

# TEST REPORT

## On Behalf of

Wuxi Qiaoyi New Energy Technology Co. LTD

|                 |                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Prepared For :  | <b>Wuxi Qiaoyi New Energy Technology Co. LTD</b><br><br>502 Xida Road, Meicun Street, Xinwu District, Wuxi city                           |
| Trade Mark :    | <b>N/A</b>                                                                                                                                |
| Product Name :  | <b>Charging pile adapter</b>                                                                                                              |
| Model(s) :      | <b>QYZO-2-16,QYZO-3-16,QYZM-3-16,QYZM-3-16,QYZM-2-16,QYZF-2-16</b>                                                                        |
| Prepared By:    | <b>Shenzhen huaxiang Testing Co., Ltd.</b><br><br>201, Building A10, Fuhai Information Port, Fuhai Street, Bao'an District, Shenzhen City |
| Test Date:      | <b>Jun. 09, 2023- Jun. 16, 2023</b>                                                                                                       |
| Date of Report: | <b>Jun. 16, 2023</b>                                                                                                                      |
| Report No. :    | <b>HUAX230609023KR</b>                                                                                                                    |

**Note:** This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Shenzhen huaxiang Testing Co., Ltd.

|                                                                                                                                               |                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| <b>TEST REPORT</b>                                                                                                                            |                                                                                         |
| <b>EN 62196-1:2014</b>                                                                                                                        |                                                                                         |
| <b>Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements</b> |                                                                                         |
| <b>Report Reference No</b> .....                                                                                                              | <b>HUAX230609023KR</b>                                                                  |
| Date of issue.....                                                                                                                            | Jun. 16, 2023                                                                           |
| Total number of pages.....                                                                                                                    | 50 pages                                                                                |
| <b>Testing Laboratory</b> .....                                                                                                               | Shenzhen BYS Testing Co., Ltd.                                                          |
| Address.....                                                                                                                                  | 201, Building A10, Fuhai Information Port, Fuhai Street, Bao'an District, Shenzhen City |
| <b>Applicant's name</b> .....                                                                                                                 | Wuxi Qiaoyi New Energy Technology Co. LTD                                               |
| Address.....                                                                                                                                  | 502 Xida Road, Meicun Street, Xinwu District, Wuxi city                                 |
| <b>Test specification:</b>                                                                                                                    |                                                                                         |
| Standard.....                                                                                                                                 | EN 62196-1:2014                                                                         |
| Test procedure.....                                                                                                                           | Test Report                                                                             |
| Non-standard test method.....                                                                                                                 | N/A                                                                                     |
| <b>Test item description</b> ..... Charging pile adapter                                                                                      |                                                                                         |
| Trade Mark.....                                                                                                                               | N/A                                                                                     |
| Manufacturer.....                                                                                                                             | Wuxi Qiaoyi New Energy Technology Co. LTD                                               |
| Address.....                                                                                                                                  | 502 Xida Road, Meicun Street, Xinwu District, Wuxi city                                 |
| Model/Type reference.....                                                                                                                     | QYZO-2-16                                                                               |
| Ratings.....                                                                                                                                  | AC 250V 50/60V,3KWmax                                                                   |

**Testing procedure and testing location**

Laboratory name.....: Shenzhen huaxiang Testing Co., Ltd.

**Testing**

location / address.....:201, Building A10, Fuhai Information Port, Fuhai Street, Bao'an District, Shenzhen City

Testing lprocedure : TL ☒ RMT SMT WMT TMP

Drafted By: Kevin su

Approved By: Amy jiang



Summary of compliance with National Differences: N/A

Copy of marking plate:

**Charging pile adapter**

QYZO-2-16

Rating: AC 250V ,50/60V, 3KWmax



**Wuxi Qiaoyi New Energy Technology Co. LTD**

MADE IN CHINA

|                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test item particulars..... :</b><br>Class of protection against electrical shock.....: Class I<br>Degree of protection against moisture..... : IPX4<br>Type of cord attachment..... : --                                                                                                                                                                                    |
| <b>Possible test case verdicts:</b><br>- test case does not apply to the test object..... : N/A<br>- test object does meet the requirement..... : P (Pass)<br>- test object does not meet the requirement.....: F (Fail)                                                                                                                                                       |
| <b>Testing..... :</b><br>Date of receipt of test item.....: Jun. 09, 2023<br>Date (s) of performance of tests..... : Jun. 09, 2023- Jun.16, 2023                                                                                                                                                                                                                               |
| <b>General remarks:</b><br>The test results presented in this report relate only to the object tested.<br>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.<br>"(See appended table)" refers to a table appended to the report.<br>Throughout this report a comma (point) is used as the decimal separator. |
| <b>General product information:</b><br>1. The product share same circuit with different rated power and appearance.<br>2. All tests were carried out the model QYZO-2-16.                                                                                                                                                                                                      |

| EN 62196-1 |                                                                                                                                                                                                                                                      |                 |         |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                   | Result - Remark | Verdict |
| 5          | Ratings                                                                                                                                                                                                                                              |                 | ---     |
| 5.1        | Preferred rated operating voltages: 0 to 30 V (signal or control purposes only); 230 V a.c. 400 V a.c. 500 V a.c. 600 V d.c.                                                                                                                         | AC 250V         | P       |
| 5.2        | Rated currents: 30 A a.c. or 32 A a.c., 250 A a.c., 400 A d.c.                                                                                                                                                                                       | 16A             | N/A     |
| 5.3        | Rated current for signal or control purposes: 2 A                                                                                                                                                                                                    |                 | N/A     |
| 5.4        | An accessory rated 250 A a.c. or 400 A d.c. shall be rated for disconnecting use only, not for current interruption.                                                                                                                                 | AC 250V         | N/A     |
| 5.5        | An accessory, rated 32 A, with a pilot circuit contact may be rated as suitable for or not suitable for making and breaking an electrical circuit. See 7.1.4.                                                                                        | 16A             | N/A     |
| 6          | Connection between the power supply and the electric vehicle                                                                                                                                                                                         |                 | ---     |
| 6.1        | This section provides a description of the physical conductive electrical interface requirements between the vehicle and the power supply, which allows two designs at the vehicle interface:                                                        |                 | P       |
|            | a) a universal interface for all modes of charging which provides for either:                                                                                                                                                                        |                 | N/A     |
|            | 1) high power a.c. and 32 A a.c., or                                                                                                                                                                                                                 |                 | N/A     |
|            | 2) high power d.c. and 32 A a.c. power;                                                                                                                                                                                                              |                 | N/A     |
|            | b) a basic interface for mode 1, 2 and 3 charging only, which provides for 32 A a.c.                                                                                                                                                                 | 16A             | N/A     |
| 6.2        | There shall be three types of vehicle inlets, each identified by the marking specified in 8.2:                                                                                                                                                       |                 | ---     |
|            | universal, high power a.c. (UA)                                                                                                                                                                                                                      |                 | P       |
|            | universal, high power d.c. (UD)                                                                                                                                                                                                                      |                 | N/A     |
|            | basic (B)                                                                                                                                                                                                                                            |                 | N/A     |
| 6.3        | There shall be four types of vehicle connectors, each identified by the marking specified in Clause 8.2:                                                                                                                                             |                 | ---     |
|            | universal, high power a.c. (UA)                                                                                                                                                                                                                      |                 | P       |
|            | universal, high power d.c. (UD)                                                                                                                                                                                                                      |                 | N/A     |
|            | universal, 32 A a.c. (U32)                                                                                                                                                                                                                           |                 | N/A     |
|            | basic (B)                                                                                                                                                                                                                                            |                 | N/A     |
| 6.4        | The universal interface shall contain up to 12 power or signal contacts, with only one physical configuration of contact positions. These positions may be used or not, according to the mode of charging of the vehicle. The electrical ratings and |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |         |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Result - Remark | Verdict |
|            | their function are described in Table 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |         |
|            | The universal vehicle inlet shall be intermateable with either the high power a.c. vehicle connector or the high power d.c. vehicle connector. This vehicle inlet shall be intermateable with the 32 A a.c. vehicle connector, as shown in Table 2. A means shall be provided to prevent the connection of d.c. power from the vehicle connector with the a.c. vehicle inlet and vice versa.                                                                                                   | 16A             | N/A     |
| 6.5        | The basic interface shall contain up to 8 power or signal contacts, with unique physical configurations of contact positions for single phase and for three phase. The electrical ratings and their function are described in Table 4.                                                                                                                                                                                                                                                         |                 | P       |
|            | The basic vehicle inlet shall be intermateable with either the single phase or the three phase vehicle connector. The basic vehicle connector shall not mate with a universal a.c. or d.c. vehicle inlet.                                                                                                                                                                                                                                                                                      |                 | P       |
|            | This vehicle coupler is rated 230 V, 32 A single phase or 230/400 V, 32 A, three phase. It may include additional contacts for control pilot and power indicator.                                                                                                                                                                                                                                                                                                                              | AC 250V, 16A    | N/A     |
| 6.6        | Contact sequencing                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 | P       |
|            | The contact sequence during the connection process shall be such that the earth connection is made first and the pilot connection is made last. The order of connection of the other contacts is not specified. During disconnection, the pilot connection shall be broken first and the earth connection shall be broken last. The neutral contact N shall make before or simultaneously with contacts L1, L2 and L3 and break after or simultaneously with contacts L1, L2 and L3. See 10.2. |                 | P       |
| 7          | Classification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 | ---     |
| 7.1        | Accessories are classified:                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 | P       |
| 7.1.1      | according to purpose: plugs, socket-outlets, vehicle connectors, vehicle inlets, and cable assemblies;                                                                                                                                                                                                                                                                                                                                                                                         |                 | P       |
| 7.1.2      | according to the method of connecting the conductors:                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 | ---     |
|            | –rewireable accessories;                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 | N/A     |
|            | –non-rewireable accessories;                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 | P       |
| 7.1.3      | according to serviceability:                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 | ---     |
|            | –field serviceable;                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 | N/A     |
|            | –user serviceable;                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                                  |                 |         |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                               | Result - Remark | Verdict |
| 7.1.4      | according to electrical operation:                                                                                                                                                                                                                                                                                                                                                               |                 | ---     |
|            | –suitable for making and breaking an electrical circuit under load;                                                                                                                                                                                                                                                                                                                              |                 | P       |
|            | –not suitable for making and breaking an electrical circuit under load;                                                                                                                                                                                                                                                                                                                          |                 | N/A     |
| 7.1.5      | according to function as specified in Clause 6:                                                                                                                                                                                                                                                                                                                                                  |                 | ---     |
|            | –basic;                                                                                                                                                                                                                                                                                                                                                                                          |                 | P       |
|            | –universal high power a.c.;                                                                                                                                                                                                                                                                                                                                                                      |                 | P       |
|            | –universal high power d.c.;                                                                                                                                                                                                                                                                                                                                                                      |                 | N/A     |
|            | –universal 32;                                                                                                                                                                                                                                                                                                                                                                                   | 16A             | N/A     |
| 7.1.6      | according to use with cable management systems. (Under future consideration)                                                                                                                                                                                                                                                                                                                     |                 | P       |
| 8          | Marking                                                                                                                                                                                                                                                                                                                                                                                          |                 | ---     |
| 8.1        | Accessories shall be marked with:                                                                                                                                                                                                                                                                                                                                                                |                 | P       |
|            | –symbol according to the intermateability of the accessories;                                                                                                                                                                                                                                                                                                                                    |                 | P       |
|            | –rated current(s) in amperes for power;                                                                                                                                                                                                                                                                                                                                                          |                 | P       |
|            | –rated maximum operating voltage(s) in volts;                                                                                                                                                                                                                                                                                                                                                    |                 | P       |
|            | –either the name or trade mark of the manufacturer or of the responsible vendor;                                                                                                                                                                                                                                                                                                                 |                 | P       |
|            | –type reference, which may be a catalogue number.                                                                                                                                                                                                                                                                                                                                                |                 | P       |
| 8.2        | When symbols are used, they shall be as follows:                                                                                                                                                                                                                                                                                                                                                 |                 | P       |
|            | amperes. volts. hertz. protective earth. alternating current. direct current. universal, high power a.c. (UA). universal, high power d.c. (UD). universal, low power a.c. (U32). basic (B)                                                                                                                                                                                                       |                 | P       |
| 8.3        | For all accessories, the marking for the intermateability symbol shall be on the outside of main part, visible to the user during use. For plugs and vehicle connectors, the marking for either the name or trade mark of the manufacturer or the responsible vendor and the type reference, catalogue number or designation shall also be on the outside of the accessory, visible to the user. |                 | P       |
| 8.4        | The intermateability symbol shall be at least 10 mm in height and prominent, may be in contrasting colour, and may be provided on a pressure sensitive label or similar means which can be attached to the vehicle inlet cover and connector.                                                                                                                                                    |                 | P       |
| 8.5        | For all accessories, the marking for the maximum rated operating voltage and rated current shall be on a place which is visible before installation of                                                                                                                                                                                                                                           |                 | P       |



| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                              |                 |         |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                           | Result - Remark | Verdict |
|            | the accessory. For socket- outlets and vehicle inlets, the marking for either the name or trademark of the manufacturer or the responsible vendor and the type reference, catalogue number or designation shall be on a place which is visible before installation of the accessory. It need not be visible after installation.              |                 |         |
| 8.6        | For rewirable accessories, the contacts shall be indicated by the position numbers 1 to 12 as indicated in Table 3, or position numbers 4 to 14 as indicated in Table 4.                                                                                                                                                                     |                 | N/A     |
|            | These position numbers shall be placed close to the relevant terminals; they shall not be placed on screws, removable washers or other removable parts.                                                                                                                                                                                      |                 | N/A     |
| 8.7        | For rewirable accessories, wiring instructions shall be provided.                                                                                                                                                                                                                                                                            |                 | N/A     |
| 8.8        | For non-rewirable accessories, the markings in Clauses 8.6 and 8.7 are not required.                                                                                                                                                                                                                                                         |                 | P       |
| 8.9        | Marking shall be indelible and easily legible.                                                                                                                                                                                                                                                                                               |                 | P       |
|            | After the humidity treatment of 20.3, the marking is rubbed vigorously by hand for 15 s with a piece of cloth soaked in water and again for 15 s with a piece of cloth soaked with petroleum spirit.                                                                                                                                         |                 | P       |
| 8.1        | Cable assemblies comprised of the cable and one accessory, shall be provided with information to identify the wire terminations, terminals, etc, to provide wiring and installation instructions.                                                                                                                                            |                 | P       |
|            | The unwired end of a cable assembly intended for connection to a rewirable accessory shall be marked to identify the conductors.                                                                                                                                                                                                             |                 | P       |
| 9          | Dimensions                                                                                                                                                                                                                                                                                                                                   |                 | ---     |
| 9.1        | EV accessories shall comply with the appropriate standard sheets, if any. If no standard sheet is available, the accessories shall comply with the specifications provided by the manufacturer.                                                                                                                                              |                 | P       |
| 9.2        | EV accessories may be compatible only with other standardised EV accessories. It shall not be possible to engage plugs or vehicle connectors with socket-outlets or vehicle inlets having different ratings, or having different contact combinations unless safe operation is ensured or other means are provided to ensure safe operation. |                 | P       |
|            | In addition, the design shall be such that improper connections shall not be possible between:                                                                                                                                                                                                                                               |                 | P       |
|            | –signal and control contacts and a live (power) contact;                                                                                                                                                                                                                                                                                     |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                      |                                 |         |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                   | Result - Remark                 | Verdict |
|            | –the earth and/or pilot plug-contact and a live socket-contact, or a live plug-contact and the earth and/or pilot socket-contact;                                                                                                                                                    |                                 | P       |
|            | –the phase plug-contacts and the neutral socket-contact, if any;                                                                                                                                                                                                                     |                                 | P       |
|            | –a neutral plug-contact and a phase socket-contact.                                                                                                                                                                                                                                  |                                 | P       |
| 9.3        | It shall not be possible to make single-pole connections between plugs and socket- outlets or vehicle connectors, or between vehicle inlets and vehicle connectors or socket- outlets within a single family of accessories.                                                         |                                 | P       |
| 10         | Protection against electric shock                                                                                                                                                                                                                                                    |                                 | ---     |
| 10.1       | Accessories shall be so designed that live parts of socket-outlets and vehicle connectors, when they are wired as in normal use, and live parts of plugs and vehicle inlets, when they are in partial or complete engagement with the complementary accessories, are not accessible. | Not reachable during normal use | P       |
|            | In addition, it shall not be possible to make contact between a live part of a plug or vehicle inlet and a live part of a socket-outlet or vehicle connector while any live part is accessible.                                                                                      | Not reachable during normal use | P       |
|            | This clause does not apply to contacts and conductors used for signal, data, communications and control circuits.                                                                                                                                                                    |                                 | P       |
|            | The standard test finger shown in Figure 2 is applied in every possible position, an electrical indicator, with a voltage not less than 40 V, being used to show contact with the relevant part.                                                                                     |                                 | P       |
| 10.2       | Accessories shall be so designed that:                                                                                                                                                                                                                                               |                                 | P       |
|            | a) when inserting the plug or vehicle connector,                                                                                                                                                                                                                                     |                                 | P       |
|            | 1) the earth connection is made before the phase connections and neutral, if any, are made;                                                                                                                                                                                          |                                 | P       |
|            | 2) the control pilot connection, if any, is made after the phase connections and neutral are made;                                                                                                                                                                                   |                                 | P       |
|            | b) when withdrawing the plug or vehicle connector,                                                                                                                                                                                                                                   |                                 | P       |
|            | 1) the phase connections and neutral, if any, are broken before the earth connection is broken;                                                                                                                                                                                      |                                 | P       |
|            | 2) the control pilot connection, if any, is broken before the phase connections and neutral are broken.                                                                                                                                                                              |                                 | P       |
| 10.3       | It shall not be possible to inadvertently assemble either the part carrying plug or inlet contacts into                                                                                                                                                                              |                                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                               |                                                                |         |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                            | Result - Remark                                                | Verdict |
|            | the enclosure of a socket-outlet or vehicle connector or the part carrying the socket-outlet or vehicle connector contacts into the enclosure of a plug or inlet.                                                                                                                                                                             |                                                                |         |
| 11         | Size and colour of earthing conductors                                                                                                                                                                                                                                                                                                        |                                                                | ---     |
|            | The core connected to the earthing terminal shall be identified by the colour combination green/yellow. The nominal cross-sectional area of the earthing conductor and of the neutral conductor, if any, shall be at least equal to that of the phase conductors, or as specified in Table 6.                                                 | The sample provided by the customer, this device was not found | N/A     |
| 12         | Provision for earthing                                                                                                                                                                                                                                                                                                                        |                                                                | ---     |
| 12.1       | Accessories shall be provided with a protective earthing contact and earthing terminal.                                                                                                                                                                                                                                                       |                                                                | P       |
|            | Protective earthing contacts shall be directly and reliably connected to the protective earthing terminals.                                                                                                                                                                                                                                   |                                                                | P       |
| 12.2       | Accessible metal parts of accessories, which may become live in the event of an insulation fault, shall be reliably connected to the internal earthing terminal(s) by construction.                                                                                                                                                           |                                                                | P       |
|            | A current of 25 A derived from an a.c. source having a no-load voltage not exceeding 12 V is passed between the earthing terminal and each of the accessible metal parts in turn.                                                                                                                                                             |                                                                | N/A     |
|            | The voltage drop between the earthing terminal and the accessible metal part is measured, and the resistance calculated from the current and this voltage drop.                                                                                                                                                                               |                                                                | P       |
| 12.3       | Earthing contacts shall comply with the test requirement in either 12.3.1 or 12.3.2– 12.3.4, as specified by the manufacturer.                                                                                                                                                                                                                |                                                                | P       |
| 12.3.1     | Earthing contacts shall be capable of carrying a current equal to that specified for the phase contacts without overheating.                                                                                                                                                                                                                  |                                                                | P       |
| 12.3.2     | The assembly of mating accessories with protective earthing contacts shall carry the current specified in Table 5 for the time specified in that table. The current is to be based on the minimum size equipment earthing conductor for the ampere rating of the device. The components in the earthing path shall not crack, break, or melt. |                                                                | N/A     |
| 12.3.3     | The mating accessories are to be mounted and assembled as intended. An earthing conductor of the minimum intended size, not less than 0,6 m long, is to be connected to the protective earthing terminal of each device, with the terminals employed to hold the conductor tightened using a                                                  |                                                                | N/A     |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                     |                 |         |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                  | Result - Remark | Verdict |
|            | torque as specified by the manufacturer. Socket-outlets and vehicle inlets are to be wired with the minimum allowable size copper conductor. Plugs and vehicle connectors are to be wired with flexible, stranded conductors or cable sized based on the ampere rating of the device. The test current shall be passed through the mating accessories and earthing wires in series. |                 |         |
| 12.3.4     | After having carried the current specified in 12.3.2, continuity shall exist on the test assembly when measured between the earthing conductors. Any indicating device such as an ohmmeter, battery-and-buzzer combination, or the like, may be used to determine whether continuity exists.                                                                                        |                 | N/A     |
| 12.4       | Earthing contacts shall be so shrouded or guarded that they are protected against mechanical damage.                                                                                                                                                                                                                                                                                |                 | P       |
| 12.5       | Clean data (signal) earth contacts shall be capable of carrying a current of 2 A without overheating.                                                                                                                                                                                                                                                                               |                 | P       |
| 13         | Terminals                                                                                                                                                                                                                                                                                                                                                                           |                 | ---     |
| 13.1       | Connections to terminals of contacts rated 250 A or more shall provide a permanent and secure connection. These terminals shall not be rewirable or user serviceable.                                                                                                                                                                                                               |                 | N/A     |
| 13.2       | Rewireable accessories shall be provided with terminals in which connection is made by means of screws, nuts or equally effective devices.                                                                                                                                                                                                                                          |                 | N/A     |
| 13.3       | Parts of terminals, other than screws, nuts, washers, stirrups, clamping plates and the like, shall be either of:                                                                                                                                                                                                                                                                   |                 | P       |
|            | •copper;                                                                                                                                                                                                                                                                                                                                                                            |                 | P       |
|            | •an alloy containing at least 58 % copper for parts that are worked cold or at least 50 % copper for other parts;                                                                                                                                                                                                                                                                   | at least 58 %   | P       |
|            | •or other metal not less resistant to corrosion than copper and having mechanical and electrical properties no less suitable.                                                                                                                                                                                                                                                       |                 | N/A     |
|            | Steel screws shall be adequately protected against corrosion.                                                                                                                                                                                                                                                                                                                       |                 | N/A     |
| 13.4       | If the body of an earthing terminal is not part of the metal frame or housing of the accessory, the body shall be of material as prescribed in 13.3 for parts for terminals. If the body is part of the metal frame or housing, the clamping screw or nut shall be of such material.                                                                                                |                 | P       |
|            | If the body of the earthing terminal is part of a frame or housing of aluminium or aluminium alloy, precautions shall be taken to avoid the risk of                                                                                                                                                                                                                                 |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |         |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                                                              | Result - Remark        | Verdict |
|            | corrosion resulting from contact between copper and aluminium or its alloys.                                                                                                                                                                                                                                                                                                                                                    |                        |         |
| 13.5       | Terminals shall provide for the connection of copper or copper-alloy conductors. For rewirable accessories, these terminals shall provide for the connection of conductors having nominal cross-sectional areas as shown in Table 6. For non-rewirable accessories, these terminals shall provide for the connection of conductors having nominal cross-sectional areas as specified by the manufacturer of the cable assembly. |                        | N/A     |
|            | For terminals other than lug terminals, compliance is checked by the following test and by the tests of 13.8, 13.9 and 13.10.                                                                                                                                                                                                                                                                                                   |                        | N/A     |
|            | Gauges as specified in Figure 12, having a measuring section for testing the insertability of the maximum specified cross-sectional area of Table 6 shall be able to penetrate into the terminal aperture under their own weight to the designated depth of the terminal.                                                                                                                                                       |                        | N/A     |
|            | For pillar terminals in which the end of a conductor is not visible, the hole to accommodate the conductor shall have a depth such that the distance between the bottom of the hole and the last screw will be equal to at least half the diameter of the screw, and in any case not less than 1,5 mm.                                                                                                                          |                        | N/A     |
|            | For terminals complying with Figure 13f), the lug shall accept conductors having nominal cross-sectional areas within the appropriate range specified in Table 6.                                                                                                                                                                                                                                                               |                        | N/A     |
|            | Terminals that cannot be checked by the gauges specified in Figure 12 are tested by suitably shaped gauges having the same cross-section as those of the appropriate gauges given in Figure 12.                                                                                                                                                                                                                                 |                        | N/A     |
| 13.6       | Terminals shall have appropriate mechanical strength.                                                                                                                                                                                                                                                                                                                                                                           |                        | P       |
|            | Screws and nuts for clamping shall have an ISO thread or a thread comparable in pitch and mechanical strength.                                                                                                                                                                                                                                                                                                                  |                        | P       |
| 13.7       | Terminals shall be properly fixed to the accessory and shall not work loose when the clamping screws or nuts are tightened or loosened.                                                                                                                                                                                                                                                                                         |                        | P       |
|            | Screws and nuts for clamping the conductors shall not serve to fix any other component.                                                                                                                                                                                                                                                                                                                                         |                        | P       |
| 13.8       | Terminals shall be so designed that they clamp the conductor between metal surfaces with sufficient contact pressure and without damage to the conductor.                                                                                                                                                                                                                                                                       | between metal surfaces | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                           |         |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Result - Remark                                           | Verdict |
| 13.9       | First test:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                           | P       |
|            | Verification is made successively with conductors of the largest and smallest cross-sectional areas specified in Table 6, using class 1 or class 2 conductors for terminals of socket-outlets or vehicle inlets and class 5 conductors for terminals of plugs or vehicle connectors.                                                                                                                                                                                                                                                                 | class 1                                                   | P       |
|            | The conductors shall be connected to the clamping unit, and the clamping screws or nuts tightened to two-thirds of the torque indicated in Table 18, unless the torque is specified by the manufacturer on the product or in an instruction sheet.                                                                                                                                                                                                                                                                                                   |                                                           | P       |
|            | Each conductor is subjected to a pull according to the value in Table 7, exerted in the opposite direction to that in which the conductor was inserted. The pull is applied without jerks for 1 min. The maximum length of the test conductor shall be 1 m.                                                                                                                                                                                                                                                                                          | 1 m                                                       | P       |
|            | During the test, the conductor shall not slip out of the terminal nor shall it break at, or in, the clamping unit.                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                           | P       |
| 13.1       | Second test:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                           | P       |
|            | This test is carried out first with the smallest cross-sectional area and then with the largest cross-sectional area of the relevant values in Table 6 for class 1 (up to and including 4 mm <sup>2</sup> ) and class 2 conductors. The clamping screws or nuts are tightened with the torque according to Table 18, unless the torque is specified by the manufacturer on the product or in an instruction sheet.                                                                                                                                   | class 1                                                   | P       |
|            | The terminal is fastened to a conductor whose length is at least 75 mm longer than the height specified in Table 8, and is secured rigidly in a vertical position simulating actual service conditions. The free end of the cable is passed through a bushing of the size specified in Table 8. The bushing is attached to an arm, driven by a motor at a rate of approximately 9 rpm and for approximately 135 revolutions, and in such a manner that the centre of the bushing is made to describe a circle in a horizontal plane (see Figure 14). | approximately 9 rpm and for approximately 135 revolutions | P       |
|            | The circle shall have a diameter of $(75 \pm 2)$ mm, and its centre shall be vertically below the centre of the conductor opening in the terminal. The bushing is lubricated to prevent binding, twisting or rotation of the insulated cable. A weight as specified in Table 8 is suspended from the free end of the conductor.                                                                                                                                                                                                                      | 77mm                                                      | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                         |                 |         |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                      | Result - Remark | Verdict |
|            | During the test, the conductor shall not pull out of the clamping unit.                                                                                                                                                                                                                                                 |                 | P       |
|            | Breaking of the conductor or of any strand of a stranded conductor is determined by examining the entire terminal while the conductor is still connected after the test. The conductor or strand of a stranded conductor shall not be visibly detached.                                                                 |                 | P       |
| 13.11      | Lug terminals shall be used only for accessories having a rated current of at least 63 A. If such terminals are provided, they shall be fitted with spring washers or equally effective locking means.                                                                                                                  |                 | N/A     |
| 13.12      | Each terminal shall be located in proximity to its corresponding terminal or terminals of different polarity, and to the internal earthing terminal, if any, unless there is a sound technical reason to the contrary.                                                                                                  |                 | P       |
| 13.13      | Clamping screws or nuts of earthing terminals shall be adequately locked against accidental loosening, and it shall not be possible to loosen them without the aid of a tool.                                                                                                                                           |                 | P       |
|            | Unless two screws in pillar type terminals are used, a test is required to prove the locking capabilities.                                                                                                                                                                                                              |                 | P       |
| 13.14      | Terminals shall be so located or shielded that:                                                                                                                                                                                                                                                                         |                 | P       |
|            | –screws becoming loose from the terminals cannot establish any electrical connection between live parts and metal parts connected to the earthing terminal;                                                                                                                                                             |                 | P       |
|            | –conductors becoming detached from live terminals cannot touch metal parts connected to the earthing terminal;                                                                                                                                                                                                          |                 | P       |
|            | –conductors becoming detached from the earthing terminal cannot touch live parts. This requirement applies also to terminals for pilot conductors.                                                                                                                                                                      |                 | P       |
| 13.15      | When the conductors have been correctly fitted, there shall be no risk of accidental contact between live parts of different polarity or between such parts and accessible metal parts, and, should a wire of a stranded conductor escape from a terminal, there shall be no risk that wires emerge from the enclosure. |                 | P       |
|            | The requirement with regard to the risk of accidental contact between live parts and accessible metal parts does not apply to accessories having rated voltages not exceeding 50 V.                                                                                                                                     |                 | P       |
|            | An 8 mm length of insulation is removed from the                                                                                                                                                                                                                                                                        |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                             |         |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                                                                        | Result - Remark             | Verdict |
|            | end of a flexible conductor having a cross-sectional area in the middle of the range specified in 13.5. One wire of the stranded conductor is left free and the other wires are fully inserted into and clamped in the terminal. The free wire is bent, without tearing the insulation back, in every possible direction, but without making sharp bends round barriers.                                                                  |                             |         |
|            | The free wire of a conductor connected to a live terminal shall neither touch any metal part, which is not a live part, nor emerge from the enclosure, and that of a conductor connected to the earthing terminal shall not touch any live part.                                                                                                                                                                                          |                             | P       |
| 14         | Interlocks                                                                                                                                                                                                                                                                                                                                                                                                                                |                             | ---     |
|            | Accessories rated "Not for current interruption" shall be provided with a control pilot contact.                                                                                                                                                                                                                                                                                                                                          |                             | P       |
| 15         | Resistance to ageing of rubber and thermoplastic material                                                                                                                                                                                                                                                                                                                                                                                 |                             | ---     |
|            | Accessories with enclosures of rubber or thermoplastic material, and parts of elastomeric such as sealing rings and gaskets, shall be sufficiently resistant to ageing.                                                                                                                                                                                                                                                                   |                             | P       |
|            | The samples are suspended freely in a heating cabinet, ventilated by natural circulation. The temperature in the cabinet and the duration of the ageing test are:                                                                                                                                                                                                                                                                         |                             | P       |
|            | (70 ± 2) °C and 10 days (240 h), for rubber;                                                                                                                                                                                                                                                                                                                                                                                              | 70 °C and 10 days (240 h)   | P       |
|            | (80 ± 2) °C and 7 days (168 h), for thermoplastic material.                                                                                                                                                                                                                                                                                                                                                                               | 80°C and 7 days (168 h)     | P       |
|            | After the samples have been allowed to attain approximately room temperature, they shall be examined and show no crack visible to the naked eye, nor shall the material have become sticky or greasy.                                                                                                                                                                                                                                     |                             | P       |
|            | After the test, the samples shall show no damage which would lead to non-compliance with this standard. If there is a doubt as to whether the material has become sticky, the sample is placed on one of the pans of a balance and the other pan is loaded with a mass equal to the mass of the sample plus 500 g. Equilibrium is then restored by pressing the sample with the forefinger, wrapped in a dry piece of coarse woven cloth. |                             | P       |
|            | No trace of the cloth shall remain on the sample and the material of the sample shall not stick to the cloth.                                                                                                                                                                                                                                                                                                                             |                             | P       |
| 16         | General construction                                                                                                                                                                                                                                                                                                                                                                                                                      |                             | ---     |
| 16.1       | Accessible surfaces of accessories shall be free                                                                                                                                                                                                                                                                                                                                                                                          | be free from burrs, flashes | P       |



