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Integrated Services Digital Network (ISDN); Basic access - safety and protection Part 3: Interface I_a - protection

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Terminal Equipment (TE) Technical Committee of the European Telecommunications Standards Institute (ETSI) in collaboration with members of the Business Telecommunications (BT) and Transmission and Multiplexing (TM) Technical Committees.

This ETS aims to meet the urgent requirements of network operators and equipment manufacturers who are designing equipment to operate with the Integrated Services Digital Network (ISDN) basic access interface.

This is the third part of a multipart ETS which comprises the following:

ETS 300 047: "Integrated Services Digital Network (ISDN); Basic access - safety and protection":

ETS 300 047-1 (Part 1): General.

ETS 300 047-2 (Part 2): Interface I_a - safety.

ETS 300 047-3 (Part 3): Interface I_a - protection.

ETS 300 047-4 (Part 4): Interface I_b - safety.

ETS 300 047-5 (Part 5): Interface I_b - protection.

Parts 2 to 5 of this ETS each cover one aspect of a specific equipment interface and are to be used in conjunction with Part 1 [3], which contains references and test circuits that are common to all parts of this ETS.

The corresponding ETS for ISDN primary rate access is ETS 300 046 ("Integrated Services Digital Network (ISDN); Primary rate access - safety and protection, Parts 1 to 5").

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1 Scope

See Clause 1 of ETS 300 047-1 [3].

This part of the ETS covers the protection requirements for interface I_a.

2 Normative references

This ETS incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications do not apply to this ETS unless specifically invoked herein. For undated references the latest edition of the publication referred to applies.

EN 41003 [1] and EN 60950 [2] contain Special National Conditions and National A-deviations for some countries. Where these deviations apply to provisions that are referred to in this ETS, they shall apply to equipment complying with this ETS, intended for use in those countries.

[1] EN 41003 (1991): "Particular electrical safety requirements for equipment to be connected to telecommunication networks".

[2] EN 60950 (IEC 950 (1986) modified) (1988 - including amendments 1 and 2): "Safety of information technology equipment including electrically operated business machines".

[3] ETS 300 047-1: "Integrated Services Digital Network (ISDN); Basic access - safety and protection - Part 1: General".

[4] IEC 801-2 (1991): "Electromagnetic compatibility for idustrial-process measurement and control equipment - Part 2: Electrostatic discharge requirments".

[5] ETS 300 012 (1992): "Integrated Services Digital Network (ISDN); Basic user-network interface, Layer 1 specification and test principles".

3 Definitions and abbreviations

3.1 Definitions

For the purpose of this part of the ETS, the definitions given in subclause 3.1 of ETS 300 047-1 [3] apply.

However, for the purpose of this part of the ETS the Equipment Under Test (EUT) is a Terminal Equipment (TE).

3.2 Abbreviations

For the purpose of this part of the ETS, the abbreviations given in subclause 3.2 of ETS 300 047-1 [3] apply.

4 Reference configuration

See Clause 4 of ETS 300 047-1 [3].

5 Protection requirements and tests

5.1 General

Clause 5 assigns test voltages and currents and specifies test circuits and conditions.

The transmit and receive pairs of interface I_a are indicated in the figures by "t" and "r".

5.2 Test conditions

See Clause 5 of ETS 300 047-1 [3].

For the purpose of this part of the ETS, interface I_b, if any, shall be treated as an auxiliary interface (see Clause 5 of ETS 300 047-1 [3]).

5.3 Compliance criteria

See Clause 3 of ETS 300 047-1 [3].

5.4 Test generators and networks

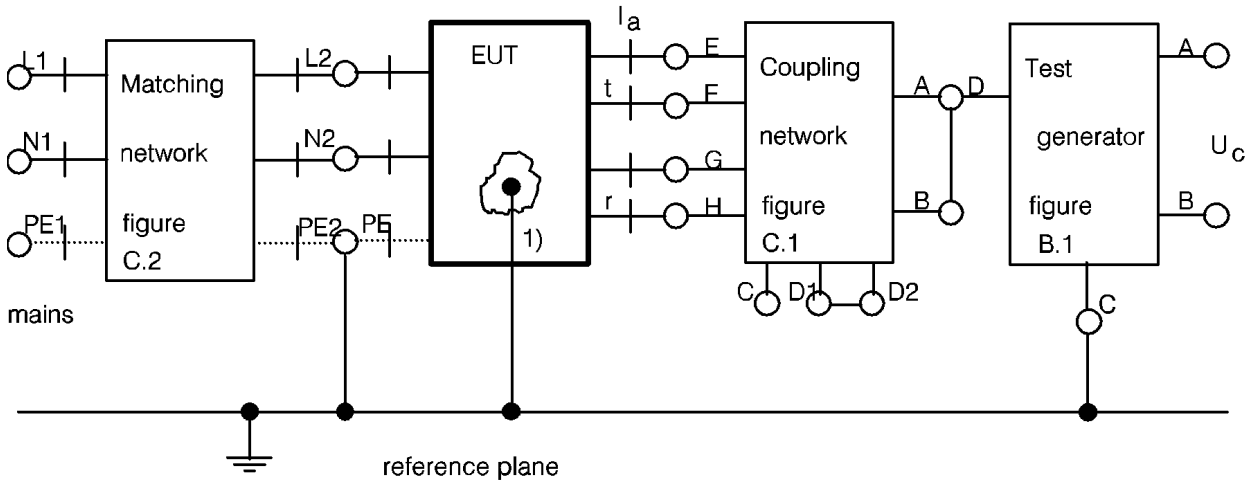
In the figures of this part of the ETS, the required surge/test generators, coupling networks and terminating networks are shown in outline. The figure numbers in those outlines refer to the figures in annexes to ETS 300 047-1 [3], as follows:

- Annex B (normative): Test generators;
- Annex C (normative): Coupling networks;
- Annex D (normative): Terminating network.

