



# SURFACE VEHICLE RECOMMENDED PRACTICE

J2192™

JUN2021

Issued 2005-05  
Revised 2021-06

Superseding J2192 JUN2016

## Recommended Testing Methods for Physical Protection of Wiring Harnesses

### RATIONALE

Clarified multiple sections of the document to improve commonality with other relevant industry standards for coverings; clarified sample/specimen construction and preparation; revised 7.7; removed noise dampening test option 2; general updates to promote commonality.

### TABLE OF CONTENTS

|       |                                                  |   |
|-------|--------------------------------------------------|---|
| 1.    | SCOPE.....                                       | 3 |
| 1.1   | Application.....                                 | 3 |
| 2.    | REFERENCES.....                                  | 3 |
| 2.1   | Applicable Documents.....                        | 3 |
| 2.1.1 | SAE Publications.....                            | 3 |
| 2.1.2 | ASTM Publications.....                           | 3 |
| 2.1.3 | ISO Publications.....                            | 4 |
| 3.    | DEFINITIONS .....                                | 4 |
| 4.    | QUALITY REQUIREMENTS.....                        | 5 |
| 4.1   | Product Quality Assurance .....                  | 5 |
| 5.    | CLASSIFICATION (TEMPERATURE IDENTIFICATION)..... | 5 |
| 6.    | TESTING METHODS.....                             | 5 |
| 7.    | TESTS PROCEDURES .....                           | 6 |
| 7.1   | Sampling .....                                   | 6 |
| 7.2   | Specimen Preparation.....                        | 6 |
| 7.2.1 | Tape .....                                       | 6 |
| 7.2.2 | Extruded Tube.....                               | 6 |
| 7.2.3 | Textile Tube .....                               | 6 |
| 7.3   | Heat Aging .....                                 | 7 |
| 7.4   | Temperature/Humidity Cycling.....                | 7 |
| 7.5   | Flammability .....                               | 8 |
| 7.6   | Low Temperature Flexibility .....                | 8 |
| 7.7   | Fluids Resistance.....                           | 8 |
| 7.8   | Fogging .....                                    | 9 |

SAE Executive Standards Committee Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2021 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

**TO PLACE A DOCUMENT ORDER:** Tel: 877-606-7323 (inside USA and Canada)  
Tel: +1 724-776-4970 (outside USA)  
Fax: 724-776-0790  
Email: CustomerService@sae.org  
http://www.sae.org

SAE WEB ADDRESS:

Full document details: SAE J2192\_202106

For more information on this standard, visit  
[https://www.sae.org/standards/content/J2192\\_202106](https://www.sae.org/standards/content/J2192_202106)

Documents

Document Sharing Hub

|          |                                                                                  |    |
|----------|----------------------------------------------------------------------------------|----|
| 7.9      | Component Compatibility .....                                                    | 9  |
| 7.10     | Noise Suppression .....                                                          | 9  |
| 7.11     | Abrasion Resistance .....                                                        | 12 |
| 7.12     | Puncture/Pinch .....                                                             | 12 |
| 7.13     | Dynamic Cut-Through .....                                                        | 12 |
| 7.14     | Extruded Tubing Impact Resistance Test .....                                     | 12 |
| 7.14.1   | Test Set-Up .....                                                                | 13 |
| 7.14.2   | Test Procedure .....                                                             | 13 |
| 7.15     | Thermal Insulation .....                                                         | 13 |
| 7.16     | Dielectric Test .....                                                            | 14 |
| 8.       | PRODUCT APPEARANCE AND QUALITY .....                                             | 14 |
| 9.       | SUPPLIER RESPONSIBILITY .....                                                    | 14 |
| 10.      | TOXICOLOGY CONFORMANCE .....                                                     | 14 |
| 11.      | PRODUCT APPROVAL .....                                                           | 14 |
| 12.      | NOTES .....                                                                      | 14 |
| 12.1     | Revision Indicator .....                                                         | 14 |
| Figure 1 | Test setup .....                                                                 | 10 |
| Figure 2 | Picture of test setup .....                                                      | 10 |
| Figure 3 | More detailed view of test setup .....                                           | 11 |
| Figure 4 | Apparatus for impact resistance test .....                                       | 13 |
| Table 1  | Temperature classifications .....                                                | 5  |
| Table 2  | Testing methods and their applicability to covering categories and classes ..... | 5  |
| Table 3  | Test temperature for heat aging and temperature/humidity cycling .....           | 7  |
| Table 4  | Cycling sequence for temperature/humidity cycling test .....                     | 7  |
| Table 5  | Fluids to be used for fluids compatibility test .....                            | 9  |

## 1. SCOPE

This SAE Recommended Practice describes the recommended methods for testing flexible harness coverings for use on ground vehicle electrical distribution systems. This SAE Recommended Practice shall apply to all tapes, extruded tube, and textile tube.

### 1.1 Application

This document shall be applied for coverings used on wiring assemblies. The Customer's Engineering Group must approve material based on the functional application performance requirements to assure proper validation of covering materials. Note that, when specimens are prepared according to this SAE Recommended Practice, specimens covered with tape wrapped spirally will have two layers of tape, while specimens covered with tape or other coverings applied longitudinally will have only one layer. This may skew any comparisons between coverings, but it also more accurately reflects the typical usage of the coverings, meaning that the comparisons are still valid. For tests where adhesive tapes are tested in single layer only (abrasion, noise suppression), additional double layer tests should be considered if tapes are compared with tubes.

