EUROPEAN TELECOMMUNICATION STANDARD

ETS 300 046-3

August 1992

Source: ETSI TC-TE

Reference: T/TE 04-29

ICS: 33.080

Key words: ISDN, primary rate access, safety protection

Integrated Services Digital Network (ISDN); Primary rate 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) primary rate access interface.

This is the third part of a multi-part ETS which comprises the following.

ETS 300 046: "Integrated Services Digital Network (ISDN); Primary rate access - safety and protection":

ETS 300 046-1 (Part 1): General.

ETS 300 046-2 (Part 2): Interface I_a - safety.

ETS 300 046-3 (Part 3): Interface I_a - protection.

ETS 300 046-4 (Part 4): Interface I_b - safety.

ETS 300 046-5 (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 basic access is ETS 300 047 ("Integrated Services Digital Network (ISDN); Basic access - safety and protection, Parts 1 to 5").

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1 Scope

See Clause 1 of ETS 300 046-1 [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 apply to this ETS only when incorporated in it by amendment or revision. 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 (1988, including amendments 1 and 2): "Safety of information technology equipment including electrically operated business machines".

[3] ETS 300 046-1: "Integrated Services Digital Network (ISDN); Primary rate access - safety and protection - Part 1: General".

[4] ETS 300 046-2: "Integrated Services Digital Network (ISDN); Primary rate access - safety and protection - Part 2: Interface I_a - safety".

[5] ETS 300 046-4: "Integrated Services Digital Network (ISDN); Primary rate access - safety and protection - Part 4: Interface I_b - safety".

[6] IEC 801-2 (1991): "Electromagnetic compatibility for industrial-process measurement and control equipment - Part 2: Electrostatic discharge requirements".

[7] ETS 300 011 (1992): "Integrated Services Digital Network (ISDN); Primary rate user-network interface, Layer 1 specification and test principles".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this part of the ETS the information provided in ETS 300 046-1 [3] subclauses 3.1 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 300 046-1 [3] apply.

4 Reference configurations

See Clause 4 of ETS 300 046-1 [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".

The power feeding pair of interface I_a is indicated in the relevant figures by "p".

5.2 Test conditions

See Clause 5 of ETS 300 046-1 [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 300 046-1 [3]).

5.3 Compliance criteria

See subclause 3.1 of ETS 300 046-1 [3].

5.4 Test generators and networks

In the figures of this part of the ETS, the required test generators, coupling and terminating networks are shown in outline. The figure numbers in those outlines refer to the figures in annexes to ETS 300 046-1 [3], as follows:

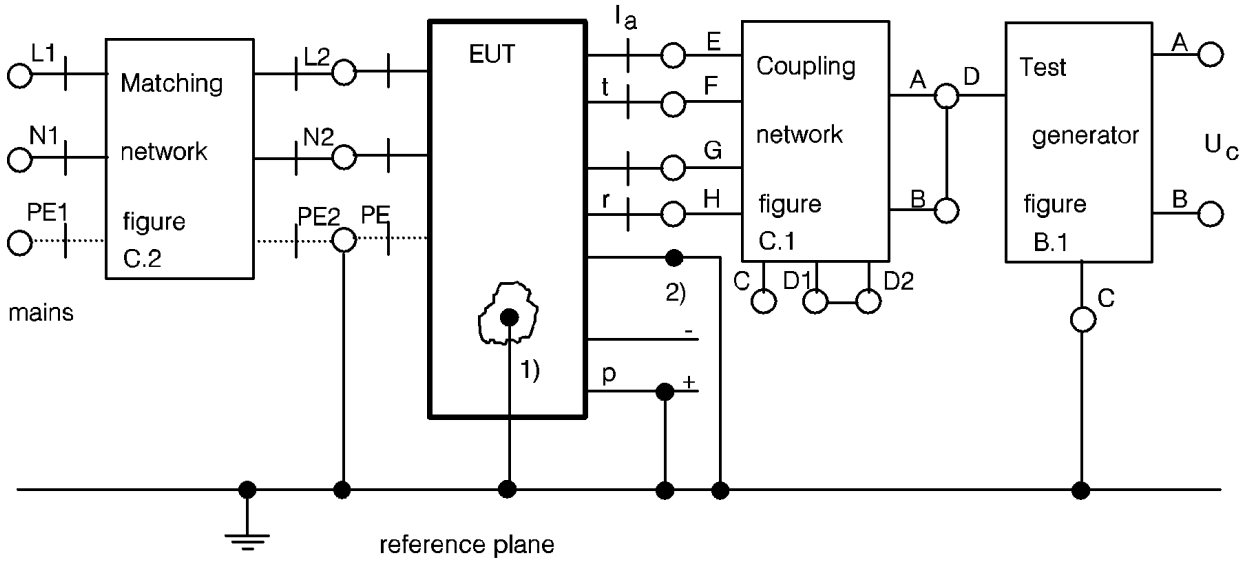
- Annex B (normative): Test generators;
- Annex C (normative): Coupling networks;
- Annex D (normative): Terminating network.