5.5 Overvoltage surge simulation at interface I_a

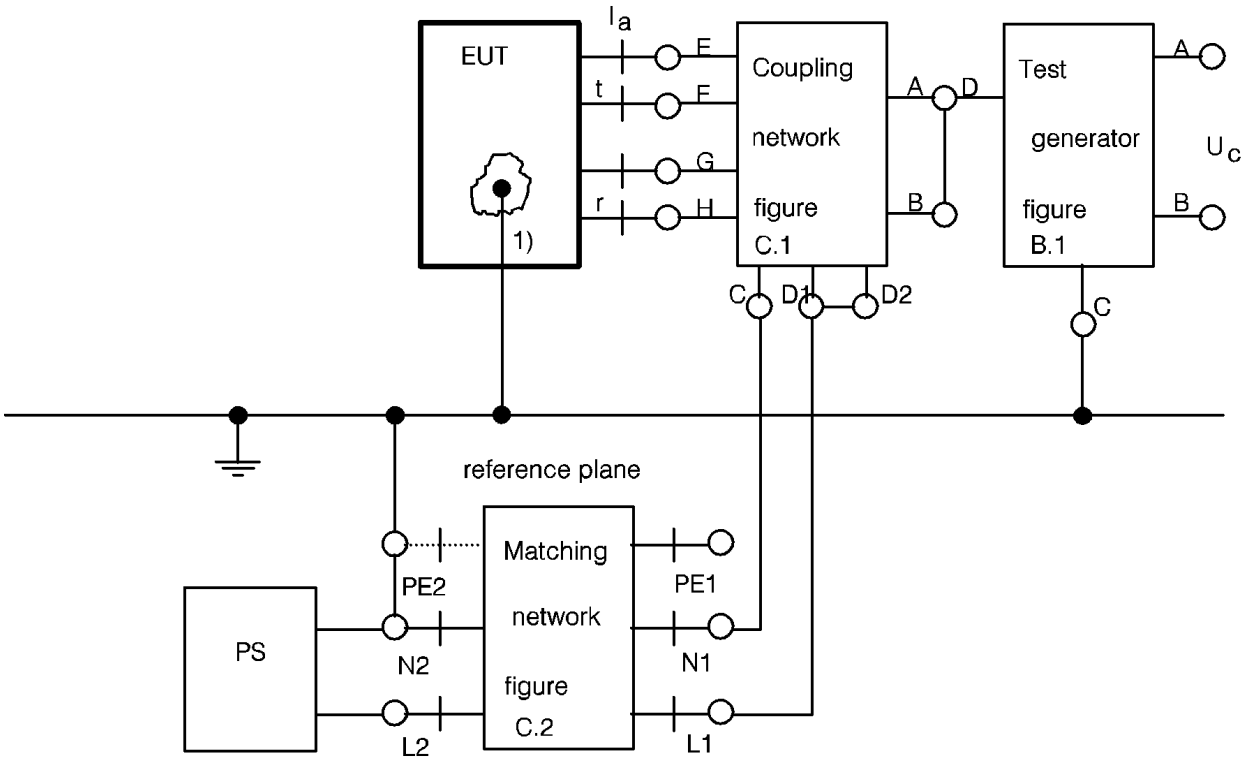
5.5.1 Common mode test

Test circuits: figures 1 and 2.
Maximum test voltage Uc: 1 kV.
Pulse form: 1,2/50 µs.
Number of pulses: 10, with alternating polarity.
Compliance criterion: A.



1) User-accessible part or metal foil.

Figure 1: Test circuit for overvoltage surge simulation; common mode, mains powered EUT



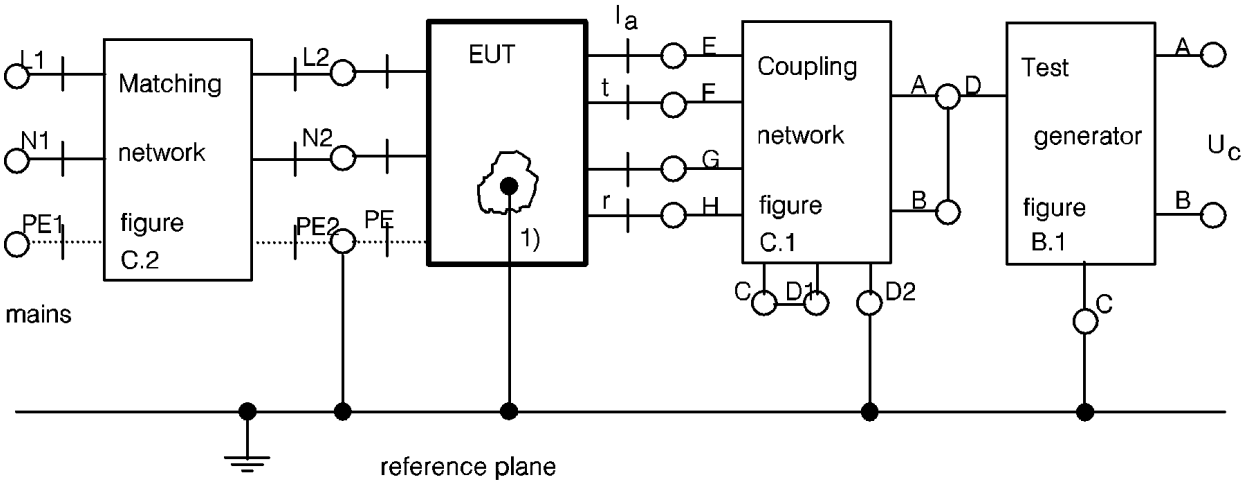
1) User-accessible part or metal foil.

Figure 2: Test circuit for overvoltage surge simulation; common mode, remotely powered EUT

