

STANDARD INFORMATION

This SUN establishes the Continuing Certification approach for UL 61010-2-201

Standard Number: UL 61010-2-201

Standard Name: Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use — Part 2-201: Particular Requirements for Control Equipment

Standard Edition and Issue Date: 2nd Edition Dated May 14, 2018

Date of Revision: May 14, 2018

Date of Previous Revision of Standard: February 20, 2017

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **No action is required for currently certified products to maintain certification.**

This SUN is being presented to assist users of the standard to appreciate the significance of the changes made to the standard that will apply should the product described be modified after January 1, 2020.

IMPACT, OVERVIEW, AND ACTION REQUIRED

Impact Statement: A review of all Listing Reports is necessary to determine which products comply with new/revise requirements and which products will require re-evaluation. **NOTE:** Effective immediately, this revised standard will be exclusively used for evaluation of new products unless the Applicant requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date noted above, unless the product is found to comply with new/revise requirements.

Overview of Changes:

- The temperature testing methodology has been changed
- Documentation methodologies allowed have been changed
- Terminal markings requirements have been changed

Specific details of new/revise requirements are found in table below.

If the applicable requirements noted in the table are not described in your report(s), these requirements will need to be confirmed as met and added to your report(s) such as markings, instructions, test results, etc. (as required).





Client Action Required:

Information – To assist our Engineer with review of your Listing Reports, please submit technical information in response to the new/revised paragraphs noted in the attached or explain why these new/revised requirements do not apply to your product (s).

Current Listings Not Active? – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records. We will do this at no charge as long as Intertek is notified in writing prior to the review of your reports.

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| CLAUSE | VERDICT | COMMENT |
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| | | Additions to existing requirements are underlined and deletions are shown lined out below. |
| 5 | Info | <p>Marking and documentation</p> <p><i>New clause added;</i></p> <p>TERMINALS</p> <p>Modification:</p> <p>Replace item a) as follows:</p> <p>a) FUNCTIONAL EARTH TERMINALS (i.e. used for non-safety purposes such as interference immunity improvement) shall be marked with one of the following symbols:</p> <p>5.1.5.2</p> <p> IEC 60417-5018 (2002-10) or</p> <p> symbol 5 of Part 1, IEC 60417-5017 (2006-08).</p> <p>Where a TERMINAL serves both as the PROTECTIVE CONDUCTOR TERMINAL and as A FUNCTIONAL EARTH TERMINAL, symbol 6 and other requirements for PROTECTIVE CONDUCTOR TERMINAL shall be applied. Where a TERMINAL serves both as an earth (bonding) TERMINAL and FUNCTIONAL EARTH TERMINAL, symbol 5 and other requirements for earth TERMINALS shall be applied.</p> |



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| | | <i>New clause added;</i> |
| | | FIELD WIRING TERMINAL boxes |
| 5.1.8 | | Addition after first paragraph: A FIELD WIRING TERMINAL need not be marked to indicate the temperature RATING if it is intended for the connection of a control circuit conductor only. A control circuit is any circuit that does not carry MAINS power and is generally limited to 15 A. |
| | | <i>New clause added;</i> |
| | | General |
| | | Addition: |
| 5.4.1 | | For equipment intended to be installed by SERVICE PERSONNEL or trained installers, all documentation may be provided by electronic media. Where the documentation is provided by electronic media, this may be accomplished by including the symbol No. 14 of Table 1 (ISO 7000-0434B: 2004-01), on the product, and the location of the documentation, e.g. URL, QRcode, on the product, packaging or printed information with the product. |
| | | <i>New clause added;</i> |
| | | Equipment operation |
| 5.4.4 | | Modification: j) details of methods of reducing the RISKS of burns from surfaces permitted to exceed the temperature limits of 10.1, Table 19. |
| 6 | Info | Protection against electric shock |
| | | <i>New clause added;</i> |
| | | Circuits with TERMINALS which are HAZARDOUS LIVE |
| | | Replacement: |
| 6.6.3 | | This subclause applies to both TERMINALS and ports (see Table 103). For ENCLOSED EQUIPMENT no ACCESSIBLE conductive parts may be HAZARDOUS LIVE. For OPEN EQUIPMENT protection for those TERMINALS and ports defined in Table 103 shall be provided. Conformity is checked by inspection. |



