



# SURFACE VEHICLE STANDARD

J2120™

FEB2023

Issued 1992-07  
Reaffirmed 2009-11  
Revised 2023-02

Superseding J2120 NOV2009

(R) Personal Watercraft - Electrical Systems

## RATIONALE

Alignment with Section 7 of ISO 13590:2022. Most changes in this document are verbiage and document layout for increased clarification. There are some minor technical changes to align with ISO standards.

### 1. SCOPE

This SAE Standard establishes a uniform test procedure and performance requirements for the electrical system in personal watercraft.

This SAE Standard does not apply to outboard powered personal watercraft and jet powered surfboards.

### 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).

SAE J378 Marine Propulsion System Wiring

SAE J1127 Low Voltage Battery Cable

SAE J1128 Low Voltage Primary Cable

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Documents

Document Sharing Hub

## 2.1.2 ISO Publications

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

ISO 8666 Small craft - Principal data

ISO 13297 Small craft - Electrical systems - Alternating and direct current installations

ISO 13590 Small craft - Personal watercraft - Construction and system installation requirements

## 2.1.3 Other Publications

ABYC E-30 Electric Propulsion Systems

## 3. DEFINITIONS

### 3.1 CONDUIT

Any type of rigid plastic or metal piping or tubing which supports the conductors contained within.

### 3.2 PERSONAL WATERCRAFT

Watercraft intended for sports and leisure purposes of less than 4 m in hull length which uses a propulsion engine having a water jet pump as its primary source of propulsion and is designed to be operated by a person or persons sitting, standing, or kneeling on, rather than within, the confines of a hull.

NOTE: The measurement methodology for the length of hull is defined in ISO 8666.

## 4. EXEMPTIONS

The following items are exempt from Sections 5, 8, 9, 10, and 11:

- a. Circuits having a current flow of less than 1 A.
- b. Conductors which are totally inside an equipment housing.
- c. Resistance conductors that control circuit amperage.
- d. High-voltage secondary conductors and terminations that exist in ignition systems.
- e. Conductors less than 175 mm of exposed length outside of a device.
- f. Cranking motor conductors.

## 5. CONDUCTOR TYPE, SIZE, AND IDENTIFICATION

- 5.1 Each conductor shall be made of insulated, stranded copper.
- 5.2 Conductor insulation shall be of fire retardant material.
- 5.3 No conductor shall be used to carry amperage greater than that specified in Table 1 for its cross-sectional area.
- 5.4 A means of identification shall be used to distinguish individual conductors.
- 5.5 Table 1 gives permissible continuous current ratings in amperes determined for 30 °C ambient temperature.

**Table 1 - Cross-sectional area of conductor, maximum current and minimum stranding**

| Cross-Sectional Area | Maximum Current, in Amperes, for Single Conductors at Insulation Temperature Ratings |       |             |        |        |        | Minimum Number of Strands <sup>a</sup> |        |
|----------------------|--------------------------------------------------------------------------------------|-------|-------------|--------|--------|--------|----------------------------------------|--------|
|                      | 60 °C                                                                                | 70 °C | 85 to 90 °C | 105 °C | 125 °C | 200 °C | Type 1                                 | Type 2 |
| 0.75                 | 6                                                                                    | 10    | 12          | 16     | 20     | 25     | 16                                     | —      |
| 1                    | 8                                                                                    | 14    | 18          | 20     | 25     | 35     | 16                                     | —      |
| 1.5                  | 12                                                                                   | 18    | 21          | 25     | 30     | 40     | 19                                     | 26     |
| 2.5                  | 17                                                                                   | 25    | 30          | 35     | 40     | 45     | 19                                     | 41     |
| 4                    | 22                                                                                   | 35    | 40          | 45     | 50     | 55     | 19                                     | 65     |
| 6                    | 29                                                                                   | 45    | 50          | 60     | 70     | 75     | 19                                     | 105    |
| 10                   | 40                                                                                   | 65    | 70          | 90     | 100    | 120    | 19                                     | 168    |
| 16                   | 54                                                                                   | 90    | 100         | 130    | 150    | 170    | 37                                     | 266    |
| 25                   | 71                                                                                   | 120   | 140         | 170    | 185    | 200    | 49                                     | 420    |
| 35                   | 87                                                                                   | 160   | 185         | 210    | 225    | 240    | 127                                    | 665    |
| 50                   | 105                                                                                  | 210   | 230         | 270    | 300    | 325    | 127                                    | 1064   |
| 70                   | 135                                                                                  | 265   | 285         | 330    | 360    | 375    | 127                                    | 1323   |
| 95                   | 165                                                                                  | 310   | 330         | 390    | 410    | 430    | 259                                    | 1666   |
| 120                  | 190                                                                                  | 360   | 400         | 450    | 480    | 520    | 418                                    | 2107   |
| 150                  | 220                                                                                  | 380   | 430         | 475    | 520    | 560    | 418                                    | 2107   |

Note 1: The values given in this table are identical to those in ISO 13297.

Note 2: Conductor current ratings can be interpolated for cross-sectional areas between those shown in this table.

<sup>a</sup> Conductors with at least Type 1 stranding shall be used for general craft wiring. Conductors with Type 2 stranding shall be used for any wiring where frequent flexing is involved during use.

For conductors in engine compartments (ambient temperature 60 °C), the maximum current rating in Table 1 shall be derated by the factors given in Table 2.

**Table 2 - Correction factors**

| Temperature Rating of Conductor Insulation °C | Multiply Maximum Current from Table 1 |
|-----------------------------------------------|---------------------------------------|
| 70                                            | 0.75                                  |
| 85 to 90                                      | 0.82                                  |
| 105                                           | 0.86                                  |
| 125                                           | 0.89                                  |
| 200                                           | 1                                     |