## 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 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), [www.sae.org](http://www.sae.org).

|           |                                                                               |
|-----------|-------------------------------------------------------------------------------|
| ARP1536   | Abrasion Test Procedure for Chafe Guard                                       |
| SAE J311  | Fluid for Passenger Car Type Automatic Transmissions                          |
| SAE J369  | Flammability of Polymeric Interior Materials - Horizontal Test Method         |
| SAE J1128 | Low Voltage Primary Cable                                                     |
| SAE J1756 | Determination of the Fogging Characteristics of Interior Automotive Materials |
| SAE J2302 | Thermal Effectiveness of Sleeve/Tubing/Tape Insulation                        |
| SAE J2495 | Thermal Containment Efficiency of Sleeve Materials                            |

#### 2.1.2 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 D471  | Standard Test Method for Rubber Property - Effect of Liquids                       |
| ASTM D3032 | Standard Test Methods for Hookup Wire Insulation, Section 22 - Dynamic Cut Through |
| ASTM D4157 | Test Method for Abrasion Resistance of Textile Fabrics                             |
| ASTM D5423 | Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation         |
| ASTM F1306 | Test Method for Slow Rate Penetration Resistance of Flexible Barrier Films         |

### 2.1.3 ISO Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ISO 3795 Road Vehicles, and Tractors and Machinery for Agriculture and Forestry - Determination of Burning Behavior of Interior Materials

ISO 6722-1 Road Vehicles - 60 V and 600 V Single-Core Cables - Dimensions, Test Methods and Requirements

Applicable Quality Standards (e.g., QS 9000, ISO/TS16949, IATF 16949, etc.)

## 3. DEFINITIONS

### 3.1 FUNCTIONALITY

Performs to design intent.

### 3.2 DEGRADATION

Loss of functionality due to physical changes such as cracks, tears, melting or other forms of reduction in material strength, composition or integrity.

### 3.3 EXTERIOR APPLICATION

Applications outside the passenger compartment.

### 3.4 INTERIOR APPLICATION

Applications inside the passenger compartment.

### 3.5 RECOMMENDED PRACTICES

Suggested test method that does not include specification limits.

### 3.6 TAPE

A continuous strip of cloth, fabric, metal, paper or plastic material with or without adhesive.

### 3.7 EXTRUDED TUBE

Tubes, plain or profiled, including convoluted tubings, that are extruded from elastomers, metals, plastics, or combination of materials.

### 3.8 TEXTILE TUBE

Tubes that are made with textile materials.

### 3.9 SPECIMEN

The combination of one or more coverings applied to a wire bundle, where the coverings and wires are specified by the customer. In some instances, the coverings may be applied to a mandrel.

### 3.10 SAMPLE

The coverings being tested using the methods in this SAE Recommended Practice. The combination of samples applied to a wire bundle form a specimen.

### 3.11 BUNDLE

Short for “wire bundle”; consists of a grouping of wires prepared in accordance with 7.2. When samples of one or more coverings are applied to a wire bundle, the combination becomes a specimen.

## 4. QUALITY REQUIREMENTS

### 4.1 Product Quality Assurance

Product Quality Assurance must follow the requirements and be in compliance with the applicable quality standard.

## 5. CLASSIFICATION (TEMPERATURE IDENTIFICATION)

Temperature requirement is by class as noted in Table 1. It is the responsibility of the customer to determine the “Class” to be used for any application. Temperature ratings are to be considered the minimum service temperature required.

It is the responsibility of the supplier to properly designate the service temperature of their product and provide the necessary data to the performance criteria in this specification when submitting to the customer for approval. Verification of any and all of the data submitted by the supplier is at the discretion of the customer.

**Table 1 - Temperature classifications**

| Class   | Temperature (°C) |
|---------|------------------|
| Class A | -40 to 85        |
| Class B | -40 to 100       |
| Class C | -40 to 125       |
| Class D | -40 to 150       |
| Class E | -40 to 175       |
| Class F | -40 to 200       |
| Class G | -40 to 225       |
| Class H | -40 to 250       |

## 6. TESTING METHODS

The recommended test methods are found in Table 2.

**Table 2 - Testing methods and their applicability to covering categories and classes**

| Test                         | Category      |               |              | Applicable Class and/or Application | Test Method |
|------------------------------|---------------|---------------|--------------|-------------------------------------|-------------|
|                              | Tape          | Extruded Tube | Textile Tube |                                     |             |
| Heat aging                   | X             | X             | X            | All                                 | 7.3         |
| Temperature/humidity         | X             | X             | X            | All                                 | 7.4         |
| Flammability                 | X             | X             | X            | All                                 | 7.5         |
| Low temperature flexibility  | X             | X             | X            | All                                 | 7.6         |
| Automotive fluids resistance | X             | X             | X            | For exterior applications only      | 7.7         |
| Fogging                      | X             | X             | X            | For interior applications only      | 7.8         |
| Component compatibility      | X             | X             | X            | Customer designated                 | 7.9         |
| Noise suppression            | X             | X             | X            | Customer designated                 | 7.10        |
| Abrasion resistance          | X             | X             | X            | Customer designated                 | 7.11        |
| Puncture/pinch               | X (film only) | X             |              | Customer designated                 | 7.12        |
| Cut through                  | X             | X             | X            | Customer designated                 | 7.13        |
| Impact                       |               | X             |              | Customer designated                 | 7.14        |
| Thermal insulation           | X             | X             | X            | Customer designated                 | 7.15        |