PERFORMANCE, STRUCTURAL ADHESIVE, REPAIR	**WSK-M11P47-A1**
PERFORMANCE, STRUCTURAL ADHESIVE, 0.1 - 0.3 mm GAP	**WSK-M11P47-A2**
PERFORMANCE, STRUCTURAL ADHESIVE, 0.3 - 7 mm GAP	**WSK-M11P47-A3**
PERFORMANCE, STRUCTURAL ADHESIVE, 0.1 - 0.3 mm GAP	**WSK-M11P47-A4**
PERFORMANCE, STRUCTURAL ADHESIVE, 0.1 - 0.3 mm GAP	**WSK-M11P47-A5**
PERFORMANCE, STRUCTURAL ADHESIVE, 0.1 - 1.0 mm GAP	**WSK-M11P47-A6**

1. SCOPE

These specifications define the performance requirements for solvent free, epoxy resin and epoxy/PVC blend based, structural metal-to-metal adhesives as follows:

WSK-M11P47-A1: Two component materials to be used for production repair as well as dealer repair (see 4.1),

WSK-M11P47-A2: One component material, low viscose, airless and/or ADFOSY sprayable, E-coatable, induction heat precurable, oven curing (see 4.1).

WSK-M11P47-A3: One component material, pumpable, warm bead applied and oven curing (see 4.1).

WSK-M11P47-A4: One component material, pumpable, cold bead or ADFOSY applied pregellable and oven curing (see 4.1).

WSK-M11P47-A5: Two component material, pumpable, induction curable, cold bead for body in white application (see 4.1).

WSK-M11P47-A6: One component material, pumpable, induction heat precurable, warm bead applied and oven curing (see 4.1).

2. APPLICATION

These specifications were released originally to provide lifetime structural bonding for body components such as inner and outer panel (hem flange) of doors, rear door lock reinforcement, roof panel and pillar, hood, deck lid etc. made from cold rolled as well as precoated steel.

The materials are applicable on oiled surfaces with acceptable oil film weights (European applications limit the oil/pre-lubricant film weight to max 3 g/m², see para. 3.6).

Note: Care must be taken to ensure that the local oil film weight in the area of the adhesive/sealer application does not exceed the critical limit. Monitoring of the film thickness, adequate storage of the part and/or cleaning of the surface prior to sealer/adhesive application is necessary to avoid critical film thickness values, which would then cause malfunction of the sealer/adhesive.

Date	Action	Revisions	Rev. 3
2015 11 12	Editorial	See Summary of revisions	B. Witkowski, NA
2014 06 24	Revised	see 5. Summary of Revision	J.Herl, EU
1991 03 01	Released	EP00E01089482000	B. Lange

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3. REQUIREMENTS

3.0 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

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

3.3 SYSTEMS COMPONENTS

3.3.1 Substrates

Cold rolled steel as specified on engineering drawing. Panel thickness: 0.8 mm unless otherwise specified.

Note 1: If any other steel, such as precoated with Zn, Zn/Ni, Duplex, galvanized, galvanealed, etc. is used for manufacturing, the adhesive has to be tested according to this specification on these substrates.
Note 2: Repair adhesives per WSK-M11P47-A1 must be tested, only for documentation, on e-coated surfaces according to manufacturing standard UC-800.

3.3.2 Preparation of Substrate

WSK-M11P47-A1:	E-coated surfaces need to be cleaned, without damaging the coating.
WSK-M11P47-A2 to A6:	According to para. 3.6

3.3.3 Adhesives, One or Two Component (see 4.1)

Suitable to meet the requirements of these specifications or as specified on engineering drawing.

