmosphere (23/50).

- Determine shear strength at a speed of testing of 25 mm/minute. A minimum of 5 specimens shall be tested and the average result shall conform to the requirement specified above.

  Note: In case of laminated glass failure before reaching minimum shear strength requirement, the test is to be rated as satisfactory and the result noted in the report, if no adhesion failure occurred, proceed similar in case of delamination of paint layers.

3.5.1 Original

Measured at 90 +/- 2 C*, min	1.5 MPa
Measured at 23 +/- 2 C	
Measured at - 40 +/- 1 C*	

* 30 minutes tempering time until measuring

3.5.2 After Heat Aging

14 days at 90 +/- 2 C, 1 hour at 23 +/- 2 C

3.5.3 Florida Exposure

Test Method:

Specimens prepared according to 3.4 shall be exposed in the Miami Florida area for 1 year with the glass facing the light at 5 degrees south. The glass shall be cleaned with distilled water once a month.

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