| EN 62196-1 |                                                                                                                                                                                                                                                                                                           |                         |         |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                        | Result - Remark         | Verdict |
|            | from burrs, flashes and similar sharp edges.                                                                                                                                                                                                                                                              | and similar sharp edges |         |
| 16.2       | Screws or other means for fixing the part carrying the socket-outlet contacts or the part carrying the plug contacts to its mounting surface, in a box or in an enclosure, shall be easily accessible.                                                                                                    |                         | P       |
|            | These fixings and those which fix the enclosure shall not serve any other purpose except in the case whereby an internal earthing connection is established automatically and in a reliable way by such a fixing.                                                                                         |                         | P       |
| 16.3       | It shall not be possible for the user to alter the position of the earthing contact, or of the neutral contact, if any, in relation to the means of non-interchangeability of the socket-outlet or vehicle connector, or in relation to the means of non-interchangeability of the plug or vehicle inlet. |                         | P       |
| 16.4       | Socket-outlets and vehicle connectors when mounted as in normal use and without a plug in position shall ensure the degree of protection specified on its marking.                                                                                                                                        |                         | P       |
|            | In addition, when a plug or vehicle inlet is fully engaged with the socket-outlet or vehicle connector, the lower degree of protection of the two accessories shall be ensured.                                                                                                                           |                         | P       |
| 16.5       | The maximum permissible temperature of those parts of the plug and the vehicle connector that can be grasped during normal operation, when tested with the accessory carrying the maximum rated current, shall not exceed:                                                                                |                         | P       |
|            | –50 °C for metal parts;                                                                                                                                                                                                                                                                                   | –50 °C                  | P       |
|            | –60 °C for non-metal parts.                                                                                                                                                                                                                                                                               | –60 °C                  | P       |
|            | For parts which may be touched but not grasped the permissible temperature are:                                                                                                                                                                                                                           |                         | P       |
|            | –60 °C for metal parts;                                                                                                                                                                                                                                                                                   | –60 °C                  | P       |
|            | –85 °C for non-metal parts.                                                                                                                                                                                                                                                                               | –85 °C                  | P       |
| 16.6       | Contacts shall be so designed as to ensure adequate contact pressure when completely engaged with the corresponding accessory. Contacts of vehicle connectors and socket-outlets shall be self-adjusting to ensure adequate contact pressure.                                                             |                         | P       |
| 16.7       | The pressure exerted between the socket and plug contacts or the vehicle connector and vehicle inlet shall not be so great as to make insertion and withdrawal of the plug or vehicle connector difficult.                                                                                                |                         | P       |
| 16.8       | A latching mechanism shall be provided on mating accessories. The latching mechanism shall                                                                                                                                                                                                                |                         | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                            |                 |         |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                         | Result - Remark | Verdict |
|            | prevent the plug or vehicle connector from working out of the socket-outlet or vehicle inlet, respectively, in normal use.                                                                                                                                                                 |                 |         |
| 16.9       | With the latching mechanism in place, the mating accessory shall be pulled with a force equal to the weight of the accessory and a length of the maximum size cable or cable assembly used with the accessory, as specified in Table 9. The latch shall not release.                       |                 | P       |
| 16.1       | Rewireable accessories shall be so constructed as to permit:                                                                                                                                                                                                                               |                 | P       |
|            | –the conductors to be easily introduced into the terminals and secured therein;                                                                                                                                                                                                            |                 | P       |
|            | –the correct positioning of the conductors, without their insulation coming into contact with live parts of a polarity different from that of the conductor; or without reducing the creepage distances and clearances below the values in 28.1;                                           |                 | P       |
|            | –the covers or enclosures to be easily removable for inspection and easily fixed after connection of the conductors.                                                                                                                                                                       |                 | P       |
| 16.11      | Field serviceable accessories shall be so designed and constructed to discourage user servicing, rewiring or accessing live parts by non-qualified personnel. This can be accomplished through one or more of the following means:                                                         |                 | P       |
|            | –Necessity of the use of speciality tools (i.e. – crimping tool, soldering equipment,)                                                                                                                                                                                                     |                 | P       |
|            | –Necessity of replacing individual parts of the accessory (i.e. – replacement of terminals, pins,)                                                                                                                                                                                         |                 | P       |
|            | –Necessity to break seals to disassemble the accessory.                                                                                                                                                                                                                                    |                 | P       |
| 16.12      | Enclosures and parts of accessories providing protection against electric shock shall have adequate mechanical strength; they shall be securely fixed in such a way that they will not work loose in normal use. It shall not be possible to remove these parts without the aid of a tool. |                 | P       |
| 16.13      | Cable entries shall allow the introduction of the conduit or the protective covering of the cable to afford complete mechanical protection.                                                                                                                                                |                 | P       |
| 16.14      | Insulating linings, barriers and the like shall have adequate mechanical strength. They shall be secured to the enclosure or body in such a way that they cannot be removed without being seriously damaged, or be so designed that they cannot be replaced in an incorrect position.      |                 | P       |
| 16.15      | The force to insert and withdraw a plug or a vehicle connector shall be less than 80 N. The                                                                                                                                                                                                | 80 N            | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 |         |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Result - Remark | Verdict |
|            | movement of either of these accessories need not necessarily be a single linear movement. The insertion and withdrawal force shall be applied as required by each stage of the insertion and withdrawal movement. The manufacturer shall state the position and direction at which this force(s) shall be applied.                                                                                                                                                                  |                 |         |
|            | The fixed accessory (the socket-outlet or vehicle inlet) shall be mounted such that the mating accessory moves vertically downward into it during the first stage of insertion. A principal weight of 7,2 kg is suitable suspended from the matching accessory. A supplementary weight of 0,8 kg is allowed to fall from a height of 5 cm onto the principal weight. The moving accessory shall enter the fixed accessory to the position required to engage the contacts properly. | 7,2 kg          | P       |
|            | The operation is then repeated for any subsequent movements.                                                                                                                                                                                                                                                                                                                                                                                                                        |                 | P       |
|            | The test is repeated using a fixed weight of 2,0 kg and no supplementary weight. The moving accessory shall not become inserted in the fixed accessory to the extent specified by the manufacturer. These tests are carried out in reverse also to check the withdrawal force to determine that the contacts disengage properly.                                                                                                                                                    | 2,0 kg          | P       |
| 17         | Construction of socket-outlets                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 | ---     |
|            | When a plug is not engaged, socket-outlets shall be totally enclosed when fitted with screwed conduits, or sheathed cables. Polyvinyl chloride sheathed cables are not excluded. The means for achieving total enclosure and that for ensuring the marked degree of protection, if any, shall be securely fixed to the socket-outlet. In addition, when a plug is completely engaged, the socket-outlet shall incorporate means for ensuring the marked degree of protection.       |                 | P       |
|            | Lid springs, if any, shall be of corrosion-resistant material, such as bronze, stainless steel, or other suitable material adequately protected against corrosion.                                                                                                                                                                                                                                                                                                                  |                 | P       |
|            | IP44 socket-outlets, designed for only one mounting position, may have provision for opening a drain-hole at least 5 mm in diameter or 20 mm <sup>2</sup> in area with a width of at least 3 mm which is effective when the socket-outlet is in the mounting position.                                                                                                                                                                                                              | IP44            | P       |
| 18         | Construction of plugs and vehicle connectors                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 | ---     |
| 18.1       | The enclosure of plugs and vehicle connectors shall completely enclose the terminals and the ends of the flexible cable.                                                                                                                                                                                                                                                                                                                                                            |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                               |                 |         |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                            | Result - Remark | Verdict |
|            | The construction of rewirable plugs and vehicle connectors shall be such that the conductors can be properly connected and the cores kept in place so that there is no risk of contact between them from the point of separation of the cores to the terminals.                               |                 | P       |
|            | Accessories shall be so designed that they can only be reassembled so as to ensure the correct relationship between the components as originally assembled.                                                                                                                                   |                 | P       |
| 18.2       | The various parts of a plug or vehicle connector shall be reliably fixed to one another in such a way that they will not work loose in normal use. It shall not be possible to dismantle plugs or vehicle connectors without the aid of a tool.                                               |                 | N/A     |
| 18.3       | Plugs shall incorporate means for ensuring the marked degree of protection when in complete engagement with the complementary accessory.                                                                                                                                                      |                 | N/A     |
|            | Where there is an attached cap, which cannot be removed without the aid of a tool, then the plug shall also meet this requirement when that cap is correctly fitted.                                                                                                                          |                 | N/A     |
|            | It shall not be possible to dismantle these means without the aid of a tool.                                                                                                                                                                                                                  |                 | N/A     |
| 18.4       | Vehicle connectors shall be totally enclosed when fitted with a flexible cable as in normal use and when not in engagement with the vehicle inlet. In addition, they shall incorporate means for ensuring the marked degree of protection when in complete engagement with the vehicle inlet. |                 | P       |
|            | The means for ensuring the marked degree of protection shall be securely fixed to the vehicle connector.                                                                                                                                                                                      |                 | P       |
|            | Lid springs shall be of corrosion-resistant material, such as bronze, stainless steel or other suitable materials adequately protected against corrosion.                                                                                                                                     |                 | P       |
| 19         | Construction of vehicle inlets                                                                                                                                                                                                                                                                |                 | ---     |
| 19.1       | Vehicle inlets shall incorporate means for ensuring the marked degree of protection when an appropriate vehicle connector is completely engaged.                                                                                                                                              |                 | N/A     |
|            | The IP degree of protection of the vehicle inlet must be considered, assuming that any accessible parts that may be live when a vehicle connector is connected are not live when the vehicle connector is removed and may be touched by the test finger.                                      |                 | N/A     |
|            | Where there is an attached cap, which cannot be removed without the aid of a tool, then the vehicle                                                                                                                                                                                           |                 | N/A     |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                   |                 |         |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                | Result - Remark | Verdict |
|            | inlets shall also meet this requirement when that cap is correctly fitted.                                                                                                                                                                                                                                                                        |                 |         |
|            | It shall not be possible to dismantle these means without the aid of a tool.                                                                                                                                                                                                                                                                      |                 | N/A     |
| 19.2       | Vehicle inlets having rated operating voltage exceeding 50 V shall be provided with earthing contacts.                                                                                                                                                                                                                                            | AC 250V         | P       |
| 19.3       | IP44 vehicle inlets, designed for only one mounting position, may have provision for opening a drain-hole at least 5 mm in diameter or 20 mm <sup>2</sup> in area with a width of at least 3 mm which is effective when the socket-outlet is in the mounting position.                                                                            | IP44            | P       |
| 20         | Degrees of protection                                                                                                                                                                                                                                                                                                                             |                 | ---     |
| 20.1       | Accessories shall have the minimum degrees of protection of IP44. The vehicle inlet, in road position and in combination with the protection provided by the vehicle manufacturer, shall have the minimum degrees of protection of IP55.                                                                                                          | IP44            | P       |
|            | The tests are made on accessories fitted with the cables or conduits for which they are designed, screwed glands and fixing screws of enclosures and covers being tightened with a torque equal to two-thirds of that applied in the tests of 26.5 or 27.1, as appropriate.                                                                       |                 | P       |
|            | Screwed caps or lids, if any, are tightened as in normal use.                                                                                                                                                                                                                                                                                     |                 | N/A     |
|            | Socket-outlets are mounted on a vertical surface so that the open drain-hole, if any, is in the lowest position and remains open.                                                                                                                                                                                                                 |                 | P       |
|            | Vehicle inlets are mounted in position as intended in the vehicle. Tests shall be conducted with any doors, access panels, covers, etc. provided by the vehicle both in the unmated, open, and closed (in the road position) positions. Vehicle connectors are placed in the most unfavourable position and the drain-hole, if any, remains open. |                 | P       |
|            | Socket-outlets and vehicle connectors are tested with and without the complementary accessory in engagement, the means for ensuring the required degree of protection against moisture being positioned as in normal use.                                                                                                                         |                 | P       |
|            | Plugs and vehicle inlets are tested as described in 18.3 or 19.1.                                                                                                                                                                                                                                                                                 |                 | P       |
| 20.2       | Accessories shall be tested in accordance with 20.1 and IEC 60529. When the first characteristic numeral is 5, category 2 shall apply.                                                                                                                                                                                                            |                 | N/A     |
|            | Immediately after the tests the samples, while still mounted in the test position, shall withstand the                                                                                                                                                                                                                                            |                 | N/A     |