| CLAUSE | VERDICT | COMMENT |
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| | | <i>New clause added;</i> |
| | | CLEARANCES |
| 6.7.1.2 | | <p>Addition:</p> <p>Linear interpolation is permitted between the nearest two points in Table 3. The calculated minimum CLEARANCE using this multiplication factor shall be rounded up to the next higher 0,1 mm increment.</p> |
| | | Requirements for insulation according to type of circuit |
| | | <p>Replacement:</p> <p>Requirements for insulation between separate circuits and between circuits and ACCESSIBLE conductive parts are specified as follows:</p> <p>a) in Figure 102; b) in IEC 61010-1:2010, Clause K.3 for circuits that have one or more of the following characteristics: 1) the maximum possible TRANSIENT OVERVOLTAGE is limited by the supply source or within the equipment to a known level below the level assumed for the MAINS CIRCUIT; 2) the maximum possible TRANSIENT OVERVOLTAGE is above the level assumed for the MAINS CIRCUIT; 3) the WORKING VOLTAGE is the sum of voltages from more than one circuit, or is a mixed voltage; 4) the WORKING VOLTAGE includes a recurring peak voltage that may include a periodic non-sinusoidal waveform or a non-periodic waveform that occurs with some regularity; 5) the WORKING VOLTAGE has a frequency above 30 kHz;</p> <p>c) in IEC 61010-1:2010, Clause K.1 for MAINS CIRCUITS of OVERVOLTAGE CATEGORY III or IV or for OVERVOLTAGE CATEGORY II over 300 V; d) in IEC 61010-1:2010, Clause K.2 for secondary circuits separated from the circuits in c) only by means of a transformer.</p> <p>Requirements for insulation of measuring circuits are specified in IEC 61010-2-030.</p> <p>NOTE See IEC 61010-1:2010, Clause K.3 for requirements for switching circuits such as a switching power supply.</p> |
| 6.7.1.5 | | |



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| | | <i>New clause added;</i> LEARANCES and CREEPAGE DISTANCES Modification: Replace Table 4 by the following: 6.7.2.1 Add after the conformity statement: Since conformity is checked by inspection and measurement, dielectric test is not required. Add after the last conformity statement: NOTE 101 See Annex FF for examples of CLEARANCE and CREEPAGE measurement special cases. |
| 8 | Info | Resistance to mechanical stresses <i>New clause added;</i> General 8.1 Modification: Replace the second paragraph and its listed points with the following: The normal energy protection level is $6,8 \pm 5\%$ J. |
| | | <i>New clause added;</i> Impact test Modification: Replace the fifth paragraph with the following: 8.2.2 Each test point is subjected to one impact by a smooth steel sphere with a diameter of approximately 50 mm. Replace the ninth paragraph (above Figure 10) with the following: The dimension X and mass are determined by the following equation: $J = X \times m \times g$ $J = 6,8 \text{ Joules} \pm 5\%$ $g = 10 \text{ m/s}^2$ NOTE 1 Values of the dimension X and mass are approximately 1,3 m and 0,5 kg |



