	PERMANENT DOCUMENT	ENEC 303 Annex P

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

Safety of power transformers, power supplies, reactors and similar products covered by the EN 61558 series

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Annex P to PD ENEC 303

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1. ROUTINE TESTS (100%)

1.1 Earth continuity test

For class I transformers, a current of at least 10 A derived from a source having a no-load voltage not exceeding 12 V, is passed in turn between the earthing terminal and each of the accessible metal parts which have to be earthed for safety reasons.
The voltage drop is measured and the resistance is calculated from the current and voltage drop.

The resistance shall not exceed 0.1 Ω.

NOTE 1: The test should be carried out for at least 1 second.

NOTE 2: Care is to be taken to ensure that the contact resistance between the tip of the measuring probe and the metal part under test does not influence the test results. During the test, neither an interruption of the connections nor a substantial decrease of the current shall occur between the earthing terminal and the relevant accessible metal part.

1.2 Electric strength test

At room temperature, the insulation is subjected for 1 second to a substantially sinusoidal test voltage at rated frequency. The values of the test voltage and the measuring points are given in the following table.

Application of test voltage	Working voltage (V*)				
	≤ 50 V	≤ 200 V	≤ 300 V	≤ 600 V	≤1000 V
1) Between input and output circuits (basic insulation)	250	1400	2100	2500	2750
2) Between input and output circuits (double insulation)	500	2800	4200	5000	5500
3) Between input and output circuits (reinforced insulation)	500	2800	4200	5000	5500
4) Over basic or supplementary insulation between: - live parts of the input circuit and accessible conductive parts - live parts of the input circuit and the body if connected to the protective earth	250	1400	2100	2500	2750
5) Over reinforced insulation between: - live parts of the input circuit and accessible conductive parts - live parts of the input circuit and the body	500	2800	4200	5000	5500
*) Values of test voltage for intermediate values of working voltage are found by interpolation between tabulated values.					

For control transformers the values of the test voltage for basic insulation have to be multiplied by the factor 1.4 (No. 1 and 4 in the table).

For isolating transformer, shaver transformers and shaver supply units the value between input and output circuit for basic insulation does not apply (No. 1 in the table).

For supply transformers the value between input and output circuit for double insulation does not apply (No. 2 in the table).

No flash over or break down shall occur during the test.

1.3 Mounting of protected device

It has to be checked that the operation of protective devices, if any, is not prevented by incorrect mounting of the device in the transformer.

1.4 No-load Output Voltage

The no-load output voltage has to be measured when the transformer is connected to rated supply voltage at rated frequency having ambient temperature.
The no-load output voltage for safety transformers shall in no case exceed 50 V AC and/or 120 V DC ripple-free even when independent output windings are not intended to be connected ins series are connected in series.

For transformers incorporation a rectifier, the output voltages are measured on both sides of the rectifier it they are connected the terminals or terminations. The measurement at the input terminals of the rectifier is made if they are accessible to the user. The output voltage is measured at the terminals of the circuits with a voltmeter giving the arithmetic mean value unless the effective (RMS) value is specifically stated.

NOTE: An effective value is differentiated from an arithmetic means value by the indications RMS on its marking.

1.4.1 Isolating transformers
The no-load output voltage for isolating transformer shall not exceed 500 V AC or 708 V DC ripple-free even when independent output windings which are not foreseen to be connected in series, are connected in series.

1.4.2 Safety isolating transformers
The no-load output voltage shall not exceed 50 V AC or 120 V DC ripple-free even when independent output windings which are not foreseen to be connected in series, are connected in series.

For transformers with tapped or multiple output windings which are not marked, the no-load output voltage is measured at the highest voltage setting.

1.4.3 Transformers for toys
The no-load output voltage shall not exceed 33 V AC or 46 V DC ripple-free even if independent windings are connected in series.

For transformers incorporating controllers, the control device is at the highest voltage setting.

1.4.4 Bell transformers
The no-load output voltage shall not exceed 33 V AC or 46 V DC ripple-free. If multiple output windings are intended to be connected in series, the combined no-load output voltage shall not exceed 33 V AC or 46 V DC ripple-free.

1.4.5 Chime transformers

The no-load output voltage shall not exceed 33 V AC or 46 V DC ripple-free. If multiple output windings are intended to be connected in series, the combined no-load output voltage shall not exceed 33 V AC or 46 V DC ripple-free.

1.4.6 Transformers for Class lll hand lamps

The no-load output voltage shall not exceed 50 V AC even when independent output windings which are not foreseen to be connected in series, are connected in series.

1.4.7 Shaver transformers and shaver supply units

For shaver transformers and shaver supply units the no-load output voltage shall not exceed 275 V.

1.4.8 Separating transformers

The no-load output voltage for separating transformer shall not exceed 1000 V AC or 1415 V DC ripple-free even when independent output windings which are not foreseen to be connected in series, are connected in series.

1.4.9 Switch mode power supplies

The no-load output voltage for switch mode power supplies shall not exceed 1000 V AC or 1415 V DC ripple-free even when independent output windings which are not foreseen to be connected in series, are connected in series.

2 PERIODIC TESTS (PVT)

A sample of each series/family (same basic construction) shall be subjected to complete tests or the main critical tests depending on the results of the pre-licence tests according to the standard at least once a year.

3 RECORDS

All test results shall be kept available. The choice of support and format for reports is left to the manufacturers; separate forms (one for each equipment), or grouped according to the most suitable parameters (periods of time, model, etc.) are equally acceptable.
The only obligation is the availability of data and their immediate interpretability for all equipment leaving the production line.

For every device tested, the following data shall be filed:

- date of test
- model or type designation of the device
- serial number of the device or another identifier permitting the identification without ambiguity
- value of earthing circuit resistance with the corresponding current value (*)
- value of voltage applied during the electric strength test (*)
- quick reference information that the whole set of tests has/has not been successful reference to test equipment used for the tests.

As an alternative to the values referred with an (*) above, the information of the accomplishment of each test (e.g. pass or fail) is permitted, if the pass/fail criteria are described elsewhere on the test report.