5.5.2 Transverse mode test between transmit and receive pairs

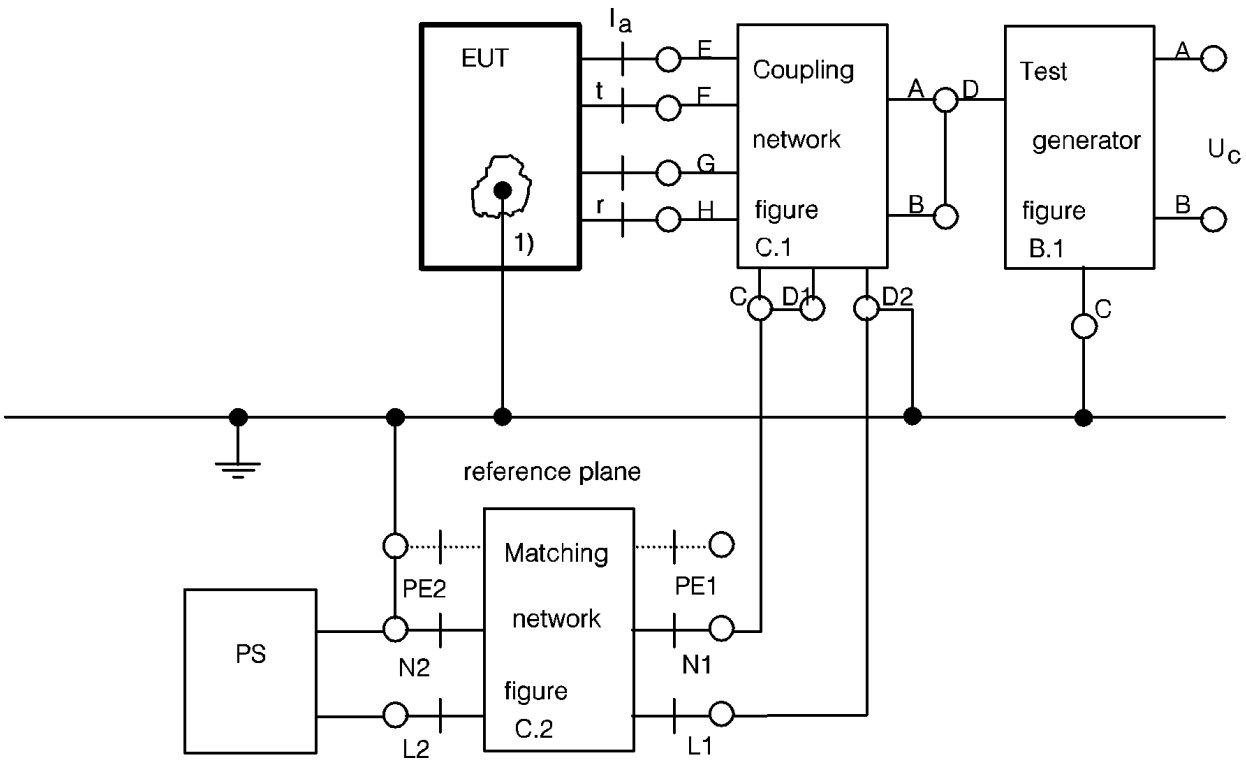
Test circuits:	figures 3 and 4.
Maximum test voltage Uc:	250 V.
Pulse form:	1,2/50 µs.
Number of pulses:	10, with alternating polarity.
Compliance criterion:	A.

The test shall be repeated with "t" and "r" interchanged.



1) User-accessible part or metal foil.

Figure 3: Test circuit for overvoltage simulation; transverse mode between pairs, mains powered EUT



1) User-accessible part or metal foil.

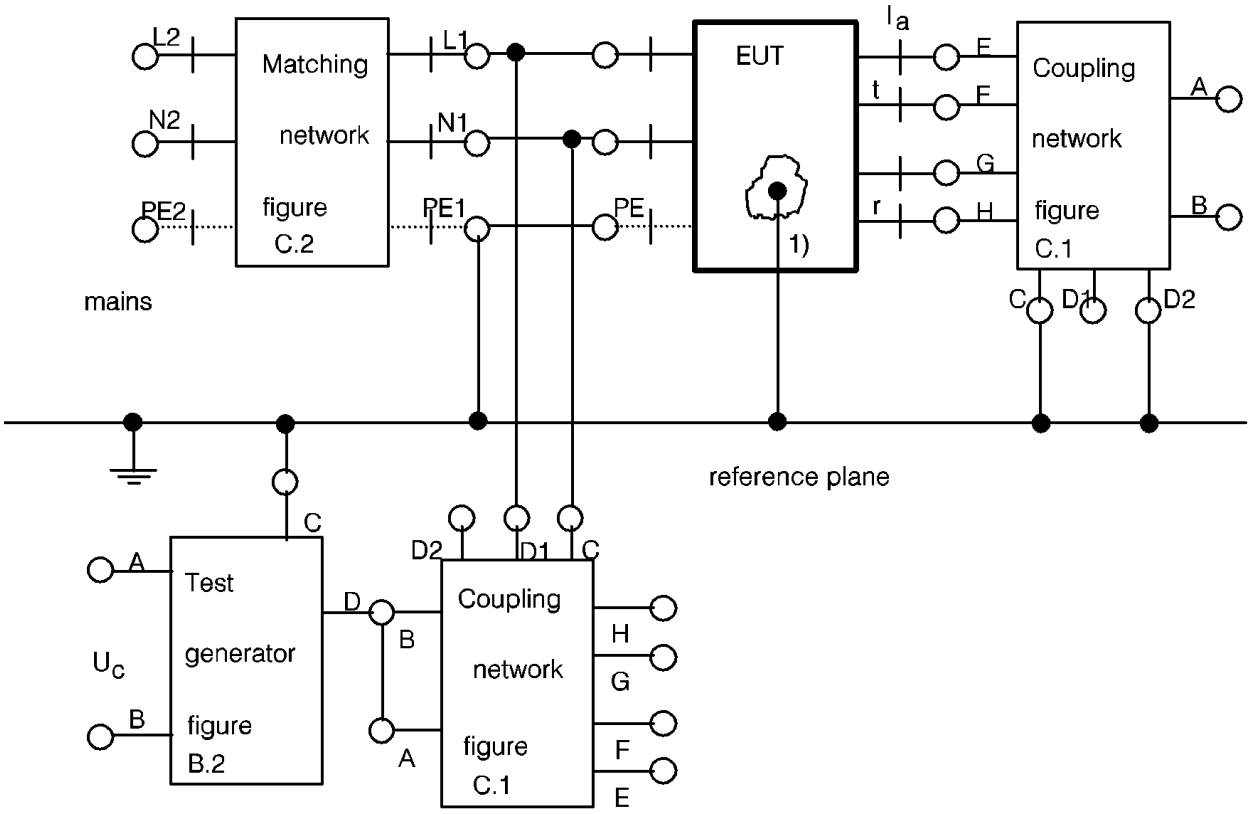
Figure 4: Test circuit for overvoltage simulation; transverse mode between pairs, remotely powered EUT

5.6 Mains overvoltage simulation

NOTE: The test conditions and parameters in subclause 5.6 are based on CCITT Recommendation K.22, HD 384 and IEC 664 (details given in Clause 2 of ETS 300 047-1 [3]).

5.6.1 Common mode test

Test circuit: figure 5.
Maximum test voltage Uc: 2,5 kV.
Pulse form: 10/700 µs.
Number of pulses: 10, with alternating polarity.
Compliance criterion: A.