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| | | using this formula. |
| | | NOTE 2 Test formula, units, etc. derived from pendulum test method of IEC 60068-2-75. |
| | | Constructional requirements |
| | | Modification: |
| | | Add at the beginning of the subclause: |
| | | For OPEN EQUIPMENT, items a) and b) apply. For ENCLOSED EQUIPMENT, a), b) and c) apply. |
| | | <u>Replace item c) 2) by the following text:</u> |
| 9.3.2 | | <u>The ENCLOSURE and any baffle or flame barrier shall be made of metal or of non-metallic materials having a flammability classification of V-1 or better, of IEC 60695-11-10. If magnesium alloy is used for the ENCLOSURE or a flame barrier it shall be verified as specified in Annex DD.</u> |
| | | <u>Replace the conformity statement after item 3) with the following:</u> |
| | | <u>Conformity is checked by inspection. If the ENCLOSURE or flame barrier is made of magnesium alloy, the flammability test of requirement c) 2) is checked as specified in Annex DD. In other cases of doubt, the flammability classification of requirement c) 2) is checked by performing the vertical burning test of IEC 60695-11-10 on samples of the material used in the relevant parts.</u> |
| 10 | Info | Equipment temperature limits and resistance to heat |
| | | Surface temperature limits for protection against burns |
| | | Modification: |
| 10.1 | | Replace Table 19: |
| | | <u>For equipment with ambient temperature ratings above 40C, higher temperatures are possible. See clause 10.1 of IEC 61010-1:2010. See 5.4.4 item j).</u> |
| 10.4.1 | Info | General |
| | | <i>New clause added;</i> |
| | | General Method |
| 10.4.1.100 | | Equipment under test (EUT) shall be tested under reference test conditions. The reference test AMBIENT TEMPERATURE shall be the same as the maximum RATED AMBIENT TEMPERATURE, as defined in IEC 61010-1:2010, 1.4.1 c) or 1.4.2.c). |



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Unless a particular SINGLE FAULT CONDITION specifies otherwise, the manufacturer's instructions concerning ventilation, cooling liquid, limits for intermittent use, etc. are followed. Any cooling liquid shall be at the highest RATED temperature.

The EUT shall be mounted in its least favourable position/orientation.

The EUT shall be generating its least favourable heat dissipation. This dissipation may be caused by some combination of load current, input voltage, input frequency, I/O duty cycle, etc.

EUT FIELD WIRING shall be the smallest size suitable for the maximum current RATING of the EUT according to manufacturer's instructions.

The test room/chamber/box (size is not a test criteria) environment surrounding the EUT shall not be subject to air movement caused by sources not part of the EUT, i.e. it shall be a natural convection environment. See Figure 105.

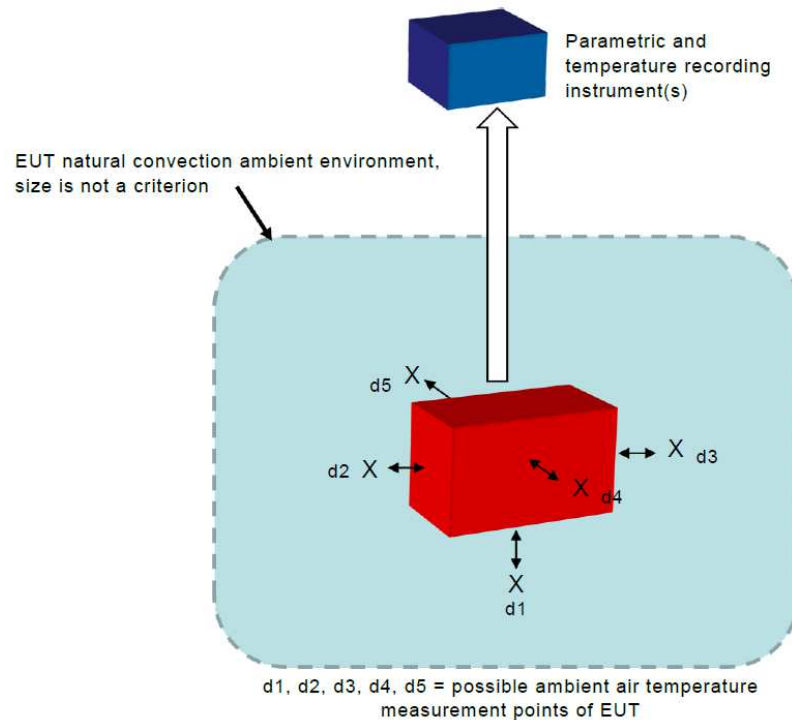


Figure 105 – General temperature test environment

Temperatures are measured when steady state has been reached.