5.5 Overvoltage surge simulation at interface I_a

5.5.1 Common mode test

The test shall be carried out with connection point 2) connected to the reference plane as shown in figure 1. Except where "bonding" is declared by the manufacturer (see subclause 5.3 of ETS 300 046-2 [4]) the test shall be repeated with connection point 2) disconnected from the reference plane.

Test circuit:	figure 1.
Maximum test voltage Uc:	1 kV.
Pulse form:	1,2/50 µs.
Number of pulses:	10.
Compliance criterion:	A.



1) User-accessible part or metal foil.
2) Connection point for interface cable shield.

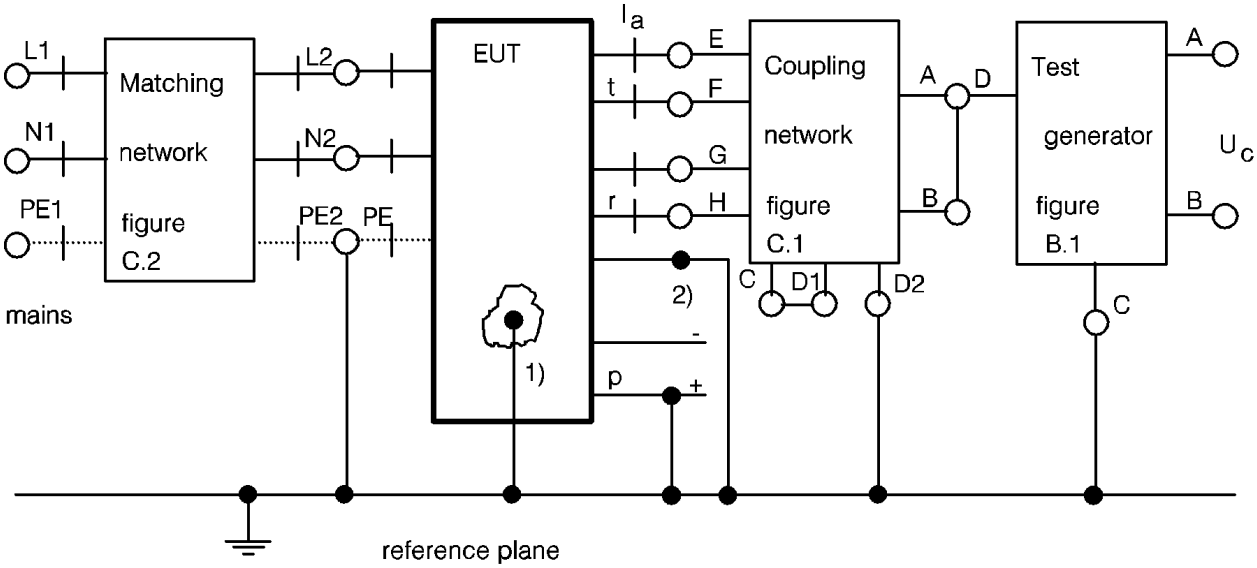
Figure 1: Test circuit for overvoltage simulation; common mode

5.5.2 Transverse mode test between transmit and receive pairs

The test shall be carried out with connection point 2) connected to the reference plane as shown in figure 2. Except where "bonding" is declared by the manufacturer (see subclause 5.3 of ETS 300 046-2 [4]) the test shall be repeated with connection point 2) disconnected from the reference plane.

Test circuit:	figure 2.
Maximum test voltage Uc:	250 V.
Pulse form:	1,2/50 µs.
Number of pulses:	10.
Compliance criterion:	A.

