SAE International

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J2413

ISSUED DEC2003

Issued 2003-12

Protocol To Verify Performance of New Xenon Arc Test Apparatus

1. Scope

1.1 This Recommended Practice is for use by contractual parties to verify new xenon arc test apparatus ability to perform SAE J1885, J1960, J2412, J2527, or other as specified**.**

1.2 This Protocol defines the process for analysis of performance capabilities of candidate xenon arc test apparatus for comparison to current xenon arc test apparatus being utilized by the industry. This will require documentation of the candidate apparatus to:

a. Produce the exposure environments as specified in the test method.
b. Produce the required degradation in the standard reference material(s) in the specified time frame.
c. Produce satisfactory repeatable and reproducible exposure results.
d. Produce satisfactory uniform results throughout the specimen exposure region of the test chamber.
e. Produce similar degradation in the benchmark test specimens, as agreed upon by contractual parties.

Standard Reference Materials (SRMs) performance data and any specified benchmark materials are used as a basis for comparison of various test apparatus. The type of failure and mode of failure should be the same for the comparison.

2. References

2.1 Applicable Documents

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

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: custsvc@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

2.1.1 SAE PUBLICATIONS

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

SAE J1885—Accelerated Exposure of Automotive Interior Trim Components Using a Controlled Irradiance Water Cooled Xenon Arc Apparatus
SAE J1960—Accelerated Exposure of Automotive Exterior Materials Using a Controlled Irradiance Water Cooled Xenon Arc Apparatus
SAE J2412—Accelerated Exposure of Automotive Interior Trim Components Using a Controlled Irradiance Xenon-Arc Apparatus
SAE J2527—Accelerated Exposure of Automotive Exterior Materials Using a Controlled Irradiance Xenon-Arc Apparatus

2.1.2 ASTM PUBLICATIONS

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

ASTM G 113—Standard Terminology Relating to Natural and Artificial Weathering for Non-Metallic Materials

3. Definitions

3.1 Definitions applicable to this standard can be found in ASTM G 113.

4. Verification of Test Apparatus Conformance

4.1 It is the responsibility of the test apparatus manufacturer to provide the necessary data to demonstrate compliance of each model apparatus with this specification. A recommended form for Verification of Test Apparatus Conformance is included at the end of this document. The instrument must have the means to automatically control irradiance, Black Panel temperature, chamber temperature and relative humidity.

4.2 The manufacturer shall submit data showing that the test apparatus is capable of producing a test cycle with the test conditions and the target values listed for the test segments and test tolerances specified in the referenced test method. For example, see Table 1 for the test conditions of SAE J1960 and J2527.

TABLE 1—TEST CONDITIONS

Segment#	Irradiance Level	Time Duration Or kJ/m²	Black Panel	Chamber Air Temp.	Relative Humidity	Front Spray	Back Spray
Segment 1	None	60 minutes	38°C	38°C	95%	yes	yes
Segment 2	0.55W/m²	40 minutes or 1.32 kJ/m²	70°C	47°C	50%	no	no
Segment 3	0.55W/m²	20 minutes or 0.66kJ/m²	70°C	47°C	Not applicable	yes	no
Segment 4	0.55W/m²	60 minutes or 1.98 kJ/m²	70°C	47°C	50%	no	no

4.3 The manufacturer shall submit data showing that the test apparatus is capable of producing the appropriate spectral power distribution, as required in the test method.

5. Performance of Standard Reference Material(s)

5.1 The manufacturer shall submit data showing that the test apparatus is capable of producing the required degradation in the standard reference material(s) in the specified time frame, as specified by this test method.

6. Repeatability and Reproducibility

6.1 The manufacturer shall submit data showing that the test apparatus is capable of producing repeatable and reproducible exposure results.

6.1.1 Repeatability shall be documented by repeating the exposure of the standard reference material in three separate exposure runs in the same piece of test apparatus.

6.1.2 Reproducibility shall be documented by repeating the exposure of the standard reference material in three separate exposure runs - one each, in three different test apparatus (same model but different serial numbers).

7. Exposure Uniformity

7.1 The test apparatus manufacturer shall submit data documenting the variability within the testing area. The data will include mapping the testing area with the current lot of SRM or other material agreed upon by contractual parties.

7.2 Uniformity shall be demonstrated by exposing replicate specimens of a standard reference material at various locations within the specimen mounting region of the chamber.

7.2.1 FOR EXAMPLE:

a. In multi-tier circular exposure types, place four (4) sets of control materials per tier, each located 90 degrees circumferentially. (See Figure 1 to illustrate one set)