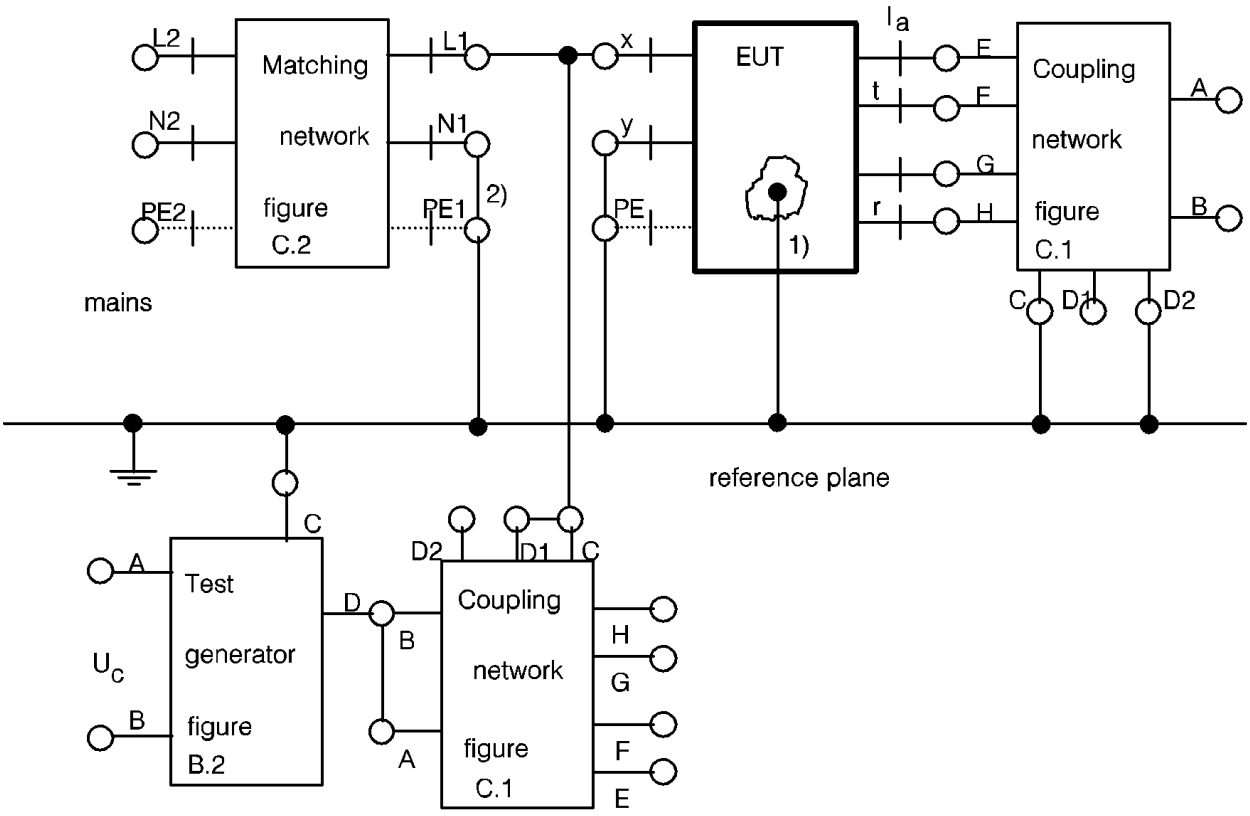
1) User-accessible part or metal foil.

Figure 5: Test circuit for mains overvoltage simulation; common mode

5.6.2 Transverse mode test

Test circuit: figure 6.
Maximum test voltage Uc: 2,5 kV.
Pulse form: 10/700 µs.
Number of pulses: 10, with alternating polarity.
Compliance criterion: A.

The test shall be repeated with "x" and "y" interchanged.



1) User-accessible part or metal foil.
2) See Clause 5 of ETS 300 047-1 [3].

Figure 6: Test circuit for mains overvoltages simulation; transverse mode

5.7 Impulse transfer

Two mechanisms for overvoltage transfer are measured by the tests in subclause 5.7:

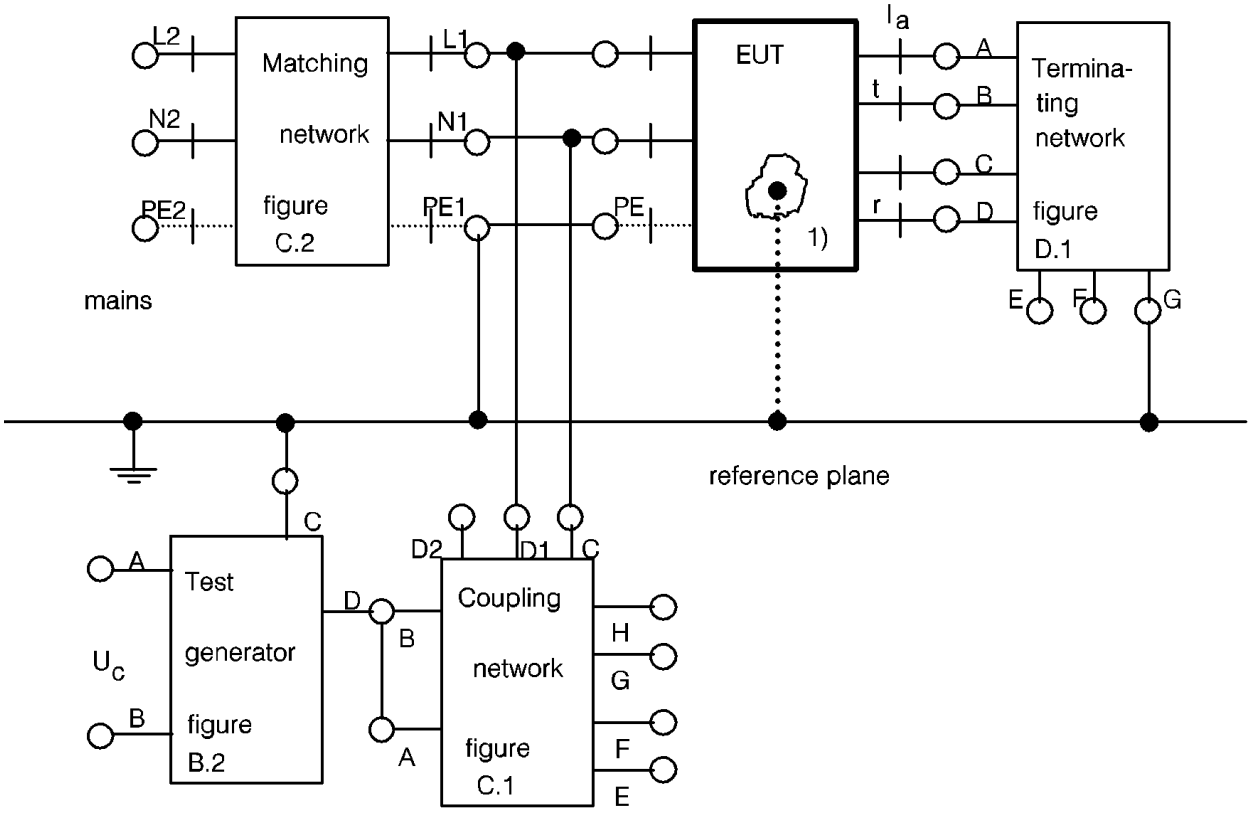
- transfer of overvoltage from one interface (e.g. mains or auxiliary interface) to interface I_a;
- conversion of common mode voltage at interface I_a to transverse mode at the same interface.