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| | | <p>If the EUT is meant to function as a standalone unit it shall be tested standalone, e.g. a standalone HMI or communications switch/router.</p> <p>If the EUT is not meant to function as a standalone unit, e.g. I/O module of a MODULAR EQUIPMENT system, then a representative system shall be utilized for testing. This system shall represent a practical least favourable combination of conditions for the EUT.</p> <p>This practical least favourable combination shall be, at a minimum, the items necessary for the EUT to function, e.g. power supply, communication module (TM's in Figure 106) and EUT. The EUT shall be surrounded, as permitted by manufacturer's documentation, on both sides with real modules or "simulation modules" (thermally representative modules, TM's in Figure 106) representing the worst case thermal environment for the EUT, i.e. adding more modules around the EUT does not cause further temperature increase of the EUT. A justification of the configuration for the test shall be provided in the test report.</p> <p>An example configuration for testing an I/O module EUT, of a modular system, might be:</p> <ul style="list-style-type: none">• the EUT (I/O module),• a power supply,• communication module,• three of the same type I/O module operating at full load to the left of the EUT,• three of the same type I/O module operating at full load to the right of the EUT, and• adding more I/O modules left or right does not cause the EUT's temperature to change. <p>For vented equipment, cooled by natural air convection, the AMBIENT TEMPERATURE is the incoming air temperature at a point not more than 50 mm and not less than 25 mm away from the plane of the equipment's air flow entry point. See Figure 106. The points d1, d2 and d3, in Figure 106, are the possible measurement points. The point with the lowest temperature should be utilized as the AMBIENT TEMPERATURE.</p> |



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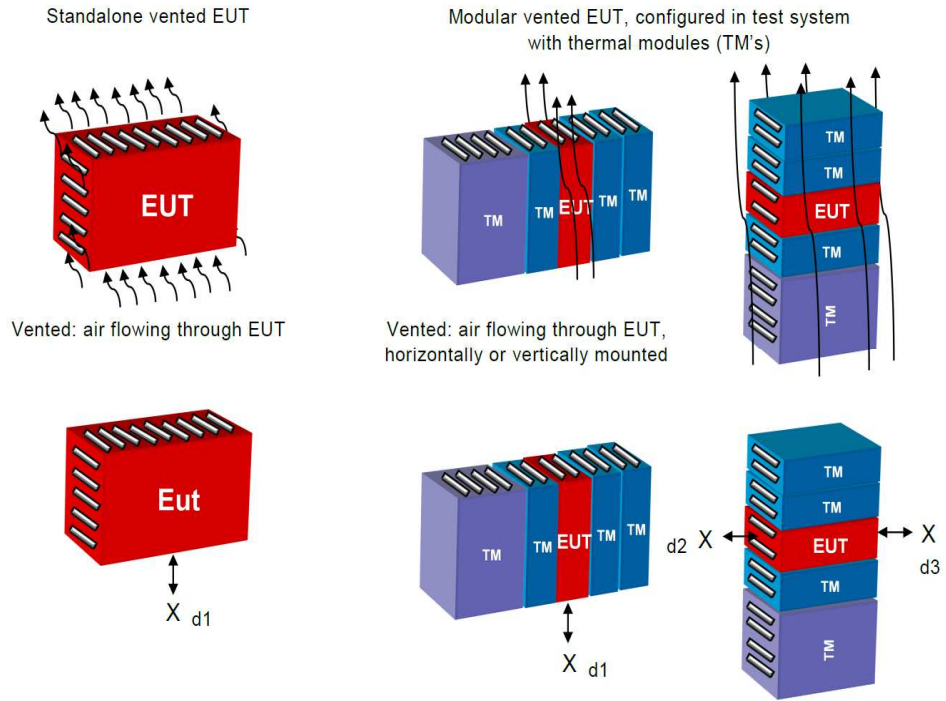


Figure 106 – Vented equipment

For non-vented equipment, cooled by natural air convection, the AMBIENT TEMPERATURE is the air temperature at a point not more than 50 mm and not less than 25 mm away from the equipment, on a horizontal plane located at the vertical mid-point of the equipment. See Figure 107. The points d2-d5 in Figure 107 are the possible measurement points. The point with the lowest temperature should be utilized as the AMBIENT TEMPERATURE.