| EN 62196-1 |                                                                                                                                                                                                                                                                                            |                                                |         |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                         | Result - Remark                                | Verdict |
|            | dielectric strength test specified in 21.3, and inspection shall show that water has not entered the samples to any appreciable extent and has not reached live parts.                                                                                                                     |                                                |         |
| 20.3       | All accessories shall be proof against humid conditions which may occur in normal use.                                                                                                                                                                                                     | 所有配件都应能抵御正常使用中可能出现的潮湿条件。                       | P       |
|            | Covers, which can be removed without the aid of a tool, are removed and subjected to the humidity treatment with the main part; spring lids are open during this treatment.                                                                                                                | 无需工具即可拆下的盖子，将其拆下并与主要部件一起进行防潮处理；在此治疗期间，弹簧盖是打开的。 | N/A     |
|            | The humidity treatment is carried out in a humidity cabinet containing air with a relative humidity maintained between 91 % and 95 %. The temperature of the air, at all places where samples can be located, is maintained within 1 °C of any convenient value T between 20 °C and 30 °C. | 93 %, 23 °C                                    | P       |
|            | Before being placed in the humidity cabinet, the samples are brought to a temperature between T and T + 4 °C.                                                                                                                                                                              |                                                | P       |
|            | The samples are kept in the cabinet for 7 days (168 h).                                                                                                                                                                                                                                    | 7 days (168 h).                                | P       |
|            | After this treatment, the samples shall show no damage within the meaning of this standard.                                                                                                                                                                                                |                                                | P       |
| 21         | Insulation resistance and dielectric strength                                                                                                                                                                                                                                              | SEE TABLE Electric strength                    | ---     |
| 21.1       | The insulation resistance and the dielectric strength of accessories shall be adequate.                                                                                                                                                                                                    |                                                | P       |
|            | Accessories with enclosures of thermoplastic material are subjected to the additional test of 21.4.                                                                                                                                                                                        |                                                | P       |
| 21.2       | The insulation resistance is measured with a d.c. voltage of approximately 500 V applied, the measurement being made 1 min after application of the voltage.                                                                                                                               | 500 V, 1 min                                   | P       |
|            | The insulation resistance shall be not less than 5 MS.                                                                                                                                                                                                                                     |                                                | P       |
| 21.2.1     | For socket-outlets and vehicle connectors, the insulation resistance is measured consecutively:                                                                                                                                                                                            |                                                | P       |
|            | a) between all poles connected together and the body, the measurement being made with and also without a plug or vehicle inlet engaged;                                                                                                                                                    |                                                | P       |
|            | b) between each pole in turn and all others, these being connected to the body, with a plug or vehicle inlet engaged;                                                                                                                                                                      |                                                | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                   |                 |         |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                | Result - Remark | Verdict |
|            | c) between any metal enclosure and metal foil in contact with the inner surface of its insulating lining, if any, a gap of approximately 4 mm being left between the metal foil and the edge of the lining.                                                                                                       |                 | P       |
| 21.2.2     | For plugs and vehicle inlets, the insulation resistance is measured consecutively:                                                                                                                                                                                                                                |                 | P       |
|            | a) between all poles connected together and the body;                                                                                                                                                                                                                                                             |                 | P       |
|            | b) between each pole in turn and all others, these being connected to the body;                                                                                                                                                                                                                                   |                 | P       |
|            | c) between any metal enclosure and metal foil in contact with the inner surface of its insulating lining, if any, a gap of approximately 4 mm being left between the metal foil and the edge of the lining.                                                                                                       |                 | P       |
| 21.3       | A test voltage of substantially sine-wave form, having a frequency of 50 Hz/60 Hz and the value shown in Table 10, is applied for 1 min between the parts indicated in 21.2.1 and 21.2.2.                                                                                                                         |                 | P       |
|            | This value is increased to 2 500 V for metal enclosures lined with insulating material.                                                                                                                                                                                                                           | 2 500 V         | P       |
|            | Initially, no more than half the prescribed voltage is applied, and then it is raised rapidly to the full value.                                                                                                                                                                                                  |                 | P       |
|            | No flashover or breakdown shall occur during the test.                                                                                                                                                                                                                                                            |                 | P       |
| 21.4       | Immediately after the test of 21.3, it shall be verified that for accessories with enclosures of thermoplastic material, the means of providing non-interchangeability have not been impaired.                                                                                                                    |                 | P       |
| 22         | Breaking capacity                                                                                                                                                                                                                                                                                                 |                 | ---     |
| 22.1       | Accessories intended for current interruption (making and breaking under load) shall have adequate breaking capacity.                                                                                                                                                                                             |                 | N/A     |
| 22.2       | The test position shall be horizontal or, if not possible, as in normal use.                                                                                                                                                                                                                                      |                 | N/A     |
|            | The plug or vehicle connector is inserted into and withdrawn from the socket-outlet or vehicle inlet at a rate of 7,5 strokes per minute, or at the rate recommended by the manufacturer, whichever is less. The speed of insertion and separation of the plug or vehicle connector shall be $(0,8 \pm 0,1)$ m/s. |                 | N/A     |
|            | The measurement of speed is made by recording the interval of time between insertion or separation of the main contacts and the insertion or separation of the earthing contact, relative to the distance.                                                                                                        |                 | N/A     |



| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |         |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Result - Remark | Verdict |
|            | Electrical contacts shall be maintained for no more than 4 s and no less than 2 s.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 | N/A     |
|            | The movement(s) of a plug or vehicle connector during insertion into the mating accessory may be more complex than a single linear movement. At the manufacturer's option, the test may be made with the insertion and withdrawal made manually or by machine. The movement may be limited to provide adequate separation of the mating contacts.                                                                                                                                                                                                                                                         |                 | N/A     |
|            | The number of cycles is specified in Table 11. A stroke is an insertion or a withdrawal of a plug or vehicle connector with its mating accessory. A cycle is composed of two strokes, one for insertion and one for withdrawal.                                                                                                                                                                                                                                                                                                                                                                           |                 | N/A     |
|            | Accessories are tested as defined in Table 11.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 | N/A     |
|            | For accessories rated for both a.c. and d.c. operation, a new set of accessories shall be tested on each circuit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 | N/A     |
|            | The test is made using the connections shown in Figure 3 except that for accessories having a rated voltage of 380 V – 415 V, the metal support is permanently connected to the neutral. In all other cases, for two-pole accessories, the selector switch C connecting the metal support and the accessible metal parts to one of the poles of the supply, is operated after half the number of strokes. For three-pole accessories, the selector switch C is operated after one-third of the number of strokes and again after two-thirds of the number of strokes, so as to connect each pole in turn. |                 | N/A     |
|            | Resistors and inductors are not connected in parallel, except that, if an air-core inductor is used, a resistor taking approximately 1 % of the current through the inductor is connected in parallel with it. Iron-core inductors may be used, provided the current has substantially sine-wave form. For the tests on three-pole accessories, three-core inductors are used.                                                                                                                                                                                                                            |                 | N/A     |
|            | After the test, the samples shall show no damage impairing their further use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 | N/A     |
| 22.3       | An accessory rated 250 A a.c. or 400 A d.c. shall have sufficient breaking capacity to interrupt the circuit in case of a fault, without any indication of a fire or shock hazard. The accessory need not remain functional after the completion of the test. It shall not be used for any further tests.                                                                                                                                                                                                                                                                                                 |                 | N/A     |
|            | Following the test, the accessories shall comply with a dielectric test in accordance with 21.3, with voltage applied between the parts as indicated in                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 | N/A     |