5.7.1 Impulse transfer from mains to interface I_a

Except where "bonding" is declared by the manufacturer for equipment with auxiliary interfaces (see subclause 5.3 of ETS 300 047-4), the test shall be carried out with no connection to connection point 1.

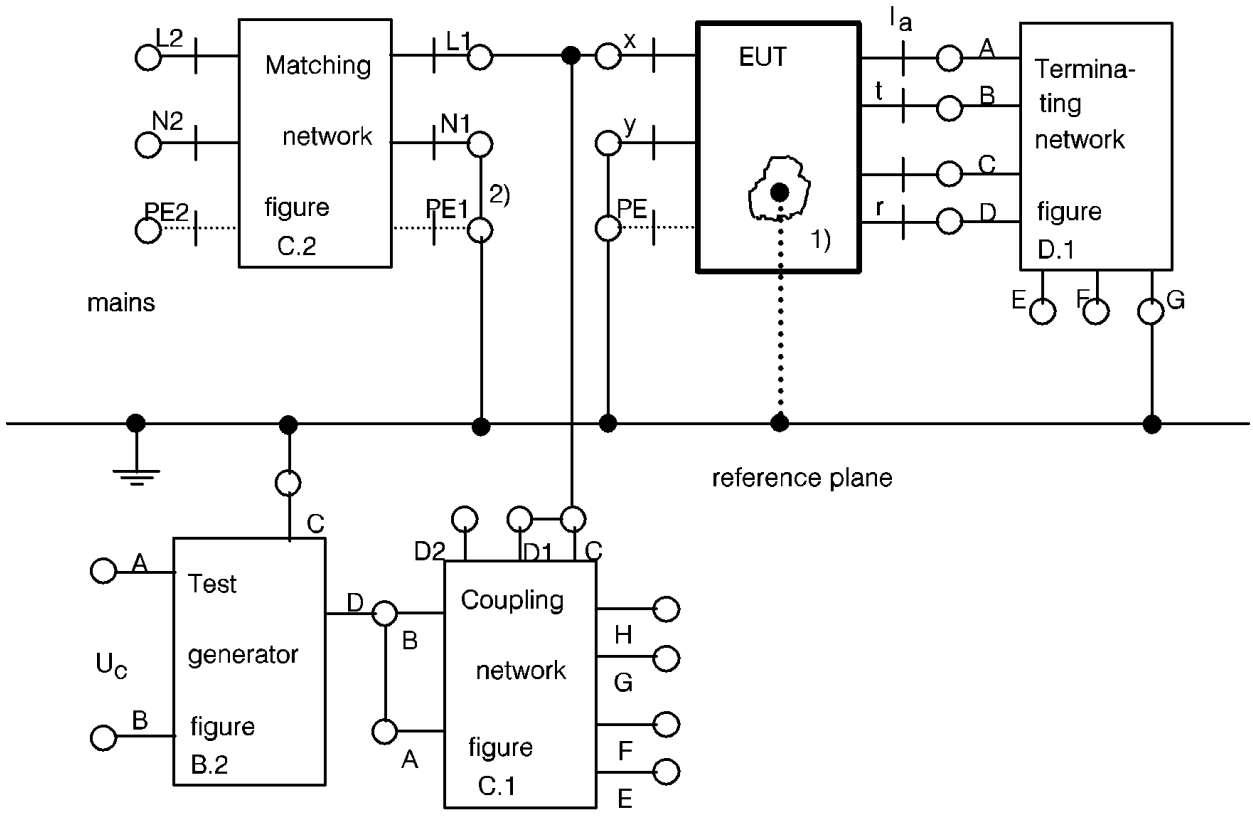
Test circuit:	figures 7 and 8.
Test voltage Uc:	2,5 kV.
Pulse form:	10/700 µs.
Number of applications:	two; one for each polarity.
Compliance criteria:	at the terminating network, figure D.1. the voltage between: - E and G shall not exceed 1 kV peak; - F and G shall not exceed 1 kV peak; - E and F shall not exceed 250 V peak.

For the tests in transverse mode, the tests shall be repeated with "x" and "y" interchanged.



1) User-accessible part or metal foil.

Figure 7: Test circuit for impulse transfer from mains; common mode



1) User-accessible part or metal foil.
2) See Clause 5 of ETS 300 047-1 [3].