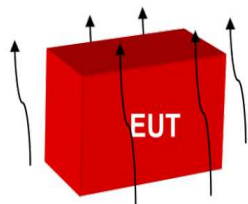
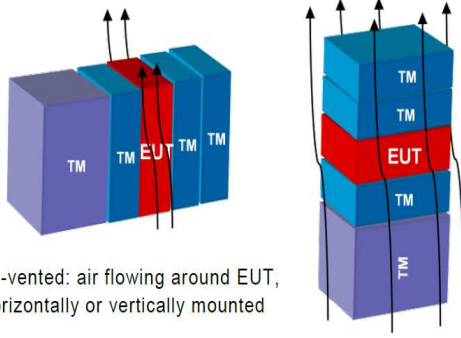
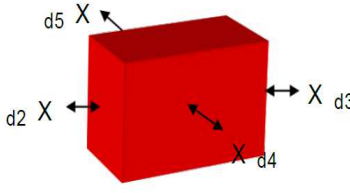
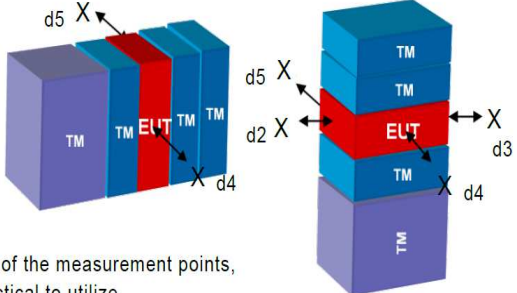
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| | | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Standalone non-vented EUT</p>  <p>Non-vented: air flowing around EUT</p> </div> <div style="text-align: center;"> <p>Modular non-vented EUT, configured in test system with thermal modules (TM's)</p>  <p>Non-vented: air flowing around EUT, horizontally or vertically mounted</p> </div> </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <p style="text-align: center;">Due to mounting requirements, some of the measurement points, e.g. d1, may not be practical to utilize</p> |

Figure 107 – Non-vented equipment

New clause added;

Special method, PANEL MOUNTED EQUIPMENT

PANEL MOUNTED EQUIPMENT presents some special considerations, see Figure 108.

10.4.1.101

In this case part of the equipment (EUTa) may be in one ambient environment, e.g. ambient environment #1 and the rest of the equipment (EUTb) may be in another ambient environment, e.g. ambient environment #2. The equipment construction techniques can be quite different, e.g. (referring to Figure 108) open/vented in ambient environment #1 and enclosed/nonvented in ambient environment #2.

It should be kept in mind, it may be necessary that these two different environments be applied simultaneously, to ensure least favourable conditions.

Each part of the equipment (EUTa and EUTb) shall be evaluated separately according to its own environment.

The general method described in 10.4.1.100 with regard to test conditions and



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least favourable EUT configuration, orientation, etc. shall be followed.

Three special methods for testing PANEL MOUNTED EQUIPMENT are provided:

- a) The equipment shall be mounted such that the two portions (EUTa and EUTb) of the EUT are subjected to their specific environments.
- b) The total EUT (EUTa + EUTb) shall be mounted in a single environment, which shall be the higher RATED temperature of the two, and the recorded temperatures of the lower RATED temperature EUT portion are corrected by the difference between the EUT's maximum RATED AMBIENT TEMPERATURE and the actual test AMBIENT TEMPERATURE.
- c) The total EUT (EUTa + EUTb) shall be mounted in a single environment, which shall be the lower RATED temperature of the two, and the recorded temperatures of the higher RATED temperature EUT portion are corrected by the difference between the EUT's maximum RATED AMBIENT TEMPERATURE and the actual test AMBIENT TEMPERATURE.