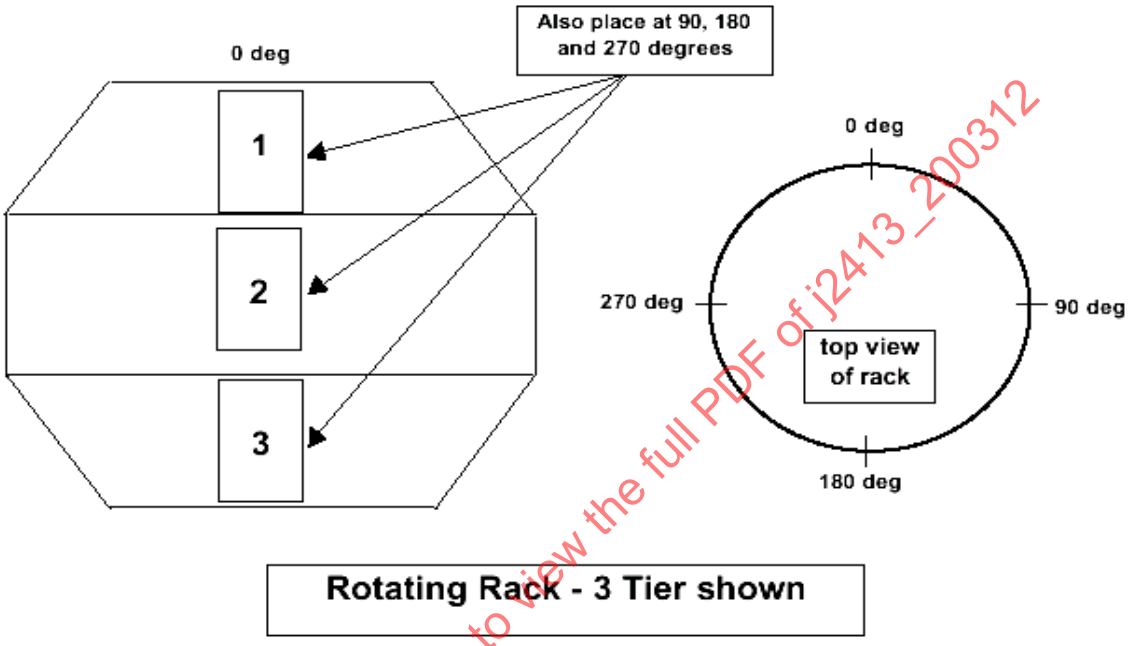

FIGURE 1—MULTI-TIER

b. In planar exposure types, place samples on top, middle and bottom, ensuring coverage in each corner. (See Figure 2 to illustrate one set)

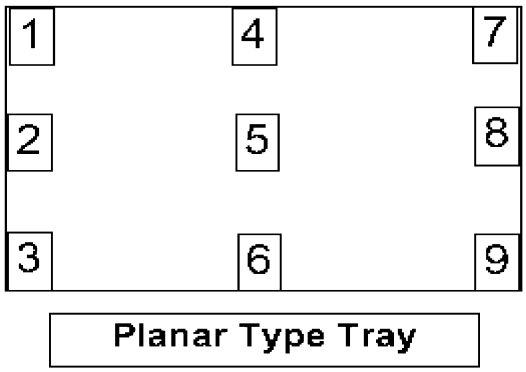

FIGURE 2—PLANAR EXPOSURE

c. In other geometries, the manufactures should provide illustration depicting specimen placement.

7.2.2 The SRMs are to be measured at each test interval (for example, 31.6 kJ/m^2 for SAE J1960) for each location. Weekends and holidays are optional. The data is to be plotted to show the variation with time within the testing area.

8. Performance of Benchmark Materials

8.1 If contractual parties require additional information on the testing capabilities of the candidate apparatus, other materials with established weathering characteristics can be run to compare the candidate equipment to current equipment**.**

8.1.1 Benchmark specimens shall be agreed upon by contractual parties.

8.1.2 Weathering modes and weathering evaluation methodology shall be agreed upon by contractual parties.

8.2 Expose the benchmark specimens in three xenon arc test apparatus agreed upon by contractual parties or that are recognized as producing acceptable results for the accelerated xenon test being evaluated. Place a replicate set of specimens in the candidate tester. Expose for the appropriate duration and evaluate the results to determine correlation**.**

PREPARED BY THE SAE TEXTILES AND FLEXIBLE PLASTICS COMMITTEE

APPENDIX A

I Instrument Description

Manufacturer _____
Model # _____
S/N _____
Mfg. Date _____
Sample Mounting Type _____
(e.g.: tray, rotating rack etc.)

II Conformance

1) Irradiance Control

A. Spectral Power Distribution (SPD)
Provide data on lamp & filter aging characteristics. Provide SPD table and graph of age extremes of recommended life.

B. Uniformity
Provide data on irradiance uniformity of top, bottom, middle and extremes of sample exposure area. Operational irradiance should be 0.55W/m^2 @ 340nm or equivalent.
Top _____W/m^2 @_____,
Mid _____W/m^2 @_____ ,
Bottom _____W/m^2 @_____

C. Lamp Type (description): _____
Filters used: type _____ age _____
Calibration device: _____
Calibration procedure: _____
Date of last calibration: _____

2) Humidity

A. Source (type) steam, atomized, water vapor: _____
Control (sensor) wet/dry bulb, electronic: _____
Calibration device: _____

3) Black Panel

A. Description (e.g. RTD, PT-100): _____
B. Age: _____
C. Calibration device and type: _____
(electronic, hot/cold, other)

4) Chamber Air Temperature Sensor

A. Description (e.g. RTD, PT100): _____
B. Calibration device and type: _____
(electronic, hot/cold, other)

FIGURE A1—RECOMMENDED FORM FOR VERIFICATION OF TEST APPARATUS CONFORMANCE