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



1) User-accessible part or metal foil.
2) Connection point for interface cable shield.

Figure 2: Test circuit for overvoltage simulation between pairs

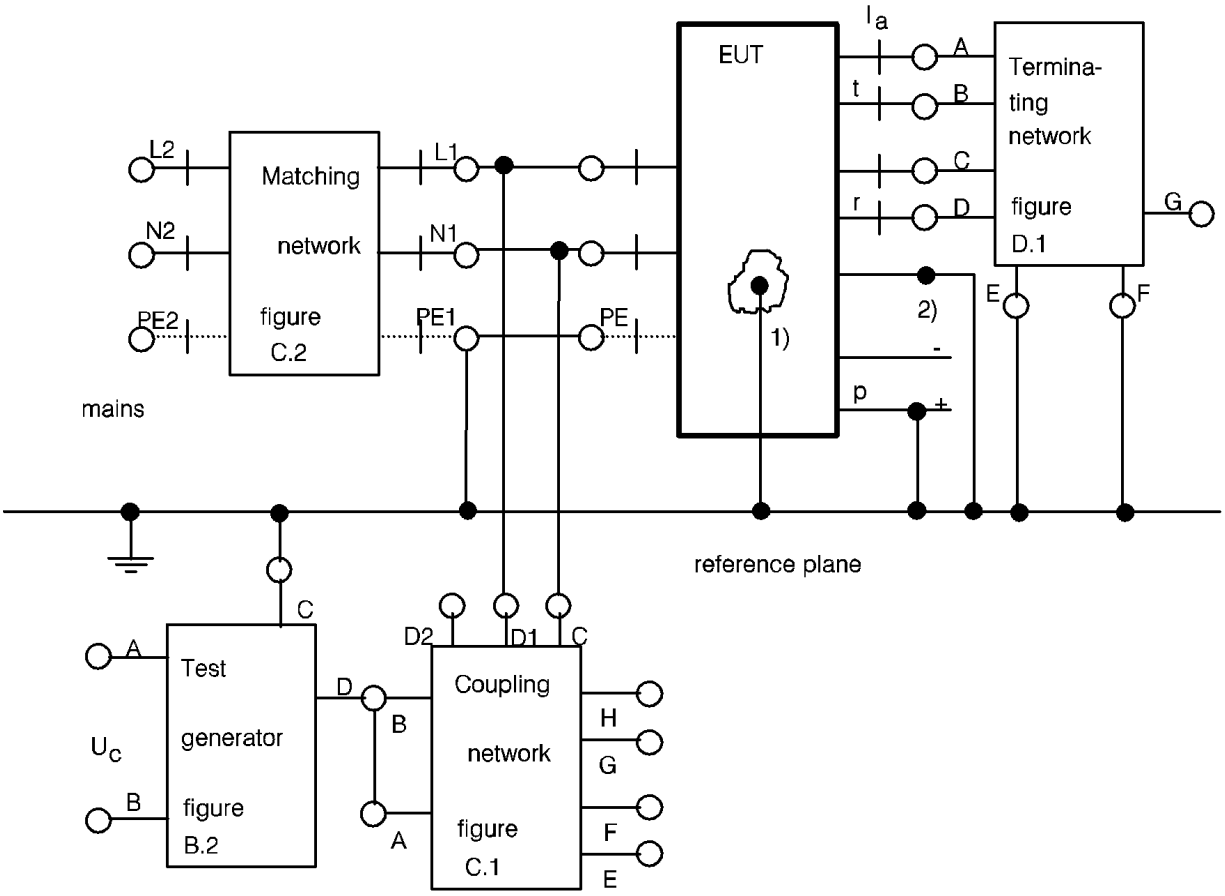
5.6 Mains overvoltage simulation

NOTE: The test conditions and parameters in subclause 5.6 are based on CCITT Recommendation K.22, IEC 364 and IEC 664 (see Clause 2 of ETS 300 046-1 [1] for title details).

5.6.1 Common mode test

The test shall be carried out with connection point 2) connected to the reference plane as shown in figure 3. Except where "bonding" is declared by the manufacturer (see subclause 5.3 of ETS 300 046-2 [4]) the test shall be repeated with connection point 2) disconnected from the reference plane.

