SURFACE VEHICLE RECOMMENDED PRACTICE

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Superseding J2100 AUG1992

Accelerated Environmental Testing for Bonded Automotive Assemblies

RATIONALE

This document covers technology, products, or processes for which technical expertise no longer resides in the owning committee.

STABILIZED NOTICE

This document has been declared “Stabilized” by the SAE Materials, Processes and Parts Council and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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Foreword—This Document has not changed other than to put it into the new SAE Technical Standards Board Format.

1. Scope—This SAE Recommended Practice defines conditions to which bonded assemblies can be exposed to simulate environmental aging. These recommendations are generally based on existing Original Equipment Manufacturer requirements at this time. (Environmental specifications used for this proposal were from General Motors, Ford, and Chrysler.) The substrate type, dimension, and number are described by the standard for materials being tested and should include control specimens which receive no environmental aging.

2. References

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein.

2.1.1 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 117—Method of Salt Spray (Fog) Testing
ASTM E 171—Specification for Standard Atmospheres for Conditioning and Testing Materials

3. Equipment—All temperatures are ± 2 °C and relative humidities (RH) are ± 5% unless otherwise indicated.

3.1 Air circulating ovens capable of maintaining 88 °C and 204 °C.

3.2 Humidity cabinets (noncondensing preferred) capable of maintaining 38 °C/95 to 100% RH and 60 °C/85% RH.

3.3 Salt spray cabinet per ASTM B 117.

3.4 Low-temperature cabinet capable of maintaining –30 °C.

3.5 Deionized water bath capable of maintaining 60 °C.

4. ***Testing*—**Evaluate after exposure to each environment and compare to control.

4.1 Control—Test at 23 °C, 50% RH.

4.2 Low Temperature—Test at –30 °C. Precondition at –30 °C for a minimum of 2 h.

4.3 High Temperature

4.3.1 Test at 88 °C. Precondition at 88 °C a minimum of 15 min.

4.3.2 Test at 204 °C. Precondition at 204 °C a minimum of 15 min.

4.4 Water Immersion—Immerse 14 days in deionized water at 60 °C.

4.4.1 WET—Remove specimens from water bath, place in an air-tight container (such as a plastic bag), cool to 23 °C, 15 to 30 min, and test wet at 23 °C.

4.4.2 RECOVERY—Test dry at 23 °C, 50% RH, after 24 h conditioning at 23 °C, 50% RH.

4.5 Heat Aging—After designated time at 88 °C, test at 23 °C, 50% RH after 30 min conditioning at 23 °C, 50% RH.

4.5.1 4 weeks

4.5.2 6 weeks

4.5.3 8 weeks

4.6 Humidity Aging

4.6.1 After designated time at 38 °C/100% RH, remove specimens from humidity chamber, place in air-tight container (such as a plastic bag), cool to 23 °C, 15 to 30 min, and test wet at 23 °C.

4.6.1.1 4 weeks

4.6.1.2 6 weeks

4.6.1.3 8 weeks

4.6.2 After designated time at 38 °C/100% RH, test dry at 23 °C, 50% RH, after 24 h conditioning at 23 °C, 50% RH.

4.6.2.1 4 weeks

4.6.2.2 6 weeks

4.6.2.3 8 weeks

4.7 Salt Spray—After designated time in ASTM B 117 salt spray cabinet, test at 23 °C, 50% RH.

4.7.1 250 h

4.7.2 500 h

4.7.3 1000 h

4.8 Thermal Cycle

4 h at –30 °C
4 h at 88 °C
16 h at 38 °C/100% RH

a. Run 10 cycles
b. No more than 10 min should elapse between each exposure. To maintain 24 h cycles, reduce humidity exposure time.
c. If delay is incurred during thermal cycle, including Saturday and Sunday, storage of specimens in humidity chamber is acceptable.
d. Test at 23 °C, 50% RH, after 24 h conditioning at 23 °C, 50% RH.

4.9 Corrosion Cycle

2 h at –30 °C
2 h at 23 °C/50% RH
2 h at 70 °C
2 h salt spray, ASTM B 117
16 h at 38 °C/100% RH

a. Run 30 cycles
b. No more than 10 min should elapse between each exposure. To maintain 24 h cycles, reduce humidity exposure time.
c. If delay is incurred during corrosion cycle, including Saturday and Sunday, storage of specimens in humidity chamber is acceptable.
d. Test at 23 °C, 50% RH, after 24 h conditioning at 23 °C, 50% RH.

4.10 Scab Cycle

Monday only:

60 min at 60 °C
30 min at –30 °C
15 min immersion in 5% sodium chloride solution at 23 °C
75 min at 23 °C/50% RH
21 h at 60 °C/85% RH

Tuesday thru Friday:

15 min immersion in 5% sodium chloride solution at 23 °C
75 min at 23 °C/50% RH
22.5 h at 60 °C/85% RH

Saturday and Sunday:

60 °C/85% RH