IEC 62852

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
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Connectors for DC-application in photovoltaic systems – Safety requirements and tests

Connecteurs pour applications en courant continu pour systèmes photovoltaïques – Exigences de sécurité et essais

IEC 62852:2014-11/AMD1:2020-03(en-fr)

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Connecteurs pour applications en courant continu pour systèmes photovoltaïques – Exigences de sécurité et essais

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FOREWORD

This amendment has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

The text of this amendment is based on the following documents:

FDIS	Report on voting
82/1646/FDIS	82/1667/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

1 Scope

Add the following new sentence after the last paragraph:

This document does not apply to connectors for data collection, tracker controls or similar, but it may be used as a guide for those connectors.

2 Normative references

Delete all year dates.

Add the following new references:

IEC 60112, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60216-1, *Electrical insulating materials – Thermal endurance properties – Part 1: Ageing procedures and evaluation of test results*

IEC 60216-5, *Electrical insulating materials – Thermal endurance properties – Part 5: Determination of relative thermal endurance index (RTE) of an insulating material*

IEC TR 60664-2-1, *Insulation coordination for equipment within low-voltage systems – Part 2-1: Application guide – Explanation of the application of the IEC 60664 series, dimensioning examples and dielectric testing*

IEC 62930, *Electric cables for photovoltaic systems with a voltage rating of 1,5 kV DC*

ISO 868, *Plastics and ebonite – Determination of indentation hardness by means of a durometer (Shore hardness)*

Replace:

IEC 61215:2005, *Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval*

by:

IEC 61215-2, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 2: Test procedures*

Replace:

IEC TS 62548, *Photovoltaic (PV) arrays – Design requirements*

by:

IEC 62548, *Photovoltaic (PV) arrays – Design requirements*

3 Terms and definitions

Replace:

3.13
ambient temperature

by:

3.13
maximum ambient temperature

5 Constructional requirements and performance

5.1 General

Replace the existing third paragraph by the following:

Multi-way connectors shall be designed so that these requirements for earth-faulted and short-circuit-proofed installation complies with IEC 62548 or IEC 60364-7-712.

5.2 Marking and identification

5.2.1 Identification

Replace the existing item h) by the following:

h) specified temperatures: ULT, LLT, maximum ambient temperature (minimum +85 °C);

Add the following new item n):

n) RTE/RTI or TI (mechanical and electrical) of all polymeric insulating materials used in the connector.

5.7 General design

Replace the existing subclause 5.7.2 by the following:

5.7.2 Connectors shall be so designed that connection of conductors of the type and cross-sectional areas as described in 5.7.3 and as specified by the manufacturer is possible. Besides the termination of the conductor, care shall be taken that no damage of the insulation is possible, e.g. by avoiding sharp edges.

Replace the existing subclause 5.7.3 by the following:

5.7.3 Cables connected to the connector shall be suitable for use in photovoltaic systems and shall comply with the requirements of IEC 62930. The values of the rated current and the rated voltage shall have at least the rated values of the connector.

The class of the conductor shall be Class 5 in accordance with IEC 60228, Class 2 conductors are allowed for cables intended for fixed installation.

5.13 Temperature rise

Add, at the end of the first sentence, the following after the word "temperature":

(ULT)

5.14 Cable anchorage

Replace the existing subclause 5.14 by the following:

5.14.1 Connectors intended to be used with cables specified by the manufacturer

For connectors intended to be used with cables specified by the manufacturer, the tests shall be performed with cables as stated by the manufacturer.

The unloaded cable shall be marked so that any displacement relative to the gland can be easily detected.

The cable is pulled for a duration of 1 s, 50 times, without jerks in the direction of the axis with the relevant force as specified in Table 13.

At the end of this period, the displacement shall not exceed 2 mm. This measurement shall be carried out after unloading the force from the cable.

Afterwards the specimen shall be mounted in the test apparatus for torque test. The unloaded cable shall be marked so that any torsion relative to the gland can be easily detected, and then a torque as specified in Table 14 shall be applied for 1 min.

During test, the torsion shall not exceed 45°.

5.14.2 Connectors intended to be used with generic cables

A test mandrel equivalent to the minimum value of the anchorage range of the cable gland as specified by the manufacturer or supplier, with a sheath thickness as specified in Table 13 shall be fixed to the sample.

The unloaded test mandrel shall be marked so that any displacement relative to the gland can be easily detected.

The test mandrel shall be pulled for a duration of 1 s, 50 times, without jerks in the direction of the axis with the relevant force as specified in Table 13.

At the end of this period, the displacement shall not exceed 2 mm. This measurement is to be carried out after unloading the force from the test mandrel.