Figure 8: Test circuit for impulse transfer from mains; transverse mode

5.7.2 Impulse transfer from auxiliary interfaces

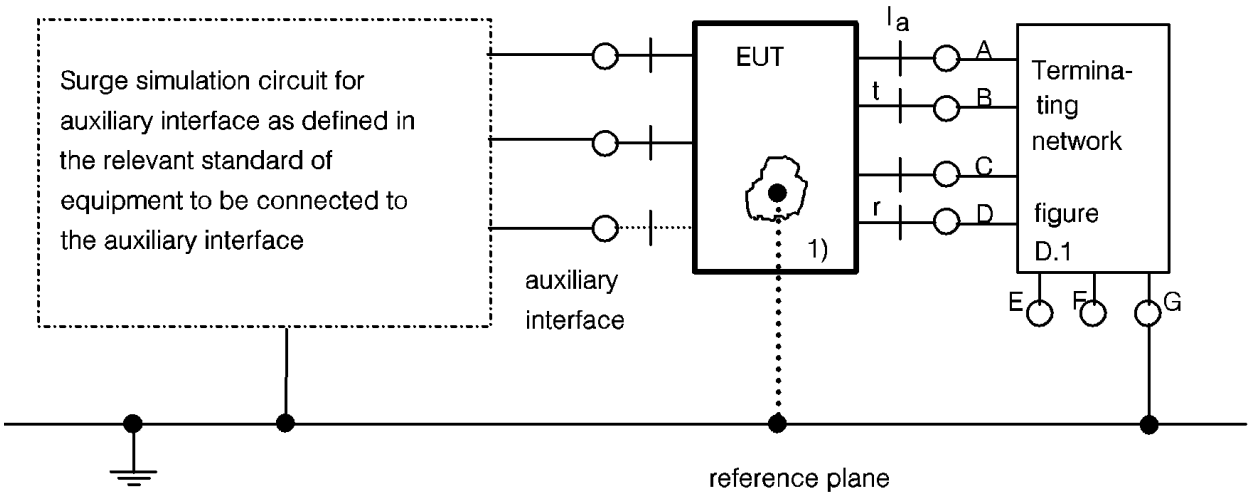
For the purpose of this test, any interfaces I_a other than the one under test shall be treated as auxiliary interfaces.

The test shall be applied to each type of construction of auxiliary interface, but only where the interface has a specified maximum withstand test voltage greater than 250 V in common or transverse mode.

Except where "bonding" is declared by the manufacturer for equipment with auxiliary interfaces, in compliance with subclause 5.3 of ETS 300 047-4, the test shall be carried out with no connection to connection point 1.

Test circuit:	figure 9.
Test voltage Uc:	as specified in relevant standard.
Pulse form:	as specified in relevant standard.
Number of applications:	two; one for each polarity.
Compliance criteria:	at the terminating network, figure D.1. the voltage between: - E and G shall not exceed 1 kV peak; - F and G shall not exceed 1 kV peak; - E and F shall not exceed 250 V peak.

In the absence of a relevant standard, Uc and the pulse form shall be determined and declared by the manufacturer of the EUT. Guidance can be found in ETR 012 ("Terminal Equipment (TE); Safety categories and protection levels at various interfaces for telecommunication equipment in customer premises").



1) User-accessible part or metal foil.

Figure 9: Test circuit for impulse transfer from auxiliary interface

5.7.3 Conversion of common mode to transverse mode

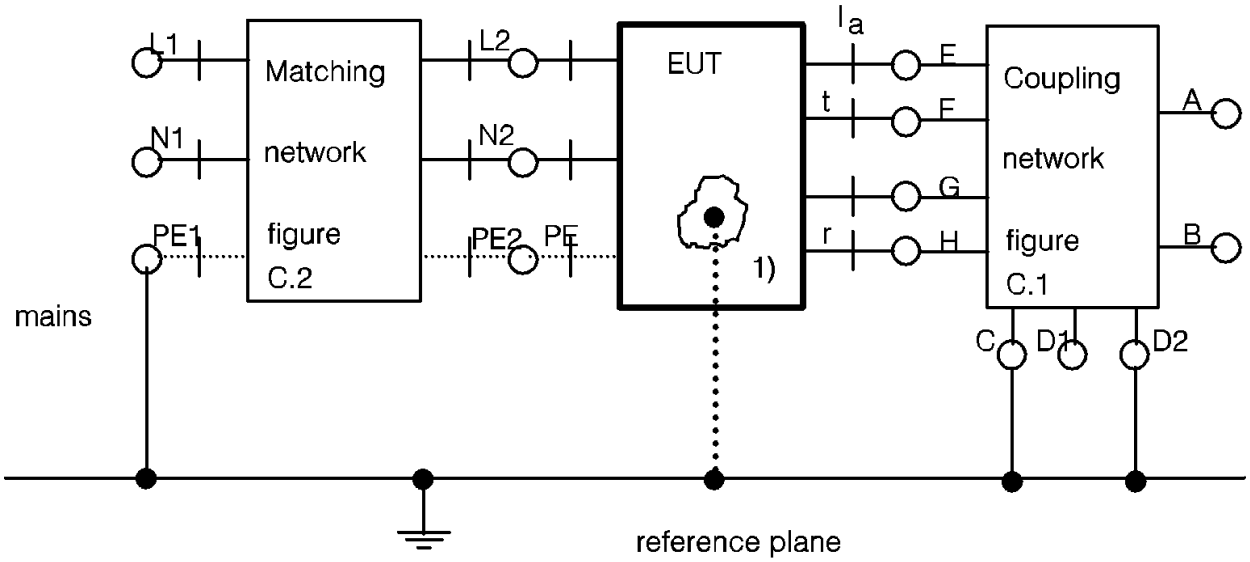
Test circuit:	figure 10.
Test voltage:	1 kV peak.
Pulse form:	1, 2/50 µs.
Number of pulses:	two; one for each polarity.
Compliance criterion:	at the coupling network, figure C.1, the voltage between C and D1 + D2, disregarding the dc component, shall not exceed 250 V peak.

5.8 Electrostatic Discharge (ESD)

For this test IEC 801-2 [4] shall be applied. Severity level 2 shall be used for contact discharge (4 kV charging voltage) and severity level 4 for air discharge (15 kV charging voltage).