Test circuit:	figure 3.
Maximum test voltage Uc:	2,5 kV.
Pulse form:	10/700 µs.
Number of pulses:	10.
Compliance criterion:	A.



1) User-accessible part or metal foil.
2) Connection point for interface cable shield.

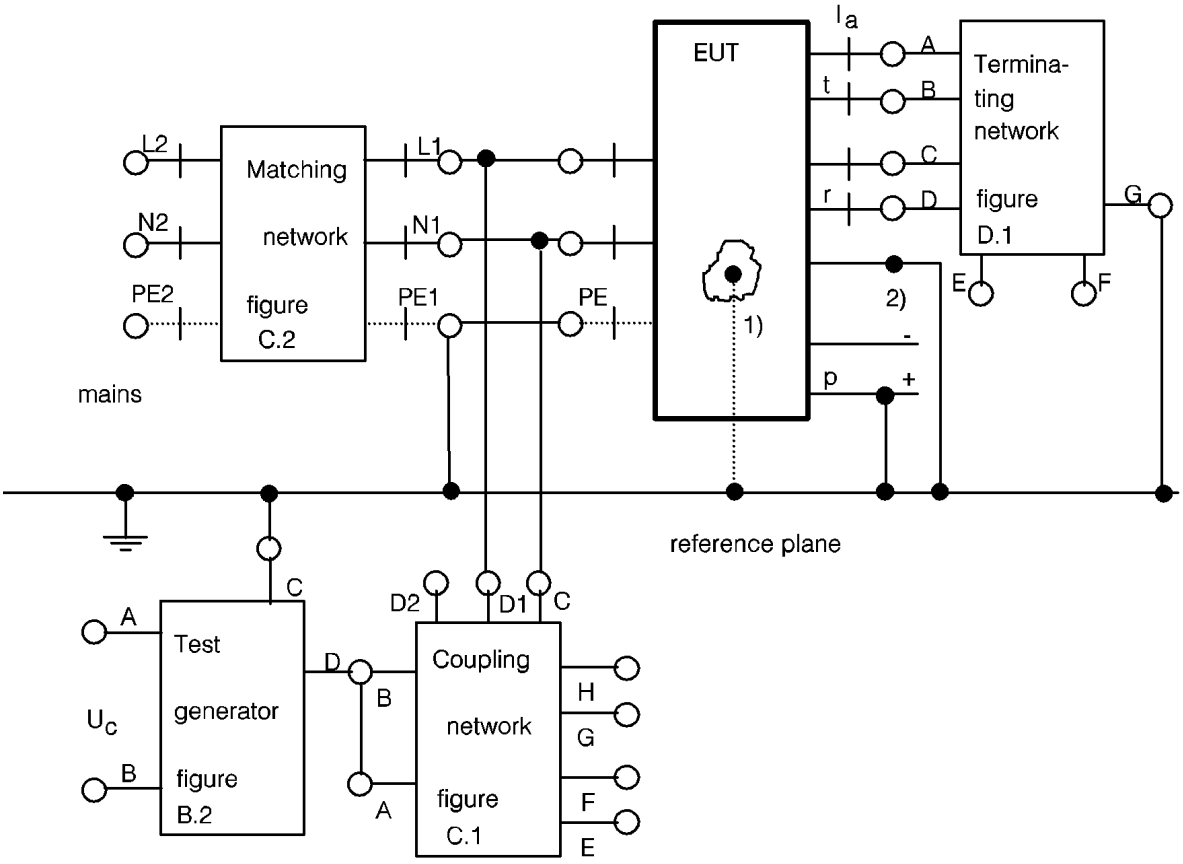
Figure 3: Test circuit for mains overvoltage simulation; common mode

5.6.2 Transverse mode test

The test shall be carried out with connection point 2) connected to the reference plane as shown in figure 4. Except where "bonding" is declared by the manufacturer (see subclause 5.3 of ETS 300 046-2 [4]) the test shall be repeated with connection point 2) disconnected from the reference plane.

Test circuit:	Figure 4.
Maximum test voltage Uc:	2,5 kV.
Pulse form:	10/700 µs.
Number of pulses:	10.
Compliance criterion:	A.

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



1) User-accessible part or metal foil.
2) Connection point for interface cable shield.
3) See subclause 5.3 of ETS 300 046-1 [3].