3.3.4 Recommended Adhesive Application Temperature

WSK-M11P47-A1:	23 +/- 2 °C
WSK-M11P47-A2:	23 +/- 2 °C
WSK-M11P47-A3:	80 +/- 2 °C
WSK-M11P47-A4:	23 +/- 2 °C
WSK-M11P47-A5:	23 +/- 2 °C
WSK-M11P47-A6:	30 +/- 2 °C

3.3.5 Adhesive Coating Thickness

WSK-M11P47-A1:	X = 0.2 mm, unless otherwise specified
WSK-M11P47-A2:	X = 0.2 mm, unless otherwise specified
WSK-M11P47-A3:	X = 3 mm, unless otherwise specified
WSK-M11P47-A4:	X = 0.2 mm, unless otherwise specified
WSK-M11P47-A5:	X = 0.25 mm, unless otherwise specified
WSK-M11P47-A6:	X = 0.2 mm, unless otherwise specified

3.3.6 Curing Conditions

WSK-M11P47-A1:	48 h at 23 +/- 2 °C or 30 minutes at 80 +/- 2 °C
WSK-M11P47-A2 to A6:	According to FLTM BV 150-05, Table 2, min and max curing cycle (separate test specimens for each cycle).

3.4 PERFORMANCE PROPERTIES OF PRECURED ADHESIVE

3.4.1 Wash and Dip Tank Resistance (A3 only)
(Also A4 to A6, except after pre-gelling per

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FLTM BU 119-01)

There shall be no evidence of material wash-out or displacement.

Test Method:

. Apply two parallel (X = see 3.3.5) mm x 10 mm beads of adhesive with 50 mm (edge) distance from each other to a 300 x 300 x 0.8 mm body steel panel (prepared according to para. 3.6).

. No pre-curing, but pre-gelling for WSK-M11P47-A4 to WSK-M11P47-A6 per FLTM BU 119-01, induction heat with 25 s hold time at 180 +/- 5 °C.

. Position the panel horizontally and maintain a spray of water at a temperature of 55 +/- 2 °C using a jet spray (Spraying System Co., Nozzle No. 1/2 GG-25 Full Jet) at 200 kPa. Direct the spray at a distance of 250 mm between the two beads of adhesive for 1 minute.

3.4.2	Green Shear Strength, MPa, min (FLTM BV 154-03)	A1	A2	A5/A6
		0.1	1.0	3.0

Test Method:

. Prepare test specimens (body steel quality per para 3.3.1 + 3.3.2 of specification) according to section A, para 1 to 3 of FLTM BV 154-03.

. Pre-cure test specimens for:

WSK-M11P47-A1:	6 h at 23 +/- 2 °C.
WSK-M11P47-A2:	Induction heat with 5 s hold time at 185 +/- 5 °C.
WSK-M11P47-A5/-A6:	Induction heat with 30 s hold time at 185 +/- 5 °C.

Note: Induction heating to be done according to FLTM BU 119-01 (temperatures mentioned refer to adhesive temperature, not substrate temperature).

. Condition for 2 h at 23 +/- 2 °C.

. Determine shear strength according to Method B of FLTM BV 154-03.

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3.5 PERFORMANCE PROPERTIES OF CURED ADHESIVE

3.5.1 Hardness Durometer "D"
(ISO 868, 3 s dwell)

		A1	A5
3.5.1.1	After Room Temperature Curing (A1 and A5 only)		
	48 h at 23 +/- 2 °C	60 - 75	70 - 85
3.5.1.2	After Accelerated Curing, max (A1 and A5 only)		
	30 minutes at 80 +/- 2 °C, (1 h at 23 +/- 2 °C)	75	75
3.5.1.3	After Heat Curing, max (per 3.3.6)	A2, A4 & A6	A3 & A5
	(1 h at 23 +/- 2 °C)	70	80

3.5.2 Shear Strength, MPa, min
(FLTM BV 154-03, panel thickness for
A1, A3, A4 and A6, 1.5 mm/Panel preparation see para 3.6)

		A1	A2/A4/A5	A3	A6
3.5.2.1	Original				
	At 23 +/- 2 °C (24 h after curing)	20	7.5	6.0	25
3.5.2.2	At 90 +/- 2 °C*	4.0	1.5	2.0	10
3.5.2.3	At - 40 +/- 2 °C*	25	8.0	5.0	25

Samples shall be conditioned for 30 minutes at the test temperature before measurement.

Test Method:

- Prepare and pre-cure per 3.4.2.
- For A1, cure samples for 30 minutes at 80 +/- 2 °C and 48 h at 23 +/- 2 °C, (separate samples).
- A2 to A6: Use minimum and maximum curing cycles of FLTM BV 150-05, Table 2 (separate samples).
- Condition for 2 h at 23 +/- 2 °C.
- Determine shear strength according to Method B.

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