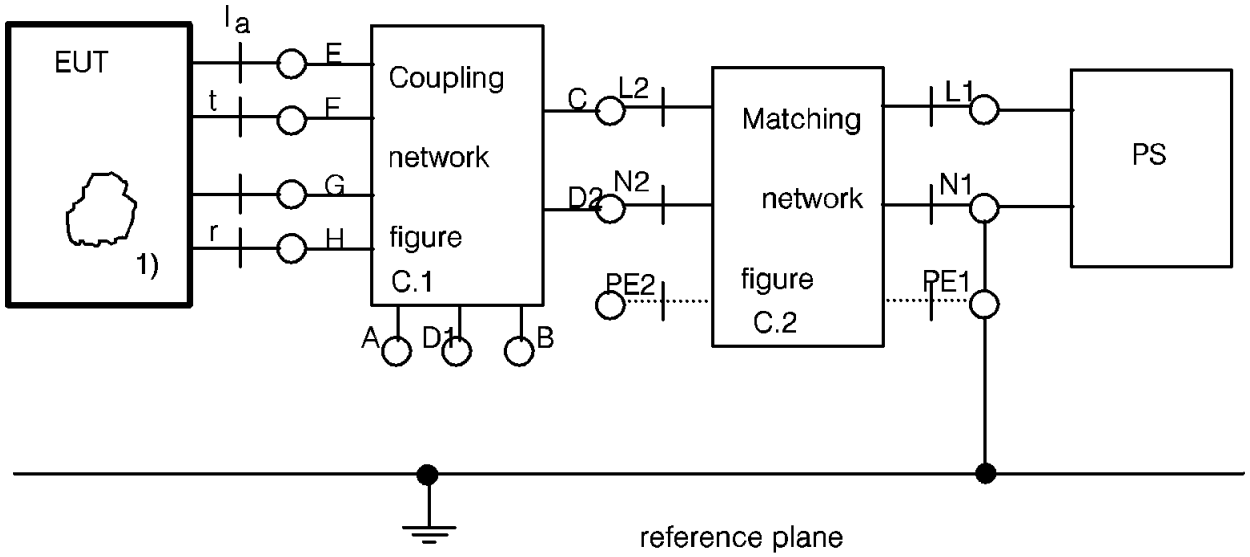
Except where "bonding" is declared by the manufacturer for equipment with auxiliary interfaces (see subclause 5.3 of ETS 300 047-4), the test shall be carried out with no connection to connection point 1).

Test circuit: figure 10 or 11.
Compliance criterion: A.



1) User-accessible part or metal foil.

Figure 10: ESD test circuit, mains powered EUT



1) User-accessible part or metal foil.

Figure 11: ESD test circuit, remotely powered EUT

5.9 Interface miswiring resistibility test

NOTE: These tests take into account four cases that the equipment may experience:

a) during connection to the interface socket the contacts of the plug does not connect through at the same point in time for all pins (short term unbalanced current through equipment transformer);

b) in an existing installation one lead of the installation may break (continuous unbalanced current through equipment transformer);

c) interchange of leads in the installation (power feeding current through the equipment transformer);

d) miswiring in an installation between an interface of the analogue telephone network and interface I_a.

The following two tests shall be applied only to remotely powered EUT or to locally powered EUT with disconnect detector (see subclause 5.3 of ETS 300 012 [5]). EUT shall be in powered up condition (except for remotely powered EUT).

Test circuit:	figures 12 and 13.
Test voltage U1:	50 V dc.
Test voltage U2:	80 V r.m.s. ac 50 Hz.
Test duration:	1 minute.
Compliance criterion:	A.

The test shall be repeated with "t" and "r" interchanged, and also with the opposite polarity unless the circuitry is clearly symmetrical.

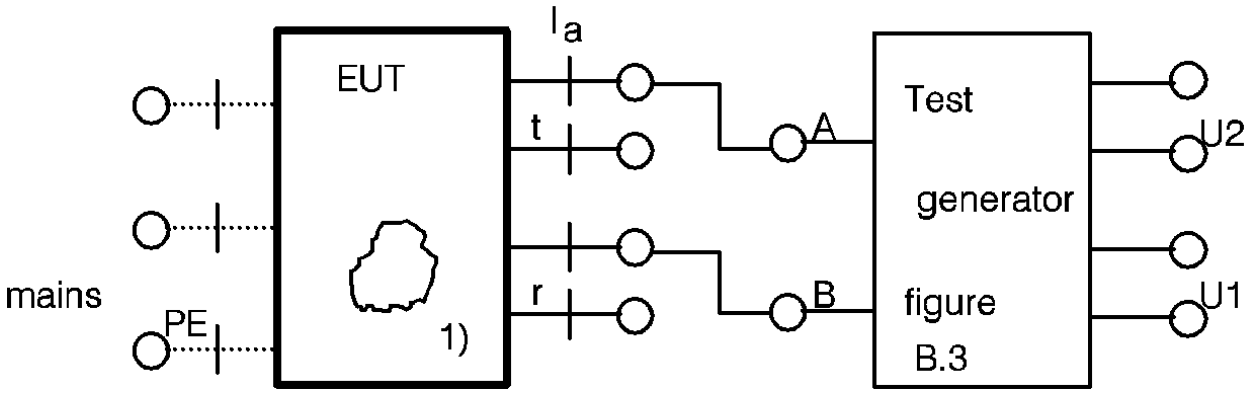


Figure 12: Test circuit simulating miswiring with analogue interface; transverse mode

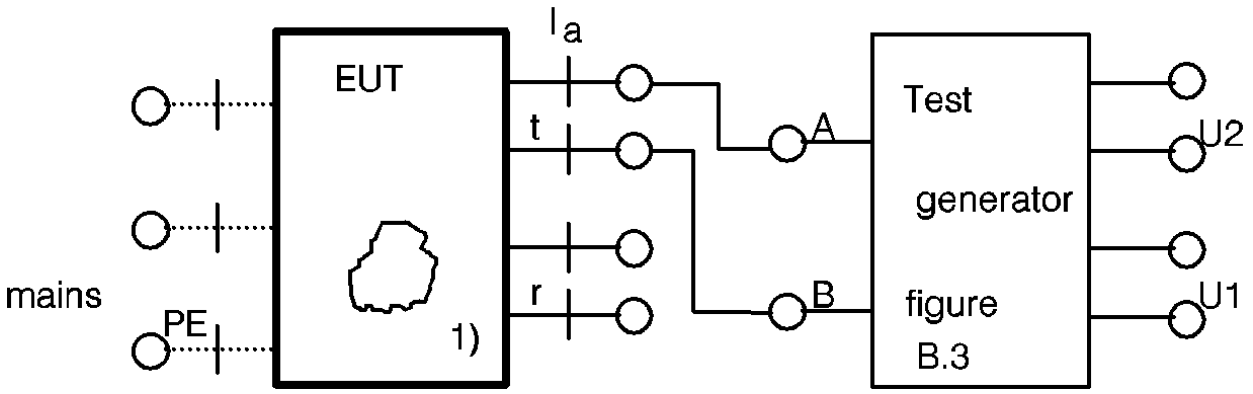


Figure 13: Test circuit simulating miswiring with analogue interface; transmit to receive

The following test shall be applied to remotely and locally powered EUT. The EUT shall be in powered up condition (except for remotely powered EUT).

