



# SURFACE VEHICLE STANDARD

J1961™

JUL2021

Issued 1988-12  
Revised 2021-07

Superseding J1961 MAY2011

## Accelerated Exposure of Automotive Exterior Materials Using a Solar Fresnel Reflector Apparatus

### RATIONALE

This standard is being revised because it is due for its Five-Year Review.

#### 1. SCOPE

- 1.1 This test method specifies the operating procedures for using a solar fresnel reflector apparatus for the accelerated exposure of various automotive materials.
- 1.2 Sample preparation, test durations, and performance evaluation procedures are covered in material specifications of the different automotive manufacturers.

#### 2. REFERENCES

##### 2.1 Applicable Documents

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

##### 2.1.1 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, [www.astm.org](http://www.astm.org).

- |            |  |
|------------|--|
| ASTM D859  | Test Methods for Silica in Water   |
| ASTM D4517 | Test Method for Low-Level Total Silica in High Purity Water by Flameless Atomic Absorption Spectroscopy                      |
| ASTM E891  | Standard Tables for Terrestrial Direct Normal Solar Spectral Irradiance for Air Mass 1.5                                     |
| ASTM G90   | Standard Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight |
| ASTM G113  | Standard Terminology Relating to Natural and Artificial Weathering of Nonmetallic Materials                                  |
| ASTM G147  | Standard Practice for Conditioning and Handling of Nonmetallic Materials for Natural and Artificial Weathering Tests         |

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## 2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

### 2.2.1 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, [www.astm.org](http://www.astm.org).

ASTM E903 Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres

## 3. DEFINITIONS

### 3.1 BLACK PANEL THERMOMETER, n.

A temperature measuring device, the sensing unit of which is covered with a black coating designed to absorb most of the radiant energy encountered in fade/weathering testing.

NOTE: This device provides an estimation of the maximum temperature a specimen may attain during exposure to natural or artificial light.

### 3.2 IRRADIANCE, SPECTRAL, n.

The radiant power within a specified wavelength interval that falls upon a unit area of exposed surface ( $W/m^2$ ).

### 3.3 IRRADIANCE, TOTAL, n.

Radiant power integrated over all wavelengths falling upon a unit area of exposure at a point in time expressed in watts per square meter ( $W/m^2$ ).

### 3.4 IRRADIATION, n.

See radiant exposure.

### 3.5 RADIANT EXPOSURE, n.

The time integral of irradiance expressed in joules per square meter ( $J/m^2$ ).

### 3.6 RADIANT EXPOSURE, SPECTRAL, n.

The integration of spectral irradiance with respect to time.

### 3.7 REFERENCE MATERIALS, n.

One or more light fastness standards selected for exposure as a check on a test apparatus and operating conditions.

### 3.8 SAMPLE, LABORATORY, n.

A portion of material taken to represent the lot sample, or the original material, and used in the laboratory as a source of test specimens.

## 3.9 SPECIMEN, n.

A specific portion of a material or a laboratory sample upon which a test is performed or selected for that purpose.

## 3.10 SPECTRAL POWER DISTRIBUTION, n.

The variation of power due to the source over the wavelength span of the emitted radiation.

## 4. SIGNIFICANCE AND USE

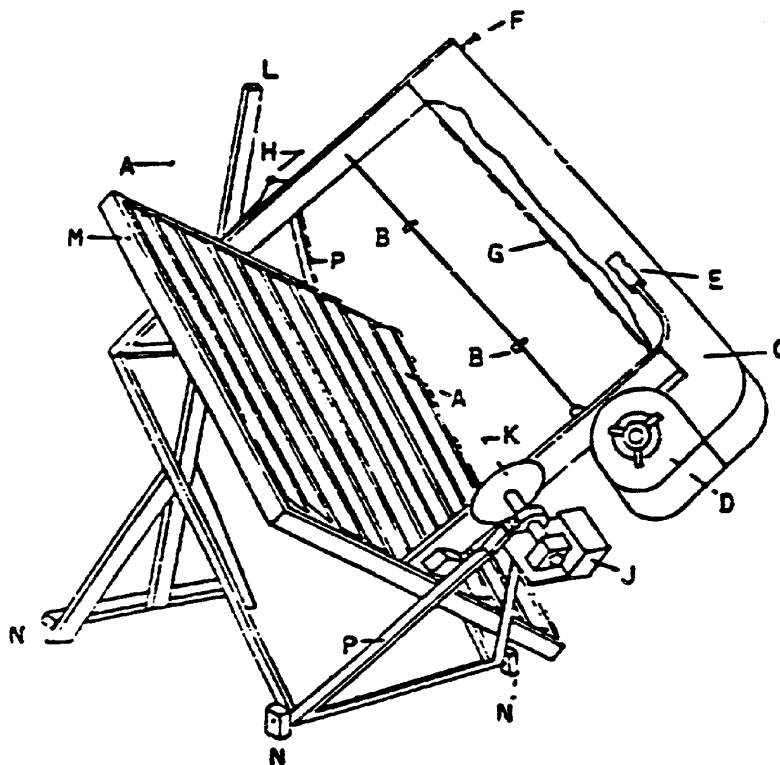
This test method is designed to simulate extreme environmental conditions encountered outside a vehicle due to sunlight, heat, and moisture (in the form of humidity, condensation, or rain) for the purpose of predicting the performance of automotive materials.

## 5. APPARATUS

5.1 The testing apparatus shall be a fresnel-reflecting device typically possessing 10 flat mirrors that focus direct sunlight onto an air-cooled sample area. A more complete description of the apparatus may be found in ASTM G90. See Figures 1 and 2.

NOTE: The apparatus shall be operated in a warm desert climate receiving approximately 3500 to 4000 hours of sunshine per year and an average annual relative humidity of approximately 25 to 35%.

A	FRESNEL-REFLECTING MIRROR	H	CENTER OF ROTATION
B	WATER SPRAY NOZZLE	J	REVERSIBLE MOTOR/GEAR DRIVE
C	AIR TUNNEL	K	CLUTCH
D	SQUIRREL CAGE BLOWER	L	ALTITUDE ADJUSTMENT MAST
E	AIR SWITCH	M	MIRROR BED/FRAME
F	SOLAR CELL TRACKER	N	ANCHORS
G	SPECIMENS ON TARGET BOARD	P	A-FRAME



**Figure 1 - Schematic of a typical fresnel reflecting concentrator accelerated weathering machine (single axis tracking)**