



SURFACE VEHICLE INFORMATION REPORT

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Guidelines for Laboratory Cyclic Corrosion Test Procedures for Painted Automotive Parts

RATIONALE

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

In cyclic corrosion testing, test specimens are exposed to at least three different types of environmental conditions:

- a. Corrosive Solutions
- b. Wet Conditions
- c. Dry Conditions

and cycled from one environment to another. Intentional paint film damage prior to testing, such as scribing or exposure to gravelometer, is usually an essential part of the test procedure. The cyclic tests make use of many types of environments, such as ASTM B 117 salt spray, immersion in a salt solution, or an exposure to hot and/or cold conditions. A humid environment or water immersion of the test specimens is included in most tests. In some cases, a thin layer of clay is applied to the specimen surface.

The diagram in Figure 1 is an example of a cyclic test which consists of three environment types:

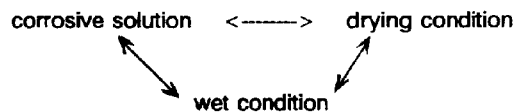


FIGURE 1—CYCLIC TEST ENVIRONMENT TYPES

1. **Scope**—These guidelines are intended for those engineers and scientists who evaluate the corrosion performance of painted automotive parts in laboratory cyclic tests. The guidelines are intended to help ensure that the results of the tests can be used to reach conclusions concerning the variables under study without being confounded by the test procedure itself. The guidelines also serve as a means to assist users of this type of test in obtaining good inter-laboratory agreement of results.

2. References

2.1 Applicable Publications—Many companies have their own accepted cyclic tests and the companies should be contacted for the one appropriate for the end use in question. SAE and AISI are engaged in a cooperative effort to develop a universal cyclic test for cosmetic corrosion. Progress in that direction is documented in the papers listed in 2.2.2 which were presented at the SAE Corrosion Conference in 1989 and 1991.

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J400—Test for Chip Resistance of Surface Coatings

2.1.2 ASTM PUBLICATIONS—Available from ASTM, .

ASTM B 117-90—Method of Salt Spray (Fog) Testing

ASTM D 1193-77 (1983)—Specification for Reagent Water

ASTM D 1654-79a (1984)—Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

2.2 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

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

ASTM D 2247-87—Practice for Testing Water Resistance of Coatings in 100% Relative Humidity

ASTM D 2933-74 (986)—Test Method for Corrosion Resistance of Coated Steel Specimens (Cyclic Method)

2.2.2 OTHER PUBLICATIONS

M. L. Stephens, "SAE ACAP Division 3 Project: Evaluation of Corrosion Test Methods," Paper No. 892571, Automotive Corrosion and Prevention Conference Proceedings, P-228. Society of Automotive Engineers, Warrendale, PA (1989), pp. 157–164.

H. E. Townsend, "Status of a Cooperative Effort by the Automotive and Steel Industries to Develop a Standard Accelerated Corrosion Test," Paper No. 892569, *ibid.*, pp. 133–145.

F. Blekkenhorst, "Hoogovens' Contribution to AISI Program "Accelerated Corrosion Testing: A Cooperative Effort by the Automotive and Steel Industries," Paper No. 892570, *ibid.*, pp. 147–156.

M. Petschel, Jr., "SAE ACAP Division 3 Project: Evaluation of Corrosion Test Results and Correlation with Two-Year, On-Vehicle Field Results," Paper No. 912283, Automotive Corrosion and Prevention Conference Proceedings, P-250, Society of Automotive Engineers, Warrendale, PA (1991), pp. 179–203.

R. J. Neville, W.A. Schumacher, D. C. McCune, R. D. Granata and H.E. Townsend, "Progress by the Automotive and Steel Industries Toward an Improved Laboratory Cosmetic Corrosion Test," Paper No. 912275, *ibid.*, pp. 73–98.

F. Blekkenhorst, "Further Developments Toward a Standard Accelerated Corrosion Test for Automotive Materials," Paper No. 912277, *ibid.*, pp. 99–114.

D. D. Davidson and W. A. Schumacher, "An Evaluation and Analysis of Commonly Used Accelerated Cosmetic Corrosion Tests Using Direct Comparisons with Actual Field Exposure," Paper No. 912284, *ibid.*, pp. 205–220.