

**ADHESION REQUIREMENTS, ADHESIVE FOR
BONDING EXTERIOR FRONT AND REAR LAMP ASSEMBLIES****WSS-M11P28-D****1. SCOPE**

This specification defines the performance requirements for an adhesive or adhesive system suitable for bonding front and rear lighting.

2. APPLICATION

This specification was released originally for an adhesive or an adhesive system used to bond lenses to bodies in the construction of lamp assemblies.

2.1 LIMITATIONS

2.1.1 Use of thermoplastic sealers and adhesives are not allowed.

2.1.2 Surface treatment (adhesion promoting CPO primer or plasma fluming) of polypropylene is necessary to achieve adequate bonding.

3. REQUIREMENTS

Materials meeting these performance specifications are identified on the Approved Source List. Adhesive bonded lamp assemblies must meet all other exterior lighting system requirements.

Initial material approval testing is to be conducted at DV using plaques. PV testing is on full lamp assemblies. See Table 1 for sample sizes and required testing.

3.1 APPROVED SOURCES

This specification is performance based and does not have approved sources.

3.2 CONDITIONING AND TEST CONDITIONS

All test values are based on material conditioned for not less than 24 h prior to testing in a controlled environment of 23 +/- 2 °C and 50 +/- 5% relative humidity. Testing of the material should occur in the conditioning environment or soon after removal.

3.3 ADHESION STRENGTH – LAP SHEAR

(ASTM D3163, 12.7 mm/min crosshead speed)

The lap shear coupons shall consist of typical production materials.

Clean the surfaces to be bonded with a hot, soapy water solution. The soap shall be free rinsing, similar to that used for glassware. After cleaning, the coupons are blown dry and conditioned at 23 +/- 2 °C for 24 h to ensure dryness.

Dispense an amount of adhesive on to the housing material coupon that will fill a 25 mm overlap with a minimum bond thickness of 0.76 mm. Shim the interface with 0.76 mm wire or glass beads to maintain the required minimum thickness and overlap. Apply the lens material coupon onto the adhesive/housing coupon and remove any excess adhesive. Maintain proper alignment of the

Date	Action	Revisions	Rev. 1
2016 06 08	Revised		
2014 01 07	Released		



assemblies during cure. Follow the cure schedule as recommended by the adhesive manufacturer. Include the manufacturer's recommended open time and cure schedule in the test report.

Note: Proper alignment of the test assembly is critical. Every effort should be made to maintain uniform tension across the bond area. Cleavage or peel of the bond area could yield inaccurate results.

Evaluate a minimum of three assemblies per condition. Report failure mode (both the lens and housing substrates) and peak load.

		<u>Min Load, N</u>	<u>Failure Mode</u> (lens and housing)
Normal (Condition for 30 minutes at specified temperature prior to test)			
3.3.1	Test at 23 +/- 2 °C	600	Report
3.3.2	Test at 107 +/- 2 °C	450	Report
3.3.3	Test at -30 +/- 1 °C	900	Report
Exposed (After environmental aging in paragraphs 3.3.4- 3.3.8 condition samples for 24 h at 23 +/- 2 °C prior to lap shear testing)			
3.3.4	Heat Age (14 days at 107 +/- 2 °C)	700	Report
3.3.5	Humidity (14 days at 38 +/- 1 °C and 95-100% R.H)	500	Report
3.3.6	Water Immersion (14 days, FLTM BI 104-01)	500	Report
3.3.7	Accelerated Weathering (ASTM D7869, 1500 hours) - Preferred or (SAE J2527 (Boro/Boro), 2000 hours)	700	Report
3.3.8	Thermal Cycle (10 cycles, DVO-19766)	600	Report
	1 cycle =	2 h at 50 °C Ramp to -40 °C (rate 0.75 – 1.5 °C/min) 2 h at -40 °C Ramp to 50 °C (rate 0.75 – 1.5 °C/min)	



3.4 STABILITY

When subjected to the following exposures, the adhesive viscosity and adhesion strength shall be +/- 25% of that obtained when originally tested.

3.4.1 Shelf Life (6 months at 23 +/- 2 °C)

3.4.1.1 Viscosity +/- 25%

3.4.1.2 Adhesion strength, Para 3.2.1 – 3.2.8 +/- 25%

3.4.2 Viscosity, original Report (per ASTM) (ASTM D3236 - spindle, temperature and speed per supplier's recommendation)

3.5 CREEPAGE

No slippage

(ASTM D1780, prepare test samples per para 3.2, apply a 4.5 kg dead weight load to test samples and expose to 85 +/- 2 °C for 24 h)

3.6 COLD SLAM RESISTANCE

No cracking, adhesive or cohesive failure

(FLTM BV 101-02, 10 cycles of 6 slams per cycle at -30 +/- 1 °C)

Prepare test assemblies as illustrated in Figure 1. Test substrates shall consist of 100 x 250 mm panels. Follow the cure schedule as recommended by the adhesive manufacturer.

Mechanically attach bonded test assembly to a 0.8 x 300 x 300 mm CRS base panel. Centrally locate test assembly on base panel.

Conduct test as outlined per FLTM BV 101-02 following steps 9, 10 and 11. Position panel in slam fixture with reinforcement facing inward. Subject each test assembly to 10 cycles of six slams per cycle at -30 +/- 1 °C.

3.7 LAMP ASSEMBLY TESTING

Test parts shall be manufactured with production or production representative processes and equipment. Evaluate a minimum of 2 pair (left and right) per condition at 23 +/- 2 °C. Every lamp shall be pressure tested prior to, and after the specific exposures listed below.

3.7.1 Seal Integrity Under Air Pressure, Baseline No leaks (RQT-170000-011017, Legacy (EX-0224))

3.7.2 Resistance to Thermal Cycle (RQT-170000-010972, Legacy (EX-0009)) Para 3.2.8: All lamps are lit at point A, off at point B - Reverse lamps are cycled separately

Lamp assembly shall not exhibit warpage, degradation in photometrics, or sink marks when subjected to thermal conditioning. They shall not leak when tested for seal integrity under air pressure.

3.7.3 Resistance to Heat Age (14 days at 107 +/- 2 °C, DVM-14455)