Unless otherwise specified, test mandrels shall consist of a metallic rod with an elastomeric sheath having a hardness of 70 Shore D ± 10 points in accordance with ISO 868 and a sheath thickness as specified in Table 13 or Table 14. The complete test mandrel shall have a tolerance of ± 0,2 mm for mandrels up to and including 16 mm diameter and ± 0,3 mm for mandrels larger than 16 mm diameter. The shape shall be circular or a profile simulating the outer dimension of the cable as specified by the manufacturer or supplier.

Table 13 – Pull forces for cord anchorage

Cable diameter mm	Pull force N	Minimum sheath thickness of test mandrel mm
Up to 4	-	1[a]
>4 to 8	30	1
>8 to 11	42	2
>11 to 16	55	2
>16 to 23	70	2
>23 to 31	80	2
>31 to 43	90	2
>43 to 55	100	2
>55	115	2

[a] For cable diameters up to 4 mm, a suitable non-metallic mandrel may be used.

Afterwards the specimen shall be mounted in the test apparatus for torque test.

The unloaded mandrel shall be marked so that any torsion relative to the gland can be easily detected, and then a torque specified in Table 14 is applied for 1 min.

During test, the torsion shall not exceed 45°.

The torsion test shall be performed by using a test mandrel equivalent to the maximum value of the anchorage range of the cable gland as specified by the manufacturer or supplier, with a torque for the appropriate maximum cable diameter as specified in Table 14.

Table 14 – Values for torsion test

Cable diameter mm	Torque Nm	Minimum sheath thickness of test mandrel mm
>4 to 8	0,10	1
>8 to 11	0,15	2
>11 to 16	0,35	2
>16 to 23	0,60	2
>23 to 31	0,80	2
>31 to 43	0,90	2
>43 to 55	1,00	2
>55	1,20	2

For metric cable glands meeting the requirements of IEC 62444 the tests described in this subclause are not required.

5.19 Insulation parts

5.19.2 Outer accessible parts

Add the following new item d):

d) approval of relative thermal endurance, relative thermal index or temperature index (RTE/RTI or TI) in accordance with IEC 60216-5 or IEC 60216-1. Values shall be listed in technical information.

NOTE Relevant RTI values evaluated in accordance to UL 746B are accepted as an alternative to RTE.

5.19.3 Inner parts

Add the following new item d):

d) approval of relative thermal endurance, relative thermal index or temperature index (RTE/RTI or TI) in accordance with IEC 60216-5 or IEC 60216-1. Values shall be listed in technical information.

NOTE Relevant RTI values evaluated in accordance to UL 746B are accepted as an alternative to RTE.

6.3.5 Mechanical operation

Replace the first sentence of the first dashed item by:

– the specimens shall be engaged and disengaged by means of a device simulating normal operating conditions for a number of cycles specified by the manufacturer.

6.3.12 Damp heat test

Replace the second sentence by:

Severity according to IEC 61215-2:2016, 4.13:

6.5 Test schedule

Table 6 – Mechanical test group A (test group A are separate tests)

Replace line A3 by the following:

A3	Polarisation	13e		Test force: 20 N or 1,5 times the insertion force, whichever is higher, but not higher than 80 N			5.3
					Visual examination	1a	No damage likely to impair safety and function

Replace line A6.1 and line A6.2 by the following:

A6.1	Cable clamp (pull)	17 c			Visual examination	1a	5.14, Table 13
A6.2	Cable clamp (torsion)	17 d			Visual examination	1a	5.14, Table 14

Table 7 – Service life test group B

Replace line B2 by the following:

B2	Mechanical operation	9a	6.3.5	Number of cycles as specified by the manufacturer			5.11
					Visual examination	1a	No damage likely to impair safety and function

Table 9 – Thermal test group D (mated test specimen)

Replace line D2 by the following:

D2	Temperature rise test	5a	6.3.4				5.13 The upper limit temperature (ULT) shall not be exceeded

Table 10 – Climatic test group E (mated test specimen)

Replace line E2 and line E3 by the following:

E2	Change of temperature		6.3.11	Maximum specified ambient temperature: minimum +85 °C Minimum specified ambient temperature: maximum -40 °C	Visual examination	1a	No damage likely to impair safety and function
E3	Damp heat		6.3.12	Test temperature: Maximum specified ambient temperature: minimum +85 °C	Visual examination	1a	No damage likely to impair safety and function

Table 11 – Degree of protection, test group F

Replace line F1 by the following:

F1	Degree of protection		6.3.3.1	Test probe 11 according to IEC 61032 with test force of 10 N			No live part shall be accessible 5.4.2

Bibliography

Delete the following:

IEC 60112:2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC TR 60664-2-1, *Insulation coordination for equipment within low-voltage systems – Part 2-1: Application guide – Explanation of the application of the IEC 60664 series, dimensioning examples and dielectric testing*

Add the following:

UL 746B, *Polymeric Material – Long Term Property Evaluations*

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