| EN 62196-1 |                                                                                                                                                                                                                                                                                                            |                 |         |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                         | Result - Remark | Verdict |
|            | 21.2.1 b) or 21.2.2 b), as applicable.                                                                                                                                                                                                                                                                     |                 |         |
| 23         | Normal operation                                                                                                                                                                                                                                                                                           |                 | ---     |
| 23.1       | Accessories shall withstand, without excessive wear or other harmful effect, the mechanical, electrical and thermal stresses occurring in normal use.                                                                                                                                                      |                 | P       |
|            | This test is carried out by the same means as in Clause 22 used in the manner indicated and in the test position as specified in Clause 22.                                                                                                                                                                |                 | P       |
|            | The test is made using the connections indicated in Clause 22, the selector switch C being operated as prescribed in that clause.                                                                                                                                                                          |                 | P       |
|            | The samples are tested at maximum rated operating voltage and rated current.                                                                                                                                                                                                                               |                 | P       |
|            | Accessories are tested for the number of cycles of operation specified and as defined in Table 12, where a cycle is composed of two strokes, one for insertion and one for withdrawal.                                                                                                                     |                 | P       |
|            | Accessories are tested with a.c. in a circuit with $\cos \phi$ as specified in Table 12.                                                                                                                                                                                                                   |                 | P       |
| 23.2       | For accessories rated for both a.c. and d.c. operation, a separate set of accessories shall be tested on each circuit.                                                                                                                                                                                     | a.c             | P       |
| 23.3       | During the test, no sustained arcing shall occur.                                                                                                                                                                                                                                                          |                 | P       |
|            | After the test, the samples shall show:                                                                                                                                                                                                                                                                    |                 | P       |
|            | —no wear impairing the further use of the accessory or of its interlock, if any;                                                                                                                                                                                                                           |                 | P       |
|            | —no deterioration of enclosures or barriers;                                                                                                                                                                                                                                                               |                 | P       |
|            | —no damage to the entry holes for the plug contacts that might impair proper working;                                                                                                                                                                                                                      |                 | P       |
|            | —no loosening of electrical or mechanical connections;                                                                                                                                                                                                                                                     |                 | P       |
|            | —no seepage of sealing compound;                                                                                                                                                                                                                                                                           |                 | P       |
|            | —the continuity between mating signal and pilot contacts are maintained.                                                                                                                                                                                                                                   |                 | P       |
|            | The samples shall then withstand a dielectric strength test made in accordance with 21.3, the test voltage, however, being decreased by 500 V.                                                                                                                                                             | 500 V           | P       |
| 23.4       | Lid springs or other devices which are not automatically operated during the normal operation test, if any, are tested separately by completely opening and closing the part, the number of times the part is opened being the same as the maximum number of insertions of the plug specified in Table 12. |                 | N/A     |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                        |                                          |         |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                     | Result - Remark                          | Verdict |
| 24         | Temperature rise                                                                                                                                                                                                                                                                                                                                                       |                                          | ---     |
| 24.1       | Accessories shall be so constructed that the temperature rise in normal use is not excessive.                                                                                                                                                                                                                                                                          | SEE TABLE: temperature rise measurements | P       |
|            | Unless a dedicated cable is provided as specified by the manufacturer, rewireable accessories are fitted with conductors of a cross-sectional area as specified in Table 13, the terminal screws or nuts being tightened with a torque specified on the product or in the instruction sheets by the manufacturer or equal to two-thirds of that specified in Table 18. |                                          | P       |
|            | For the purpose of this test, a length of at least 2 m of the cable shall be connected to the terminals.                                                                                                                                                                                                                                                               |                                          | P       |
|            | Non-rewireable accessories are tested as delivered.                                                                                                                                                                                                                                                                                                                    |                                          | P       |
|            | For accessories having three or more poles per circuit, for multiphase circuits, the test current during the test shall be passed through the phase contacts. If there is a neutral contact, a separate test shall be carried out passing the test current through the neutral contact and the nearest phase contact.                                                  |                                          | P       |
|            | A current of 2 A shall be passed through the pilot contact and clean data (signal) earth, if any, at the same time as any of these tests.                                                                                                                                                                                                                              |                                          | N/A     |
|            | The test shall be continued until thermal stabilisation is reached.                                                                                                                                                                                                                                                                                                    |                                          | P       |
|            | The temperature is determined by means such as melting particles, colour-changing indicators, or thermocouples, which are so chosen and positioned that they have negligible effect on the temperature being determined.                                                                                                                                               |                                          | P       |
|            | The temperature rise of terminals shall not exceed 50 K.                                                                                                                                                                                                                                                                                                               |                                          | P       |
| 24.2       | Accessories shall be so constructed that the surface temperatures in normal use are not excessive, as indicated in 16.5.                                                                                                                                                                                                                                               |                                          | P       |
| 25         | Flexible cables and their connection                                                                                                                                                                                                                                                                                                                                   |                                          | ---     |
| 25.1       | Plugs and vehicle connectors shall be so designed that the conductors are relieved from strain, including twisting, where they are connected to the terminals or terminations, and that their covering is protected from abrasion.                                                                                                                                     |                                          | P       |
|            | The construction shall ensure that the cable cannot touch accessible metal parts or internal metal parts, for example cable anchorage screws, if these are electrically connected to accessible metal parts, unless the accessible metal parts are                                                                                                                     |                                          | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                 |                 |         |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                              | Result - Remark | Verdict |
|            | connected to the internal earth terminal.                                                                                                                                                                                                                                                                                                                                       |                 |         |
| 25.2       | Requirements for plugs and vehicle connectors                                                                                                                                                                                                                                                                                                                                   |                 | P       |
| 25.2.1     | Non-rewireable plugs and vehicle connectors<br>Accessories shall be provided with a suitable flexible cable appropriate for the rating of the accessory and as specified by the manufacturer.                                                                                                                                                                                   |                 | P       |
|            | Non-rewireable plugs and vehicle connectors shall be tested as a cable assembly.                                                                                                                                                                                                                                                                                                |                 | P       |
| 25.2.2     | Rewireable plugs and vehicle connectors                                                                                                                                                                                                                                                                                                                                         |                 | N/A     |
|            | Rewireable accessories shall be provided with a strain relief means designed to prevent the twisting of the cable that may occur. If any one of the components is not in position in the accessory as provided, an instruction sheet shall be provided to identify the necessary parts, the method of assembly and the maximum and minimum size cable for which it is suitable. |                 | N/A     |
|            | The design of the cable anchorage shall be such that the anchorage or components are properly positioned relative to the accessory when assembled.                                                                                                                                                                                                                              |                 | N/A     |
|            | Cable anchorages shall present no sharp edges to the cable and shall be so designed that the anchorages or their components are not likely to be lost when the enclosure of the accessory and not the cable anchorage is being opened.                                                                                                                                          |                 | N/A     |
|            | Makeshift methods, such as tying the cable into a knot or tying the ends with string, shall not be used.                                                                                                                                                                                                                                                                        |                 | N/A     |
|            | Cable anchorages and cable inlets shall be suitable for the different types of flexible cable that may be connected.                                                                                                                                                                                                                                                            |                 | N/A     |
|            | If a cable entrance is provided with a sleeve to prevent damage to the cable, this sleeve shall be of insulating material and shall be smooth and free from burrs.                                                                                                                                                                                                              |                 | N/A     |
|            | If a bell-mouthed opening is provided, the diameter at the end shall be at least 1,5 times the diameter of the cable with the largest cross-sectional area to be connected.                                                                                                                                                                                                     |                 | N/A     |
|            | Helical metal springs, whether bare or covered with insulating material, are not allowed as cable sleeves.                                                                                                                                                                                                                                                                      |                 | N/A     |
| 25.3       | Plugs and vehicle connectors provided with a flexible cable are subjected to a pull test in apparatus similar to that shown in Figure 4, followed by a torque test.                                                                                                                                                                                                             |                 | P       |
|            | Non-rewireable accessories are tested as                                                                                                                                                                                                                                                                                                                                        |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                      |                 |         |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                   | Result - Remark | Verdict |
|            | delivered.                                                                                                                                                                                                                                                                                                                           |                 |         |
|            | Rewireable accessories are tested with the maximum and minimum size cables recommended by the manufacturer.                                                                                                                                                                                                                          |                 | N/A     |
|            | Conductors of the cable of rewireable accessories are introduced into the terminals, the terminal screws being tightened just sufficiently to prevent the conductors from easily changing their position.                                                                                                                            |                 | N/A     |
|            | The cable anchorage is used in the normal way, clamping screws being tightened with a torque equal to two-thirds of that specified in 27.1. After reassembly of the sample, with cable                                                                                                                                               |                 | N/A     |
|            | The sample is fixed in the test apparatus so that the axis of the cable is vertical where it enters the sample.                                                                                                                                                                                                                      |                 | N/A     |
|            | The cable is then subjected 100 times to a pull of the value shown in the Table 14. Each pull is applied without jerks and has a duration of 1 s.                                                                                                                                                                                    |                 | P       |
|            | Immediately afterwards, the cable is subjected to a torque of the value shown in the Table 14 for 1 min.                                                                                                                                                                                                                             |                 | P       |
|            | During the tests, the cable shall not be damaged.                                                                                                                                                                                                                                                                                    |                 | P       |
|            | After the tests, the cable shall not have been displaced by more than the values indicated in Table 14. For rewireable accessories, the ends of the conductors shall not have moved noticeably in the terminals; for non-rewireable accessories, there shall be no break in the electrical connections.                              |                 | P       |
|            | For the measurement of the longitudinal displacement, a mark is made on the cable at a distance of approximately 2 cm from the end of the sample or the cable anchorage before starting the tests. If, for non-rewireable accessories, there is no definite end to the sample, an additional mark is made on the body of the sample. |                 | P       |
|            | After the tests, the displacement of the mark on the cable in relation to the sample or the cable anchorage is measured.                                                                                                                                                                                                             |                 | P       |
| 26         | Mechanical strength                                                                                                                                                                                                                                                                                                                  |                 | ---     |
| 26.1       | Accessories shall have adequate mechanical strength so as to withstand the stresses imposed during installation and use.                                                                                                                                                                                                             |                 | P       |
|            | Before starting the test of 26.2 or 26.3, accessories with enclosures of resilient or thermoplastic material are placed, with their bases or flexible cables, in a chamber at a temperature of $(-30 \pm 2) ^\circ\text{C}$ for at least 16 h; they are then                                                                         |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |         |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Result - Remark | Verdict |
|            | removed from the chamber and immediately subjected to the test of 26.2 or 26.3, as appropriate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |         |
| 26.2       | Accessories shall have adequate strength to maintain the integrity of the marked degree of protection after being subjected to impact blows occurring in normal use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 | P       |
| 26.2.1     | Blows shall be applied to the samples by swinging or dropping a 50.8 mm diameter steel sphere, weighing 0,535 kg, from a height (H), which will produce an impact as indicated in Table 15. The sample being tested shall be rigidly supported and the impact made normal to sample by means of the ball impact test apparatus. The ball impact test apparatus is shown in Figure 5.                                                                                                                                                                                                                                                                                                                                                                     |                 | P       |
|            | It is intended that blows applied to samples in these tests will not strike mounting flanges or male contacts of vehicle inlets. The ball impact test apparatus shall be adjusted to apply blows as they might occur in actual use and according to 26.2.2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 | P       |
| 26.2.2     | Five blows shall be applied to each test sample by means of the ball impact test apparatus.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 | P       |
|            | The first four blows are applied when the accessory is mounted as in normal use on a vertical board. The ball pendulum shall be mounted so that it swings parallel to that board. The impact face of the ball pendulum shall be arranged such that when the ball pendulum hangs freely, the impact face just touches the side of the accessory. The point of contact shall be substantially at the geometric centre of the side face of the accessory, or the appropriate projections of that face. The ball pendulum is then raised, released and the blow applied. The accessory is then revolved 90° about an axis perpendicular to the mounting face and its relationship to the impact face corrected, if necessary. A second blow is then applied. |                 | P       |
|            | The same procedure is repeated for two successive rotations of 90°, with a total of 4 blows being applied.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | P       |
|            | The fifth blow is applied with the plane of the ball pendulum perpendicular to the plane of the mounting board such that the ball pendulum strikes the sample at its furthestmost projection from the mounting board.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 | P       |
|            | Each blow shall have an impact energy according to Table 15.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 | P       |
| 26.2.3     | Socket outlet and vehicle inlet samples shall each be fixed to a rigid mounting board as in normal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                  |                 |         |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                               | Result - Remark | Verdict |
|            | use, cable entries are left open and fixing screws of covers and enclosures are tightened with a torque equal to two-thirds of that specified in Table 18. Lids on socket outlets are left normally closed. Caps supplied with vehicle inlets will be installed. |                 |         |
|            | After the test, the samples shall show no damage within the meaning of this standard, in particular, no part shall have become detached or loosened.                                                                                                             |                 | P       |
|            | Accessories with a degree of protection IP44 and higher shall withstand the relevant test specified in Clause 20.                                                                                                                                                | IP44            | P       |
|            | Accessories with enclosures of thermoplastic material shall withstand the test of 21.4.                                                                                                                                                                          |                 | P       |
| 26.3       | Rewireable plugs and vehicle connectors are fitted with a small section (approximately 200 mm) of the lightest type of flexible cable of the smallest cross-sectional area recommended by the manufacturer.                                                      |                 | N/A     |
|            | Non-rewireable plugs and vehicle connectors are tested with a small section (approximately 200 mm) of the flexible cable as delivered.                                                                                                                           |                 | P       |
|            | Cable assemblies specified to be used with cable management systems are to be tested per 26.2                                                                                                                                                                    |                 | P       |
|            | The free end of the cable and an additional rope or other flexible means, etc, attached to the flexible cable, both having a total length of 2,25 m, is fixed to a wall at a height of 1 m above the floor, as shown in Figure 6.                                |                 | P       |
|            | The sample is held so that the cable is horizontal and then it is allowed to fall on to a concrete floor. This is done eight times, the cable being rotated through 45° at its fixing each time.                                                                 |                 | P       |
|            | After the test, the samples shall show no damage within the meaning of this standard; in particular, no part shall have become detached or loosened.                                                                                                             |                 | P       |
|            | Accessories with a degree of protection IP44 and higher shall withstand the relevant test specified in Clause 20.                                                                                                                                                | IP44            | P       |
|            | Accessories with enclosures of thermoplastic material shall withstand the test of 21.4.                                                                                                                                                                          |                 | P       |
| 26.4       | Non-rewireable accessories are subjected to a flexing test in an apparatus similar to that shown in Figure 7.                                                                                                                                                    |                 | P       |
|            | The sample is fixed to the oscillating member of the apparatus so that, when this is at the middle of its travel, the axis of the flexible cable, where it enters the sample, is vertical and passes through                                                     |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                        |                 |         |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                     | Result - Remark | Verdict |
|            | the axis of oscillation.                                                                                                                                                                                                                                                                                                                                               |                 |         |
|            | The oscillating member is so positioned that the flexible cable makes the minimum lateral movement when the oscillating member of the test apparatus is moved over its full travel.                                                                                                                                                                                    |                 | P       |
|            | The cable is loaded with a weight such that the force applied is as shown in the following Table 16.                                                                                                                                                                                                                                                                   |                 | P       |
|            | A current equal to the rated current of the accessory is passed through the conductors, the voltage between them being the rated voltage.                                                                                                                                                                                                                              |                 | P       |
|            | The oscillating member is moved backwards and forwards through an angle of 90° (45° on either side of the vertical), the number of flexings being 20 000 and the rate of flexing 60 per minute.                                                                                                                                                                        |                 | P       |
|            | After the test, the samples shall show no damage within the meaning of this standard.                                                                                                                                                                                                                                                                                  |                 | P       |
| 26.5       | Screwed glands are fitted with a cylindrical metal rod having a diameter, in millimetres, equal to the nearest whole number below the internal diameter of the packing, in millimetres. The glands are then tightened by means of a suitable spanner, the force shown in Table 17 being applied to the spanner for 1 min, at a point 25 cm from the axis of the gland. |                 | N/A     |
|            | After the test, the glands and the enclosures of the samples shall show no damage within the meaning of this standard.                                                                                                                                                                                                                                                 |                 | N/A     |
| 27         | Screws, current-carrying parts and connections                                                                                                                                                                                                                                                                                                                         |                 | ---     |
| 27.1       | Connections, electrical or otherwise, shall withstand the mechanical stresses occurring in normal use.                                                                                                                                                                                                                                                                 |                 | N/A     |
|            | Screws transmitting contact pressure and screws which are operated when connecting the accessory, and have a nominal diameter less than 3,5 mm, shall screw into a metal nut or metal insert.                                                                                                                                                                          |                 | N/A     |
|            | The screws or nuts are tightened and loosened:                                                                                                                                                                                                                                                                                                                         |                 | N/A     |
|            | –ten times for screws in engagement with a thread of insulating material;                                                                                                                                                                                                                                                                                              |                 | N/A     |
|            | –five times for nuts and other screws.                                                                                                                                                                                                                                                                                                                                 |                 | N/A     |
|            | Screws in engagement with a thread of insulating material are completely removed and reinserted each time.                                                                                                                                                                                                                                                             |                 | N/A     |
|            | This removal and insertion of the screws or nuts shall be carried out at such a rate that the thread in the insulating material suffers no appreciable                                                                                                                                                                                                                 |                 | N/A     |



| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |         |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Result - Remark | Verdict |
|            | temperature rise owing to friction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |         |
|            | When testing terminal screws and nuts, a copper conductor having the largest cross-sectional area in Table 7, rigid (solid or stranded) for socket-outlets and vehicle inlets and flexible for plugs and vehicle connectors, is placed in the terminal.                                                                                                                                                                                                                                                                                                                                                                                       |                 | N/A     |
|            | The test is made by means of a suitable screwdriver or spanner. The maximum torque applied when tightening is equal to that shown in Table 18 except that the torque is increased by 20 % for screws in engagement with a thread in a hole which is obtained by plunging, if the length of the extrusion exceeds 80 % of the original thickness of the metal.                                                                                                                                                                                                                                                                                 |                 | N/A     |
|            | When the manufacturer specifies, for terminal screws, a torque greater than values given in Table 18, this specified torque shall be applied for the test. 24,0 Up to and including 2,8 Over 2,8 up to and including 3,0 Over 3,0 up to and including 3,2 Over 3,2 up to and including 3,6 Over 3,6 up to and including 4,1 Over 4,1 up to and including 4,7 Over 4,7 up to and including 5,3 Over 5,3 up to and including 6,0 Over 6,0 up to and including 8,0 Over 8,0 up to and including 10,0 Over 10,0 up to and including 12,0 Over 12,0 up to and including 15,0 Over 15,0 up to and including 20,0 Over 20,0 up to and including 24,0 |                 | N/A     |
|            | Each time the clamping screw(s) or nut(s) is (are) loosened, a new conductor shall be used for a further connection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 | N/A     |
|            | When a screw has a hexagonal head with means for tightening with a screwdriver and the values in columns II and III are different, the test is made twice, first applying the torque specified in column III to the hexagonal head and then, on another set of samples, applying the torque specified in column II by means of a screwdriver. If the values in columns II and III are the same, only the test with the screwdriver is made.                                                                                                                                                                                                   |                 | N/A     |
|            | After the test for clamping screws or nuts, the clamping unit shall not have undergone changes that adversely affect its further use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 | N/A     |
|            | The shape of the blade of the test screwdriver shall suit the head of the screw to be tested.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 | N/A     |
|            | The screws and nuts shall not be tightened in jerks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 | N/A     |
| 27.2       | Screws in engagement with a thread of insulating material and which are operated when connecting up the accessory shall have a length of engagement of at least 3 mm plus one-third of the nominal screw diameter, or 8 mm, whichever                                                                                                                                                                                                                                                                                                                                                                                                         |                 | N/A     |



| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                 |                 |         |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                              | Result - Remark | Verdict |
|            | is the shorter.                                                                                                                                                                                                                                                                                                                                 |                 |         |
|            | Correct introduction of the screw into the threaded hole shall be ensured.                                                                                                                                                                                                                                                                      |                 | N/A     |
| 27.3       | Electrical connections shall be so designed that the contact pressure is not transmitted through insulating material other than ceramic, pure mica or other material with characteristics no less suitable, unless there is sufficient resiliency in the metallic parts to compensate for any shrinkage or yielding of the insulating material. |                 | N/A     |
| 27.4       | Screws and rivets, which serve as electrical as well as mechanical connections, shall be locked against loosening.                                                                                                                                                                                                                              |                 | N/A     |
|            | For rivets, a non-circular shank or an appropriate notch may be sufficient.                                                                                                                                                                                                                                                                     |                 | N/A     |
|            | Sealing compound, which softens on heating, provides satisfactory locking only for screw connections not subject to torsion in normal use.                                                                                                                                                                                                      |                 | N/A     |
| 27.5       | Current-carrying parts, other than terminals, shall be either of:                                                                                                                                                                                                                                                                               |                 | N/A     |
|            | –copper,                                                                                                                                                                                                                                                                                                                                        |                 | N/A     |
|            | –an alloy containing at least 50 % copper,                                                                                                                                                                                                                                                                                                      |                 | N/A     |
|            | –or other metal no less resistant to corrosion than copper and having mechanical properties no less suitable.                                                                                                                                                                                                                                   |                 | N/A     |
| 27.6       | Contacts, which are subjected to a sliding action in normal use, shall be of a metal resistant to corrosion. Springs ensuring the resiliency of contact tubes shall be of metal resistant to corrosion or be adequately protected against corrosion.                                                                                            |                 | N/A     |
| 28         | Creepage distances, clearances and distances                                                                                                                                                                                                                                                                                                    |                 | ---     |
| 28.1       | Creepage distances, clearances and distances:                                                                                                                                                                                                                                                                                                   |                 | P       |
|            | –between live parts of different polarity;                                                                                                                                                                                                                                                                                                      |                 | P       |
|            | –between live parts and:                                                                                                                                                                                                                                                                                                                        |                 | P       |
|            | •accessible metal parts;                                                                                                                                                                                                                                                                                                                        |                 | P       |
|            | •earthing contacts, fixing screws and similar devices;                                                                                                                                                                                                                                                                                          |                 | N/A     |
|            | •external assembly screws, other than screws which are on the engagement face of plugs and are isolated from the earthing contacts;                                                                                                                                                                                                             |                 | N/A     |
|            | •metal enclosures, if not lined with insulating material, including fittings for conduit or armoured cable;                                                                                                                                                                                                                                     |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |         |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Result - Remark | Verdict |
|            | •the surface on which the base of a socket-outlet is mounted;                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 | P       |
|            | •the bottom of any conductor recess in the base of a socket-outlet;                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | P       |
|            | –through sealing compound (as solid insulation)                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 | P       |
|            | •between live parts covered with at least 2,5 mm of sealing compound and the surface on which the base of a socket-outlet is mounted;                                                                                                                                                                                                                                                                                                                                                                             |                 | P       |
|            | •between live parts covered with at least 2 mm of sealing compound and the bottom of any conductor recess in the base of a socket-outlet                                                                                                                                                                                                                                                                                                                                                                          |                 | P       |
|            | shall be evaluated in accordance with IEC 60664-1 and IEC 60664-3, according to 28.4. The control pilot and signal circuits shall be treated as “accessible metal parts” for the purpose of this clause.                                                                                                                                                                                                                                                                                                          |                 | P       |
|            | For rewirable accessories, compliance is checked using samples fitted with conductors of the largest cross-sectional area specified in Table 6, and also without conductors. For non-rewirable accessories, compliance is checked using samples as delivered.                                                                                                                                                                                                                                                     |                 | P       |
|            | Socket-outlets and vehicle connectors are checked when in engagement with a plug and also without a plug.                                                                                                                                                                                                                                                                                                                                                                                                         |                 | P       |
|            | The surface on which the base of a socket-outlet is mounted includes any surface with which the base is in contact when the socket-outlet is installed. If the base is provided with a metal plate at the back, this plate is not regarded as the mounting surface.                                                                                                                                                                                                                                               |                 | P       |
| 28.2       | Sealing compound shall not protrude above the edge of the cavity in which it is contained.                                                                                                                                                                                                                                                                                                                                                                                                                        |                 | P       |
| 28.3       | Unless otherwise stated, the normal use environment for indoor use equipment is pollution degree 3 according to IEC 60664-1. For outdoor use equipment, pollution degree 4 is expected, unless protection is afforded by a suitable enclosure appropriate for the installation in which case a lower pollution degree can be achieved. The interior of equipment with enclosure types IP54 can be considered pollution degree 3. Hermetically sealed or encapsulated enclosures are considered pollution degree 1 |                 | P       |
|            | If other pollution degrees are needed, creepage and clearance distances have to be in accordance with IEC 60664-1. The comparative tracking index (CTI) value shall be evaluated in accordance with IEC 60112.                                                                                                                                                                                                                                                                                                    |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |         |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Result - Remark | Verdict |
| 28.4       | In conducting evaluations in accordance with IEC 60664-1 and IEC 60664-3, the guidelines noted in 28.4.1 to 28.4.8 shall be used:                                                                                                                                                                                                                                                                                                                                                                                                                 |                 | P       |
| 28.4.1     | All accessories shall be considered Over voltage Category II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 | P       |
| 28.4.2     | Pollution degree 2 may be considered to exist on a printed wiring board between adjacent conductive material which is covered by any coating, which provides an uninterrupted covering over at least one side, and the complete distance up to the other side of conductive material.                                                                                                                                                                                                                                                             |                 | P       |
| 28.4.3     | Pollution degree 1 may be achieved at a specific printed wiring board location by application of at least 0,8 mm thick layer of suitable silicone rubber or for a group of printed wiring boards through potting, without air bubbles, in epoxy or a suitable potting material.                                                                                                                                                                                                                                                                   |                 | P       |
| 28.4.4     | Evaluation of clearances, only, may be conducted in accordance with IEC 60664-1, Section 4, Tests and Measurements.                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | P       |
| 28.4.5     | Evaluation of clearances and creepage distances shall be conducted in accordance with IEC 60664-1, Section 3, Requirements and dimensioning rules, Clause 3.1, Dimensioning of clearances, and Clause 3.2, Dimensioning of creepage distances.                                                                                                                                                                                                                                                                                                    |                 | P       |
| 28.4.6     | Evaluation of permanent protective coatings applied to rigid printed board assemblies used to improve the insulation properties shall be conducted in accordance with IEC 60664-3.                                                                                                                                                                                                                                                                                                                                                                |                 | P       |
| 28.4.7     | The phase-to-ground rated system voltage used in the determination of clearances shall be the equipment rated supply voltage rounded to the next higher value (in the table for determining clearances for equipment) for all points on the supply side of an isolating transformer or the entire product if no isolating transformer is provided. The system voltage used in the evaluation of secondary circuitry may be interpolated with the interpolation continued across the table for rated impulse withstand voltage peak and clearance. |                 | P       |
| 28.4.8     | Determination of the dimensions of clearance and creepage distances shall be conducted in accordance with 4.2 of IEC 60664-1.                                                                                                                                                                                                                                                                                                                                                                                                                     |                 | P       |
| 29         | Resistance to heat, fire and tracking                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 | ---     |
| 29.1       | Accessories shall be sufficiently resistant to heat.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 | P       |
|            | Compliance is checked by the tests of 29.2 and 29.3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                          |                 |         |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                       | Result - Remark | Verdict |
| 29.2       | The samples are kept for 1 h in a heating cabinet at a temperature of $(110 \pm 5) ^\circ\text{C}$ .                                                                                                                                                     | 115℃ 的          | P       |
|            | They shall not undergo any change impairing their further use, and sealing compound shall not flow to such an extent that live parts are exposed.                                                                                                        |                 | P       |
|            | Marking shall still be easily legible.                                                                                                                                                                                                                   |                 | P       |
| 29.3       | Parts of insulating material are subjected to a ball-pressure test by means of the apparatus shown in Figure 8.                                                                                                                                          |                 | P       |
|            | The surface of the part to be tested is placed in the horizontal position and a steel ball of 5 mm diameter is pressed against this surface by a force of 20 N.                                                                                          | 20 N            | P       |
|            | The test is made in a heating cabinet at a temperature of:                                                                                                                                                                                               |                 | P       |
|            | $-(125 \pm 5) ^\circ\text{C}$ for parts supporting live parts of rewirable accessories;                                                                                                                                                                  | 130℃            | P       |
|            | $-(80 \pm 3) ^\circ\text{C}$ for other parts.                                                                                                                                                                                                            | 83 °C           | P       |
|            | After 1 h, the ball is removed and the diameter of the impression measured. For materials which show deformation, this diameter shall not exceed 2 mm.                                                                                                   |                 | P       |
| 29.4       | External parts of insulating material and insulating parts supporting live parts of accessories shall be resistant to abnormal heat and to fire.                                                                                                         |                 | P       |
|            | Compliance is checked by the glow-wire test given in IEC 60695-2-10, with the following specifications.                                                                                                                                                  |                 | P       |
|            | The test apparatus is shown in Figures 9 and 10.                                                                                                                                                                                                         |                 | P       |
|            | A piece of white pinewood board, approximately 10 mm thick and covered with a single layer of tissue paper, is positioned at a distance of $(200 \pm 5)$ mm below the place where the glow- wire is applied to the accessory.                            |                 | P       |
|            | The temperature of the tip of the glow-wire is: $(650 \pm 10) ^\circ\text{C}$ for parts of insulating material not necessary to retain current-carrying parts and parts of the earthing circuits in position, even though they are in contact with them. | 660℃            | P       |
|            | The accessories are stored for 24 h in an atmosphere having a temperature between $15 ^\circ\text{C}$ and $35 ^\circ\text{C}$ and a relative humidity between 45 % and 75 % before starting the test.                                                    | 25℃ , 65%       | P       |
|            | The tip of the glow-wire is applied to the following places:                                                                                                                                                                                             |                 | P       |
|            | —in the middle of one external part for each                                                                                                                                                                                                             |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                            |                 |         |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                         | Result - Remark | Verdict |
|            | material, with the exception of glands and sealing compounds;                                                                                                                                                                                                              |                 |         |
|            | –in the middle of an insulating contact-carrying part for each material.                                                                                                                                                                                                   |                 | P       |
|            | The tip is applied to flat surfaces and not to grooves, knockouts, narrow recesses or sharp edges and if possible not less than 9 mm from the edges of the accessories. The movement of the tip of the glow-wire into the accessory shall be mechanically limited to 7 mm. |                 | P       |
|            | The test is made on one specimen. In case of doubt regarding the results of the test, the test shall be repeated on two further specimens.                                                                                                                                 |                 | P       |
|            | The specimen is regarded as having passed the glow-wire test if:                                                                                                                                                                                                           |                 | P       |
|            | –there is no visible flame and no sustained glowing, or if                                                                                                                                                                                                                 |                 | P       |
|            | –flames or glowing of the specimen or of the surroundings extinguish within 30 s after removal of the glow-wire, and the surrounding parts have not burned away completely. There shall be no ignition of the tissue paper or scorching of the board.                      |                 | P       |
| 29.5       | Insulating parts supporting live parts shall be of material resistant to tracking.                                                                                                                                                                                         |                 | P       |
|            | Unless otherwise specified, parts of insulating material retaining live parts in position shall be of material resistant to tracking.                                                                                                                                      |                 | P       |
|            | For materials other than ceramic, compliance is checked by the following test on three specimens. The test is performed according to IEC 60112.                                                                                                                            |                 | P       |
|            | A flat surface of the part to be tested at least 15 mm – 15 mm and at least 3 mm thick is placed in the horizontal position on the apparatus.                                                                                                                              |                 | P       |
|            | The material under test shall pass at a proof tracking index of 175 V using test solution A with an interval between drops of 30 s ± 5 s.                                                                                                                                  |                 | P       |
|            | In case of doubt, the test is repeated on a new set of specimens, which shall then pass the test. The test is not made on accessories having rated operating voltages not exceeding 50 V.                                                                                  |                 | P       |
| 30         | Corrosion and resistance to rusting                                                                                                                                                                                                                                        |                 | ---     |
|            | Ferrous parts, including enclosures, shall be adequately protected against rusting.                                                                                                                                                                                        |                 | P       |
|            | For specific conditions and the provisions for these conditions, special consideration should be given to the product by the manufacturer with                                                                                                                             |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                       |                 |         |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                    | Result - Remark | Verdict |
|            | regard to resistance to corrosion.                                                                                                                                                                                                                                                                                                    |                 |         |
|            | All grease is removed from the parts to be tested, by immersion in ethyl acetone, acetone, methylethyl ketone or an equivalent degreasing agent for 10 min. The parts are then immersed for 10 min in a 10 % solution of ammonium chloride in water at a temperature of $(20 \pm 5) ^\circ\text{C}$ .                                 | 25°C            | P       |
|            | Without drying, but after shaking off any drops, the parts are placed for 10 min in a box containing air saturated with moisture at a temperature of $(20 \pm 5) ^\circ\text{C}$ .                                                                                                                                                    | 25°C            | P       |
|            | After the parts have been dried for 10 min in a heating cabinet at a temperature of $(100 \pm 5) ^\circ\text{C}$ , their surfaces shall show no signs of rust.                                                                                                                                                                        | 100°C           | P       |
|            | For small helical springs and the like, and for inaccessible parts exposed to abrasion, a layer of grease may provide sufficient protection against rusting. Such parts are subjected to the test only if there is doubt about the effectiveness of the grease film and the test is then made without previous removal of the grease. |                 | P       |
| 31         | Conditional short-circuit current withstand test                                                                                                                                                                                                                                                                                      |                 | ---     |
|            | Socket-outlets and mating plugs shall be submitted to the tests listed below:                                                                                                                                                                                                                                                         |                 | P       |
| 31.1       | Ratings and test conditions                                                                                                                                                                                                                                                                                                           |                 | P       |
|            | The test is applied to a new socket-outlet and mating plug mounted as in normal use and connected according to the indications of 30.2.                                                                                                                                                                                               |                 | P       |
|            | Different numbers of poles for the same rated current and the same construction are considered as representative of the type. Compliance is checked by testing each socket-outlet and mating plug with a new complementary socket-outlet and mating plug complying with this standard.                                                |                 | P       |
|            | The short-circuit protective device shall be a "gG" type fuse for general application complying with the requirements of IEC 60269-1 and IEC 60269-2 and having rating identical to those of the socket-outlets and mating plugs.                                                                                                     |                 | P       |
|            | In the case a fuse with a rated current equal to that of the socket-outlets and mating plugs being tested does not exist, a fuse having the next higher rated value shall be used.                                                                                                                                                    |                 | N/A     |
|            | Fuse technical data as well as its cut-off value shall be stated in the test report.                                                                                                                                                                                                                                                  |                 | N/A     |
|            | The fuse (F1) shall be installed between the supply source and the socket-outlets and mating plugs being tested.                                                                                                                                                                                                                      |                 | N/A     |

