



PERMANENT DOCUMENT

**ENEC 303
Annex BA**

**Annex BA
to Routine Test Requirements for manufacturers
(as per Article 9 of the Agreement)**

**Safety requirements for electrical equipment for
measurement, control, and laboratory use
Part 1: General requirements
covered by EN 61010-1**

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| Issued by: | Electronic vote closed on 14 August 2019 | No. of pages: 4 |
| Date of issue: | August 2019 | |
| Supersedes: | New document | Page 1 of 4 |

Annex BA to PD ENEC 303

Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: General requirements EN 61010-1 - Annex F

1 ROUTINE TESTS (100%)

F.1 General

The manufacturer shall perform the tests of F.2 to F.4 on 100 % of equipment produced which has both HAZARDOUS LIVE parts and ACCESSIBLE conductive parts. Unless it can be clearly shown that the result of the tests cannot be invalidated by subsequent manufacturing stages, tests shall be made with equipment fully assembled. Components shall not be unwired, modified or disassembled for the test, but snap-on covers and friction-fit knobs may be removed if they would interfere with the tests. The equipment shall not be energized during the tests, but the MAINS switch shall be in the on-position.

Wrapping the equipment in foil is not required, nor is humidity preconditioning necessary.

Test site altitude correction of the test voltage is not required.

The voltage test equipment shall be able to maintain the required voltage for the specified period of time. No other requirements apply.

Conformity is checked by inspection.

F.2 Protective earth

A continuity test is made between the earth pin of the appliance inlet or the MAINS plug of plug-connected equipment, or the PROTECTIVE CONDUCTOR TERMINAL of PERMANENTLY CONNECTED EQUIPMENT on the one side, and all ACCESSIBLE conductive parts which are required by 6.5.2 to be connected to the PROTECTIVE CONDUCTOR TERMINAL on the other side.

NOTE of EN 61010-1 Annex F: No value is specified for the test current.

Protective Earth impedance test (duration 2-5 sec.):

For Class I equipment a current of at least 10 A, derived from an a.c. source having a no-load voltage not exceeding 12 V, is passed between the Protective Earth terminal and each accessible metal part, which has to be protectively earthed for safety reasons.

Test parameters

For permanently installed equipment and equipment with an appliance inlet the impedance shall not exceed 0.1 ohm.

For equipment with a non-detachable power supply cord the impedance shall not exceed 0.2 ohm when measured from the earth contact in the mains plug.

Note: For appliances having a long non detachable supply cord the resistance can exceed 0,2 ohm. However, the resistance is not to exceed 0,1 ohm + R, where R is the resistance of the supply cord.

F.3 MAINS CIRCUITS

F.3.1 General

A test voltage is applied between:

- a) the MAINS TERMINALS connected together, and
- b) all ACCESSIBLE conductive parts including the PROTECTIVE CONDUCTOR TERMINAL, if any, connected together.

During this test, the equipment shall be electrically isolated from any external earthing. This test is not applied to small metal parts such as name plates, screws or rivets, if they are separated from parts which are HAZARDOUS LIVE by REINFORCED INSULATION or its equivalent.

NOTE For equipment which has all ACCESSIBLE conductive parts connected to the PROTECTIVE CONDUCTOR TERMINAL, the interconnection of the ACCESSIBLE conductive parts is not necessary because the correct interconnections are tested by F.2.

The test voltage may be a.c. or d.c. or impulse, and is selected from Table F.1 for the appropriate OVERVOLTAGE CATEGORY. For the a.c. and d.c. tests, the test voltage is raised to its specified value within 5 s, and maintained for at least 2 s. Impulse tests are the 1,2/50 μ s test specified in IEC 61180, conducted for a minimum of three pulses of each polarity at 1 s minimum intervals.

No flashover of CLEARANCES or breakdown of solid insulation shall occur during the test, nor shall the test device indicate failure.

Table F.1 – Test voltages for ROUTINE TESTS of MAINS CIRCUITS

| Nominal line-to-neutral voltage of MAINS supply | OVERVOLTAGE CATEGORY II | | | OVERVOLTAGE CATEGORY III | | | OVERVOLTAGE CATEGORY IV | | |
|---|-------------------------|-------|--------|--------------------------|-------|--------|-------------------------|-------|--------|
| | a.c. r.m.s. or d.c. | a.c. | d.c. | 1,2/50 μ s Impulse | a.c. | d.c. | 1,2/50 μ s Impulse | a.c. | d.c. |
| V | V r.m.s. | V | V peak | V r.m.s. | V | V peak | V r.m.s. | V | V peak |
| ≤ 150 | 840 | 1 200 | 1 200 | 1 400 | 2 000 | 2 000 | 2 200 | 3 100 | 3 100 |
| $>150 \leq 300$ | 1 400 | 2 000 | 2 000 | 2 200 | 3 100 | 3 100 | 3 300 | 4 700 | 4 700 |
| $>300 \leq 600$ | 2 200 | 3 100 | 3 100 | 3 300 | 4 700 | 4 700 | 4 300 | 6 000 | 6 000 |
| $>600 \leq 1 000$ | 3 300 | 4 700 | 4 700 | 4 300 | 6 000 | 6 000 | 5 300 | 7 500 | 7 500 |

F.3.2 MAINS CIRCUITS with voltage limiting devices

For MAINS CIRCUITS with voltage limiting devices that meet the requirements of 14.8, the a.c. or d.c. test of F.3.1 can be carried out using a test voltage of 0,9 times the clamping voltage of the voltage limiting device but not less than twice the WORKING VOLTAGE of the MAINS CIRCUIT.

F.4 Floating circuits

A test voltage is applied between

- a) the TERMINALS of floating input and output circuits, which can be HAZARDOUS LIVE in NORMAL USE, connected together, and
- b) ACCESSIBLE conductive parts connected together.

The value of the applied voltage in each case is 1,5 times the maximum RATED voltage to earth but not less than 350 V a.c. r.m.s or 500 V d.c. If voltage-limiting (clamping) devices clamp below the applied voltage, the value of the applied voltage is 0,9 times the clamping

voltage, but not less than that of the maximum RATED voltage to earth.

The test voltage is raised to its specified value within 5 s and maintained for at least 2 s, with the circuit electrically isolated from any external earthing means.

No flashover of CLEARANCES or breakdown of solid insulation shall occur during the test nor shall the test device indicate failure.

2 PERIODIC TESTS

Product verification tests are in addition to the production line inspection and routine tests and are performed on samples taken randomly from the production line.

The manufacturer is responsible for conducting or arranging for the following periodic testing to be completed. Records shall be available for review during factory inspection visits.

- 5: Marking, marking durability and documentation (e.g. valid revision of operating manual).
- 6.2-6.3: Protection against electric shock and touch current.
- 6.7: Creepage distances, air clearances, distances through insulation and the securing of wiring.
- 9: Abnormal operation (check operation of protective devices).
- 11: Protection against hazards from fluids.
- 14: Comparison of used components with the approved version, for example power supply units, flexible cords, switches, opto-couplers, EMC filters, fans, fuses, motors, DC/DC converters, batteries etc.