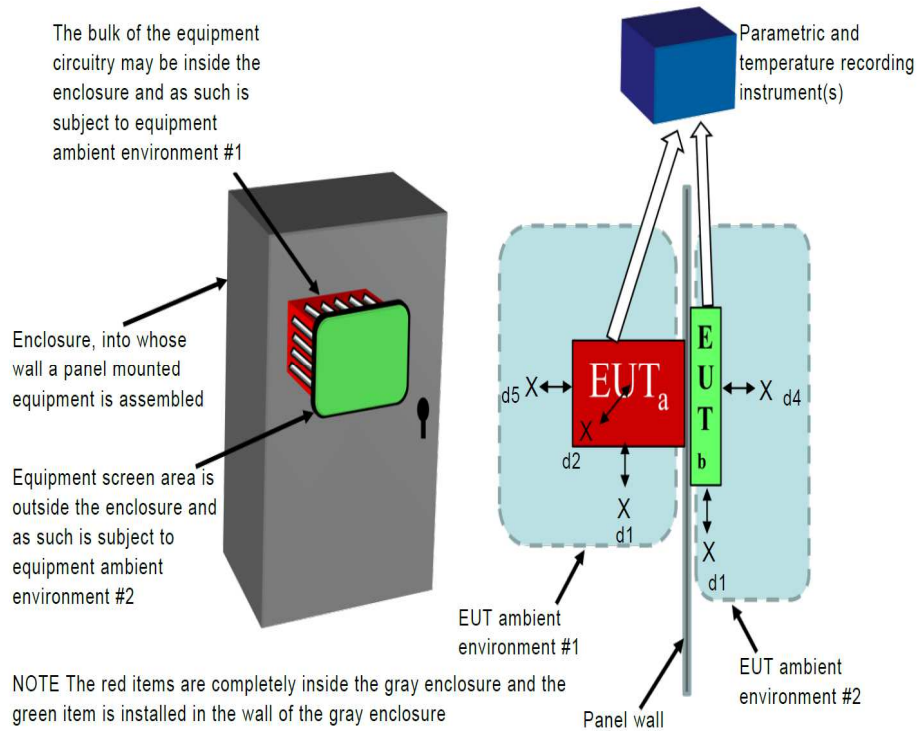


Figure 108 – Panel mounted device extending through the wall of a cabinet



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| | | <i>New clause added;</i> |
| | | Special method, large or heavy equipment |
| 10.4.1.102 | | Equipment too large or too heavy can be tested at room AMBIENT TEMPERATURE, if the recorded temperatures are corrected by the difference between the EUT's maximum RATED AMBIENT TEMPERATURE and the actual test room AMBIENT TEMPERATURE. Where this method is applied, rationale shall be provided in the test report. |
| | | <i>New clause added;</i> |
| | | Other considerations, applying to all cases |
| | | Other considerations for temperature testing: |
| 10.4.1.103 | | a) The temperature of insulating material of windings is measured as the temperature of winding wire and of core lamination in contact with the insulating material. It can be determined by the resistance method or by using temperature sensors selected and positioned so that they have a negligible effect on the temperature of the winding. The latter method may be used if the windings are non-uniform or if it is difficult to measure resistance. b) Due to the difficulty of setup and repeat for single fault tests, these tests can be done at room AMBIENT TEMPERATURE. The recorded temperatures shall be corrected by the difference between the EUT's maximum RATED AMBIENT TEMPERATURE and the actual test room AMBIENT TEMPERATURE. |
| 11 | Info | Protection against HAZARDS from fluids |
| | | Specially protected equipment |
| | | Replacement: |
| 11.6 | | If the equipment is rated and marked by the manufacturer as conforming to a stated degree of protection, e.g. from IEC 60529, it shall resist the entry of fluids and other material to the extent specified. Conformity is checked 1) by inspection or 2) by subjecting the equipment to the appropriate treatment, e.g. of IEC 60529, after which the CLEARANCES and solid insulation shall pass the voltage tests of 6.8 (without humidity preconditioning) <u>applicable to the type of insulation (see 6.7) and ACCESSIBLE parts shall not exceed the limits of 6.3.1. If there is any doubt, 2) shall be applied.</u> |
| 14 | Info | Components and subassemblies |
| 14.101 | Info | Components bridging insulation |