| EN 62196-1 |                                                                                                                                                                                                                                                         |                 |         |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                      | Result - Remark | Verdict |
|            | The minimum prospective short-circuit current withstand of 10 kA or of a higher value specified by the manufacturer shall be applied to a socket-outlet and mating plug and a complementary accessory in the connected position.                        |                 | N/A     |
|            | The test voltage shall be identical to the rated operating voltage of the socket-outlets and mating plugs tested.                                                                                                                                       |                 | N/A     |
|            | No power-factor value or time constant is specified for this test. The following tolerances shall be applied during the test:                                                                                                                           |                 | N/A     |
|            | –current: from 90 % to 110 %;                                                                                                                                                                                                                           |                 | N/A     |
|            | –voltage: from 100 % to 105 %;                                                                                                                                                                                                                          |                 | N/A     |
|            | –frequency: from 95 % to 105 %.                                                                                                                                                                                                                         |                 | N/A     |
| 31.2       | Test-circuit                                                                                                                                                                                                                                            |                 | P       |
|            | a)Figures 15, 16 and 17 give the diagrams of the circuit to be used for the test:                                                                                                                                                                       |                 | P       |
|            | –two-pole accessories on single-phase a.c. or d.c. (Figure 15);                                                                                                                                                                                         |                 | N/A     |
|            | –three-pole accessories on three-phase a.c. (Figure 16);                                                                                                                                                                                                |                 | P       |
|            | –four-pole accessories on three-phase four-wire a.c. (Figure 17).                                                                                                                                                                                       |                 | P       |
|            | b)The supply S feeds a circuit including resistors R1, reactors X and the accessories D under test.                                                                                                                                                     |                 | P       |
|            | In all cases, the supply shall have sufficient power to permit the verification of the characteristics given by the manufacturer.                                                                                                                       |                 | P       |
|            | c)In each test circuit (Figures 15, 16 and 17), the resistors and reactors are inserted between the supply source S and the equipment D under test. The position of the closing device A and the current sensing devices (I1, I2, I3) may be different. |                 | P       |
|            | There shall be one and only one point of the test circuit which is earthed; this may be the short-circuit link of the test circuit of the neutral point of the supply or any other convenient point.                                                    |                 | P       |
|            | d)All parts of the accessories normally earthed in service, including the earth contact and pilot contact, the enclosure or the screens, shall be insulated from earth and connected to a point as indicated in Figures 15, 16 and 17.                  |                 | P       |
|            | This connection shall comprise a fuse element F2 consisting of a copper wire 0,8 mm in diameter                                                                                                                                                         |                 | P       |

| EN 62196-1 |                                                                                                                                                                                                                                       |                 |         |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                    | Result - Remark | Verdict |
|            | and at least 50 mm long, or of a fuse element of 30/35 A for the detection of the fault current.                                                                                                                                      |                 |         |
|            | The connection of the accessories under test shall be made with copper wires having cross-sectional areas as indicated in Table 7, and lengths as short as possible, not exceeding 1 m on either side.                                |                 | P       |
| 31.3       | Calibration                                                                                                                                                                                                                           |                 | P       |
|            | The calibration of the test circuit is carried out by placing temporary connections B of negligible impedance as close as reasonably possible to the terminals provided for connecting the accessories under test.                    |                 | P       |
| 31.4       | Test procedure                                                                                                                                                                                                                        |                 | P       |
|            | Temporary connections B are replaced by the accessories under test. The circuit is closed on a value of the prospective current at least equal to the conditional short-circuit withstand current of the accessories under test.      |                 | P       |
| 31.5       | Behaviour of the equipment under test                                                                                                                                                                                                 |                 | P       |
|            | During the test, the accessories shall not endanger the operator nor damage the adjacent equipment.                                                                                                                                   |                 | P       |
|            | There shall be neither arcing nor flashover between poles, and no melting of the fault detection circuit fuse of the exposed conductive parts (F2).                                                                                   |                 | P       |
| 31.6       | Acceptance conditions                                                                                                                                                                                                                 |                 | P       |
|            | –The accessories shall remain mechanically operable.                                                                                                                                                                                  |                 | P       |
|            | –Contact welding, such as to prevent an opening operation using normal operating means, is not permitted.                                                                                                                             |                 | P       |
|            | –Immediately after the test, the accessories shall comply with a dielectric test in accordance with 19.3, with voltage applied between the parts as indicated in 19.2.1 b) or 19.2.2 b), as applicable. Electromagnetic compatibility | See EMC report  | P       |
| 32.1       | Immunity                                                                                                                                                                                                                              |                 | P       |
|            | The operation of accessories within the scope of this standard in normal use is not affected by electromagnetic disturbances.                                                                                                         | See EMC report  | P       |
| 32.2       | Emission                                                                                                                                                                                                                              |                 | P       |
|            | Accessories within the scope of this standard are intended for continuous use. In normal use, they do not generate electromagnetic disturbances.                                                                                      | See EMC report  | P       |



| EN 62196-1 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                            |         |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Result - Remark            | Verdict |
| 33         | Vehicle driveover                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                            | ---     |
| 33.1       | A plug or vehicle connector shall have adequate resistance to damage from being driven over by a vehicle, unless it is provided with a cable management system which prevents the accessory from being left on the ground.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                            | P       |
|            | Compliance is checked by the test mentioned in subclauses 33.2 and 33.3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                            | P       |
| 33.2       | Accessories wired with the minimum size cable of a type recommended by the manufacturer shall be placed on a concrete floor in any normal position of rest. A crushing force of $(5\,000 \pm 250)$ N shall be applied by a conventional automotive tire, P225/75R15 or an equivalent tire suitable for the load, mounted on a steel rim and inflated to a pressure of $(2,2 \pm 0,1)$ bar. The wheel is to be rolled over the vehicle connector or plug at a speed of $(8 \pm 2)$ km/h. The accessory is to be oriented in a natural resting position before applying the force in a different direction for each sample. The accessory under test shall be held or blocked in a fixed position so that it does not move substantially during the application of the applied force. In no case is the force to be applied to the projecting pins. | 5 150N , P225/75R15, 9km/h | P       |
|            | There shall be no severe cracking, breakage, or deformation to the extent that:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                            | P       |
|            | –live parts, other than exposed wiring terminals, or internal wiring are made accessible to contact by the standard test finger shown in Figure 2. See 10.1;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                            | P       |
|            | –the integrity of the enclosure is defeated so that acceptable mechanical or environmental (degree of) protection is not afforded to the internal parts of the accessory, or polarisation of the accessory is defeated;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                            | P       |
|            | –there is interference with the operation, function or installation of the accessory;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                            | P       |
|            | –the accessory does not provide adequate strain relief for the flexible cable;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                            | P       |
|            | –the creepage distances and clearances between live parts of opposite polarity, live parts and accessible dead or earthed metal are reduced below the values in 28.1;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                            | P       |
|            | –other evidence of damage that could increase the risk of fire or electric shock occurs;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                            | P       |
|            | –the accessory does not comply with a repeated dielectric test in accordance with 21.3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                            | P       |
| 33.3       | The procedure described in 33.2 is to be repeated                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 11 300N                    | P       |