Test circuit:	figure 14.
Test voltage U:	42 V.
Test duration:	1 minute.
Compliance criterion:	A.

The test shall be repeated with "t" and "r" interchanged and also with the opposite polarity unless the circuitry is clearly symmetrical.

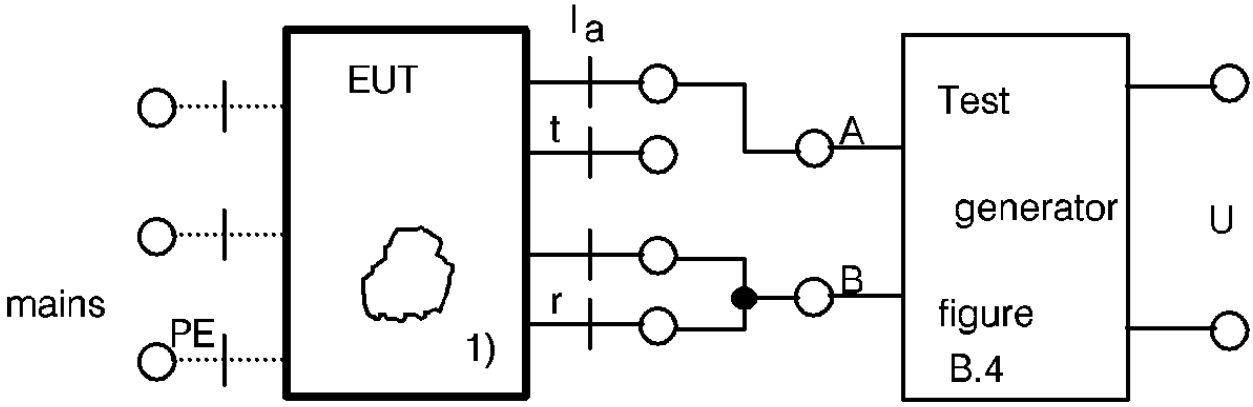


Figure 14: Test circuit simulating installation miswiring

5.10 Voltage and current limitation under single fault conditions

Under single fault conditions the output of the EUT at interface I_a shall not exceed:

1 kV peak: common mode;

250 V peak: transverse mode between transmit and receive pairs;

100 mA peak: in a 50 õ terminating resistance connected to either the or dc transmit pair or the receive pair.

Compliance shall be checked wherever possible by examination of the circuit and, in case of doubt, by simulation of single faults.

NOTE 1: Examples of single faults are:

- short circuits and open circuits of components;
- contact of adjacent circuitry or metalwork.

NOTE 2: Single fault conditions include consequential effects, including resulting failure of other components or the operation of fault-protection devices.

Annex A (normative): Enhanced requirements for "extra-strength equipment"

A.1 The following additional test shall be carried out.

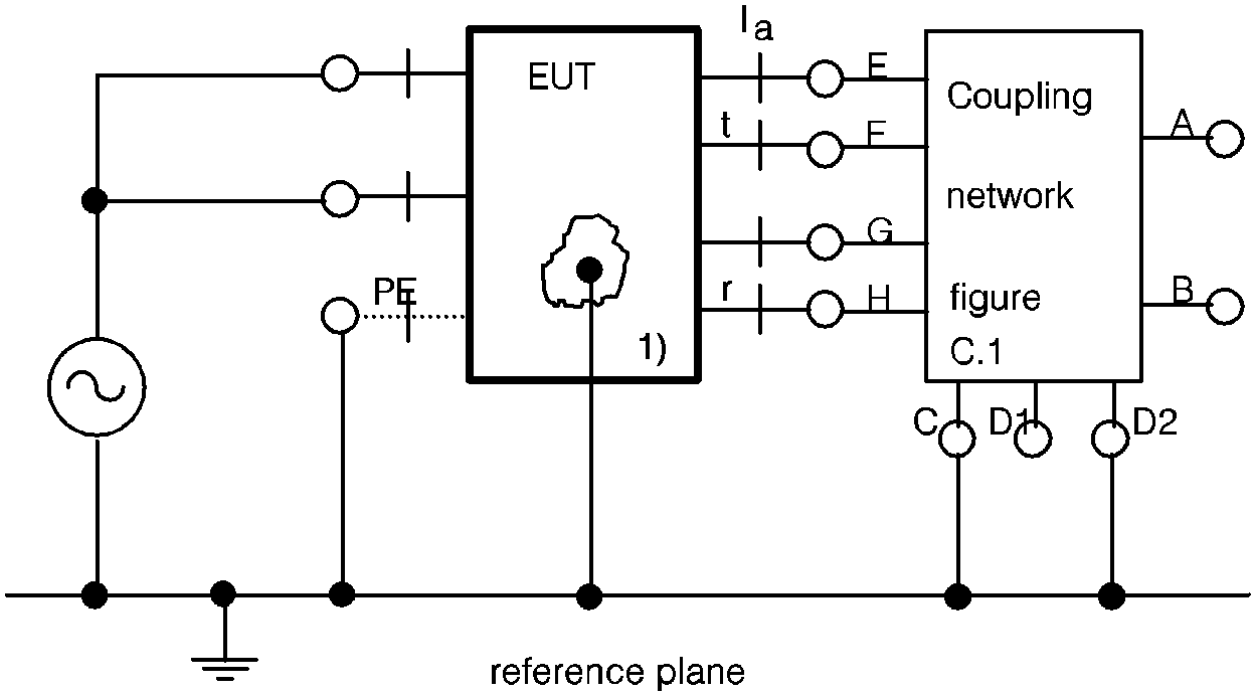
Test circuit:	figure A.1.
Test voltage:	6 kV r.m.s., 50Hz.
Duration:	1 s.
Compliance criterion:	A.

A.2 For tests according to subclause 5.6.1 the following parameters apply:

Test circuit:	figure 5.
Maximum test voltage Uc:	10 kV.
Pulse form:	10/700 µs.
Number of pulses:	10, with alternating polarity.
Compliance criterion:	A.

A.3 For tests according to subclause 5.5.1 the following parameters apply:

Test circuits:	figures 1 and 2.
Maximum test voltage Uc:	2,5 kV.
Pulse form:	1, 2/50 µs.
Number of pulses:	10, with alternating polarity.
Compliance criterion:	A.



1) User-accessible part or metal foil.

Figure A.1: 50 Hz test circuit for extra-strength equipment

History

Document history	
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