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| | | <p>Capacitors</p> <p>A capacitor connected between two line conductors in a MAINS CIRCUIT, or between one line conductor and the neutral conductor shall comply with subclass X1 or X2 of IEC 60384-14.</p> <p>A capacitor between the MAINS CIRCUIT and protective earth shall comply with subclass Y1, Y2 or Y4 of IEC 60384-14.</p> <p>A capacitor bridging DOUBLE INSULATION or REINFORCED INSULATION in the control equipment <u>shall comply with subclass Y1 or Y2 of IEC 60384-14.</u></p> <p>In all cases a capacitor shall be used in accordance with its RATING.</p> <p>These requirements do not apply to a capacitor connected between a hazardous voltage secondary circuit and protective earth, where only BASIC INSULATION is required.</p> <p>Capacitors in conformity with IEC 60384-14 and approved by a recognized testing authority may be removed from the circuit for the high-voltage TYPE TEST.</p> <p>Compliance is checked by inspection.</p> |
| 14.101.1 | | |
| Annex DD | | <p><i>New annex added;</i></p> <p>Flammability test for magnesium alloy fire ENCLOSUREs or flame barriers (see 9.3.2)</p> |
| | | <p>General</p> <p>When magnesium alloy is used as a fire ENCLOSURE or a flame barrier, the flammability properties shall be determined to support the requirements of 9.3.2. The method described in Annex DD will demonstrate whether the material will ignite under typical conditions, and whether the flame, if it does ignite, will propagate long enough to cause a HAZARD of the spread of fire.</p> |
| DD.1 | | <p>This method is similar to the method used for determining the flammability characteristics of plastics.</p> <p>NOTE The test methods and conformance criteria of the 500 W Vertical Burning Test for plastic materials of ANSI/UL 94 are equivalent.</p> <p>Conformity is checked as specified in Clause DD.2 to Clause DD.5. During the test and until 1 min after the last application of the test flame, the sample shall not ignite.</p> |



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| | | Samples |
| DD.2 | | One sample is tested, consisting of a complete fire ENCLOSURE or flame barrier. |
| | | Mounting of samples |
| DD.3 | | The sample is mounted and oriented as it would be in actual use. |
| | | Test flame |
| DD.4 | | The 500 W nominal test flame of IEC 60695-11-3 is used. |
| | | Test procedure |
| | | The test flame is applied to an inside surface of the sample at a minimum of three points and a maximum of five points, including the section of the sample where the material is the thinnest, sections of the sample where ventilation or other openings are located, and sections of the sample that are located near a source of ignition. If it is not possible to apply the flame to the inside surface, it may be applied to the outside surface. |
| DD.5 | | <p>If a vertical part is involved, the flame is applied at an angle of approximately 20° from the vertical. If ventilation or other openings are involved, the flame is applied to an edge of an opening, otherwise to a solid surface. In all cases, the tip of the inner blue cone of the flame is to be in contact with the sample.</p> <p>The flame is applied to each point for 5 s, removed for 5 s, then reapplied again to the same point until a total of five applications have been made to this point. After that, the flame is removed for 60 s, and then applied in the same manner to the next test point on the sample.</p> |
| CUSTOMERS PLEASE NOTE: This Table and column “Verdict” can be used in determining how your current or future production is or will be in compliance with new/revised requirements. | | |