| EN 62196-1 |                                                                                                                                                                                                |                 |         |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause     | Requirement - Test                                                                                                                                                                             | Result - Remark | Verdict |
|            | on additional samples, with an applied crushing force of $(11\ 000 \pm 550)$ N using a conventional automotive tire suitable for the load, and inflated to its rated pressure.                 |                 |         |
| 33.4       | As a result of the test in 33.3, the accessories shall either comply with 33.1 or be damaged or broken to the extent that the accessory is rendered unusable and will be removed from service. |                 | P       |

|                                                       |                                             |              |              |                |
|-------------------------------------------------------|---------------------------------------------|--------------|--------------|----------------|
| <b>1</b>                                              | <b>TABLE: temperature rise measurements</b> |              |              | <b>P</b>       |
|                                                       | Ambient (t1) (°C)                           | 24,5 °C      |              |                |
|                                                       | Ambient (t2) (°C)                           | 24,6 °C      |              |                |
|                                                       | Test condition                              | 230*0.9=207V | 230*1.1=253V |                |
| No.                                                   | Temperature rise dT of part/at:             | dT (K)       | dT (K)       | Limited dT (K) |
| 1                                                     | Power supply cord                           | 17,9         | 19,2         | 50             |
| 2                                                     | Inner wiring                                | 5            | 8.2          | 60             |
| 3                                                     | Primary connector                           | 9.1          | 11.3         | -              |
| 4                                                     | Internal wiring terminal                    | 7.2          | 10.4         | See clause 30  |
| 5                                                     | Outside                                     | 5,4          | 12.3         | 60             |
| 6                                                     | Plug holder                                 | 32.6         | 28.5         | 120            |
| Remarks: Thermocoupler method used for all positions. |                                             |              |              |                |

|                                         |                                                                        |        |                     |
|-----------------------------------------|------------------------------------------------------------------------|--------|---------------------|
| <b>2</b>                                | <b>TABLE: Leakage current</b>                                          |        | <b>P</b>            |
|                                         | Heating appliances: 1.15 x rated input..... :                          | --     | —                   |
|                                         | Motor-operated and combined appliances:<br>1.06 x rated voltage..... : | 253V~  | —                   |
| Leakage current between                 |                                                                        | I (mA) | Max. allowed I (mA) |
| DC input and accessible parts with foil |                                                                        | 0,08   | 0,75                |

|                                           |                                 |             |                       |
|-------------------------------------------|---------------------------------|-------------|-----------------------|
| <b>3</b>                                  | <b>TABLE: Electric strength</b> |             | <b>P</b>              |
| Test voltage applied between:             |                                 | Voltage (V) | Breakdown<br>(Yes/No) |
| Live parts and accessible parts with foil |                                 | 3000        | No                    |
| L to N                                    |                                 | 1250        | No                    |

|                    |                                      |                     |                              |                             |                       |          |
|--------------------|--------------------------------------|---------------------|------------------------------|-----------------------------|-----------------------|----------|
| <b>4</b>           | <b>TABLE: Transient overvoltages</b> |                     |                              |                             |                       | <b>N</b> |
| Clearance between: | CI (mm)                              | Required<br>CI (mm) | Rated impulse<br>voltage (V) | Impulse test<br>voltage (V) | Flashover<br>(Yes/No) |          |
|                    |                                      |                     |                              |                             |                       |          |

|                                      |                                                                           |        |                     |          |
|--------------------------------------|---------------------------------------------------------------------------|--------|---------------------|----------|
| <b>5</b>                             | <b>TABLE: Leakage current</b>                                             |        |                     | <b>P</b> |
|                                      | Single phase appliances: 1.06 x rated voltage.....:                       | 253V~  |                     | —        |
|                                      | Three phase appliances 1.06 x rated voltage divided by $\sqrt{3}$ :.....: | --     |                     | —        |
| Leakage current between              |                                                                           | I (mA) | Max. allowed I (mA) |          |
| input and accessible parts with foil |                                                                           | 0,06   | 0,25                |          |

|                        |                                                             |                    |                    |        |        |             |
|------------------------|-------------------------------------------------------------|--------------------|--------------------|--------|--------|-------------|
| <b>6</b>               | <b>TABLE: Abnormal operation, locked rotor/moving parts</b> |                    |                    |        |        | <b>P</b>    |
|                        | Test voltage (V).....:                                      | 253V~              |                    |        |        | —           |
|                        | Ambient, $t_1$ (°C).....:                                   | 25.6               |                    |        |        | —           |
|                        | Ambient, $t_2$ (°C).....:                                   | 25.7               |                    |        |        | —           |
| Temperature of winding |                                                             | $R_1$ ( $\Omega$ ) | $R_2$ ( $\Omega$ ) | dT (K) | T (°C) | Max. T (°C) |
| Winding of motor       |                                                             | 150                | 188                | 64     | 120    | 165         |

|                        |                                                    |                    |                    |        |        |             |
|------------------------|----------------------------------------------------|--------------------|--------------------|--------|--------|-------------|
| <b>7</b>               | <b>TABLE: Abnormal operation, running overload</b> |                    |                    |        |        | <b>P</b>    |
|                        | Test voltage (V).....:                             | 253V~              |                    |        |        | —           |
|                        | Ambient, $t_1$ (°C).....:                          | 25.6               |                    |        |        | —           |
|                        | Ambient, $t_2$ (°C).....:                          | 25.7               |                    |        |        | —           |
| Temperature of winding |                                                    | $R_1$ ( $\Omega$ ) | $R_2$ ( $\Omega$ ) | dT (K) | T (°C) | Max. T (°C) |
| Winding of motor       |                                                    | 150                | 196                | 72     | 120    | 165         |

|                 |                                               |            |                         |           |                       |          |
|-----------------|-----------------------------------------------|------------|-------------------------|-----------|-----------------------|----------|
| <b>8</b>        | <b>TABLE: components</b>                      |            |                         |           |                       | <b>P</b> |
| object/part No. | manufac-turer/tra demark                      | type/model | technical data          | stan-dard | mark(s) of conformity |          |
| Internal wire   | Wenzhou City Wen Tian Electronics Co., Ltd.   | 1015       | 300V, 80°C, 24AWG       | ---       | VDE                   |          |
| power cord      | ZHONGSHAN HE YI ELECTRICAL APPLIANCES FACTORY | 1015       | 600V;VW-1; 18AWG;105°C° | UL758     | UL                    |          |

| 9                                                                                                         | TABLE: CREEPAGE DISTANCE AND CLEARANCE THROUGH INSULATION MEASUREMENTS |  |                     |     |                             |     |            |     | P          |
|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|--|---------------------|-----|-----------------------------|-----|------------|-----|------------|
| creepage (cr) and clearance (cl) distance (mm):                                                           |                                                                        |  | Class II appliances |     | other appliances, Uworking: |     |            |     | remark     |
|                                                                                                           |                                                                        |  |                     |     | < 130 V                     |     | 130- 250 V |     | 250- 440 V |
|                                                                                                           |                                                                        |  | cr                  | cl  | cr                          | cl  | cr         | cl  |            |
| between live parts of different polarity:                                                                 |                                                                        |  | --                  | --  | --                          | --  | --         | --  | --         |
| - if protected Against deposition of dirt                                                                 |                                                                        |  | 1,0                 | 1,0 | 1,0                         | 1,0 | 2,0        | 2,0 | 2,0        |
| - if not protected Against deposition of dirt                                                             |                                                                        |  | 2,0                 | 1,5 | 2,0                         | 1,5 | 3,0        | 2,5 | 4,0        |
| - if lacquered or enamelled windings                                                                      |                                                                        |  | 1,0                 | 1,0 | 1,5                         | 1,5 | 2,0        | 2,0 | 3,0        |
| between live parts And other metal parts over basic insulation:                                           |                                                                        |  | --                  | --  | --                          | --  | --         | --  | --         |
| - if protected Against deposition of dirt:                                                                |                                                                        |  | --                  | --  | --                          | --  | --         | --  | --         |
| . if of ceramic material or pure mica And the like                                                        |                                                                        |  | 1,0                 | 1,0 | 1,0                         | 1,0 | 2,5        | 2,5 | --         |
| . if of other material                                                                                    |                                                                        |  | 1,5                 | 1,0 | 1,5                         | 1,0 | 3,0        | 2,5 | --         |
| - if not protected Against deposition of dirt                                                             |                                                                        |  | 2,0                 | 1,5 | 2,0                         | 1,5 | 4,0        | 3,0 | --         |
| - if the live parts Are lacquered or enamelled windings                                                   |                                                                        |  | 1,0                 | 1,0 | 1,5                         | 1,5 | 2,0        | 2,0 | --         |
| - At the end of tubular sheathed-type heating elements                                                    |                                                                        |  | --                  | --  | 1,0                         | 1,0 | 1,0        | 1,0 | --         |
| between live parts And other metal parts over reinforced insulation                                       |                                                                        |  | --                  | --  | --                          | --  | --         | --  | --         |
| - if the live parts Are lacquered or enamelled windings                                                   |                                                                        |  | --                  | --  | 6,0                         | 6,0 | 6,0        | 6,0 | --         |
| - for other live parts                                                                                    |                                                                        |  | --                  | --  | 8,0                         | 8,0 | 8,0        | 8,0 | --         |
| between metal parts separated by supplementary insulation                                                 |                                                                        |  | --                  | --  | 4,0                         | 4,0 | 4,0        | 4,0 | --         |
| between live parts in recesses in the mounting face of the Appliance And the surface to which it is fixed |                                                                        |  | 2,0                 | 2,0 | 6,0                         | 6,0 | 6,0        | 6,0 | --         |

| 10                | TABLE: Ball pressure |                     |                                 | P |
|-------------------|----------------------|---------------------|---------------------------------|---|
| Part              | Test temperature(°C) | Impression diameter | Allowed impression diameter(mm) |   |
| Inner wring       | 75                   | 0.8                 | 2.0                             |   |
| Primary connector | 125                  | 1.0                 | 2.0                             |   |

| 11                | TABLE: glow wire test |        | P |
|-------------------|-----------------------|--------|---|
| Part              | Test temperature(°C)  | Result |   |
| Inner wring       | 550                   | Pass   |   |
| Primary connector | 650                   | Pass   |   |

## Photo documentation

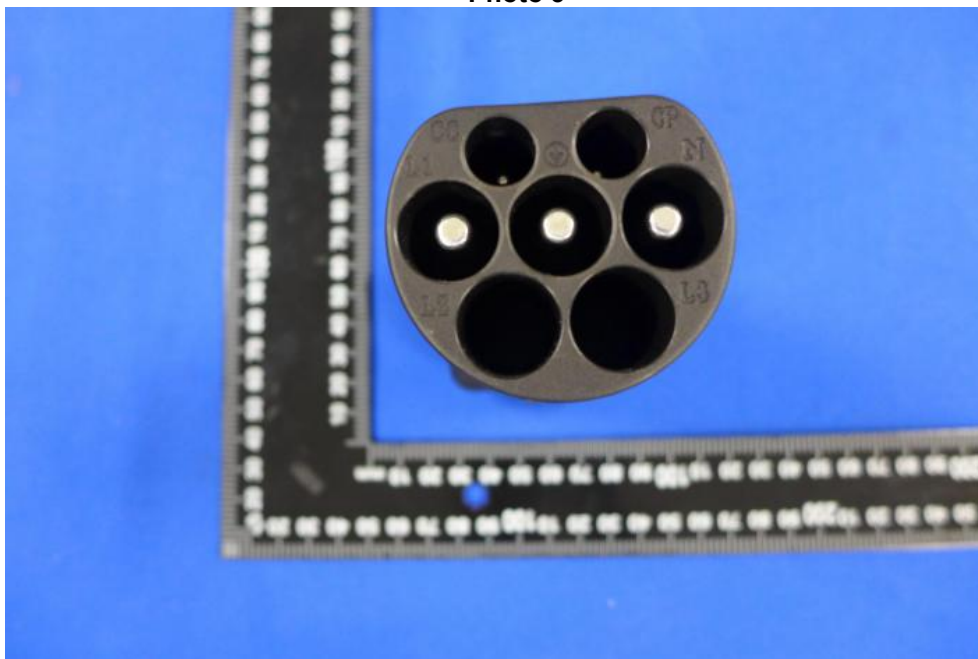
Photo 1



Photo 2



Photo 3



※※※※※ END OF REPORT ※※※※※