Figure 4: Test circuit for mains overvoltage simulation; transverse mode

5.7 Impulse transfer

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

- transfer of overvoltage from one interface (e.g. mains or interface I_b or an auxiliary interface) to interface I_a;

- conversion of common mode voltage at interface I_a to transverse mode at the same interface.

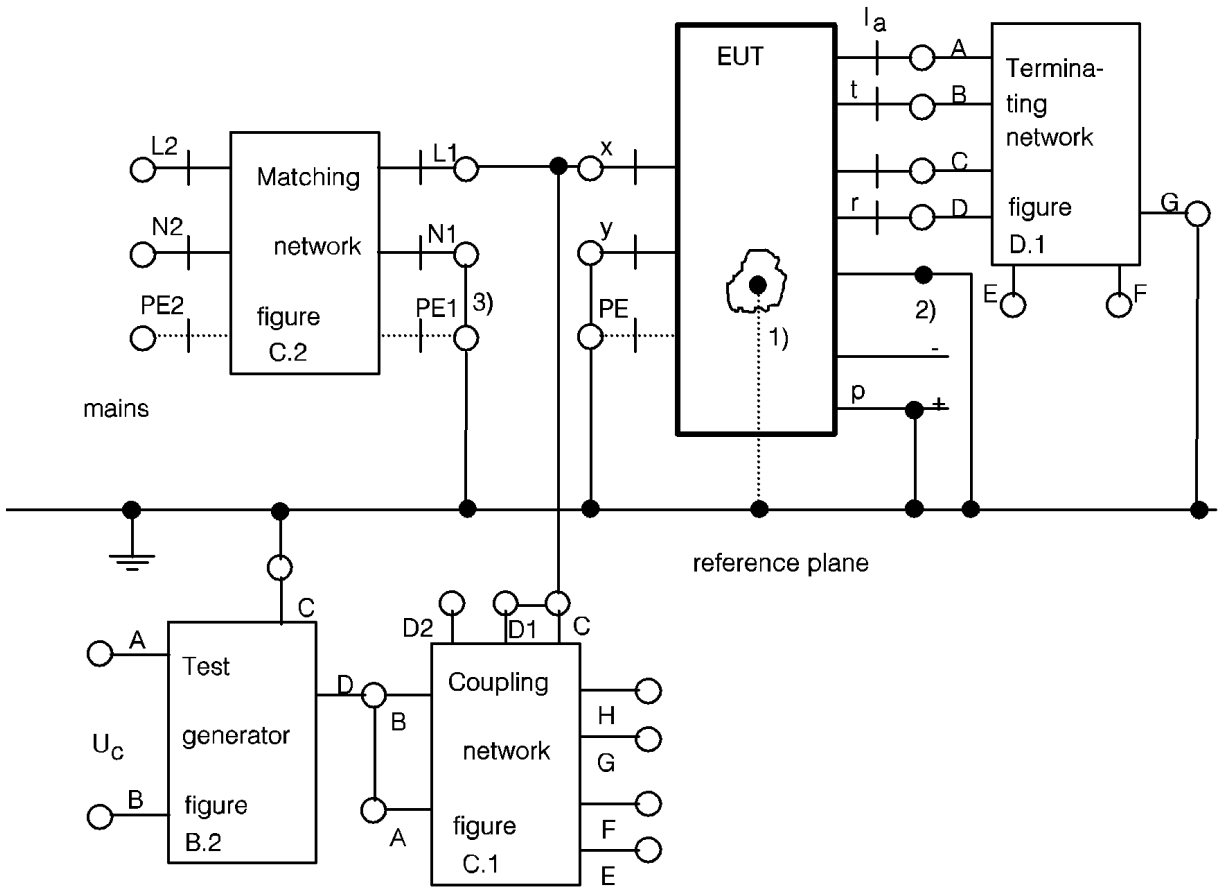
5.7.1 Impulse transfer from mains (common mode and transverse mode)

Except where "bonding" is declared by the manufacturer (see subclause 5.3 of ETS 300 046-2 [4]) the test shall be carried out with no connection to connection point 1).

The test shall be carried out with connection point 2) connected to the reference plane as shown in figure 5. Except where "bonding" is declared by the manufacturer (see subclause 5.3 of ETS 300 046-4 [5]) the test shall be repeated with connection point 2) disconnected from the reference plane.

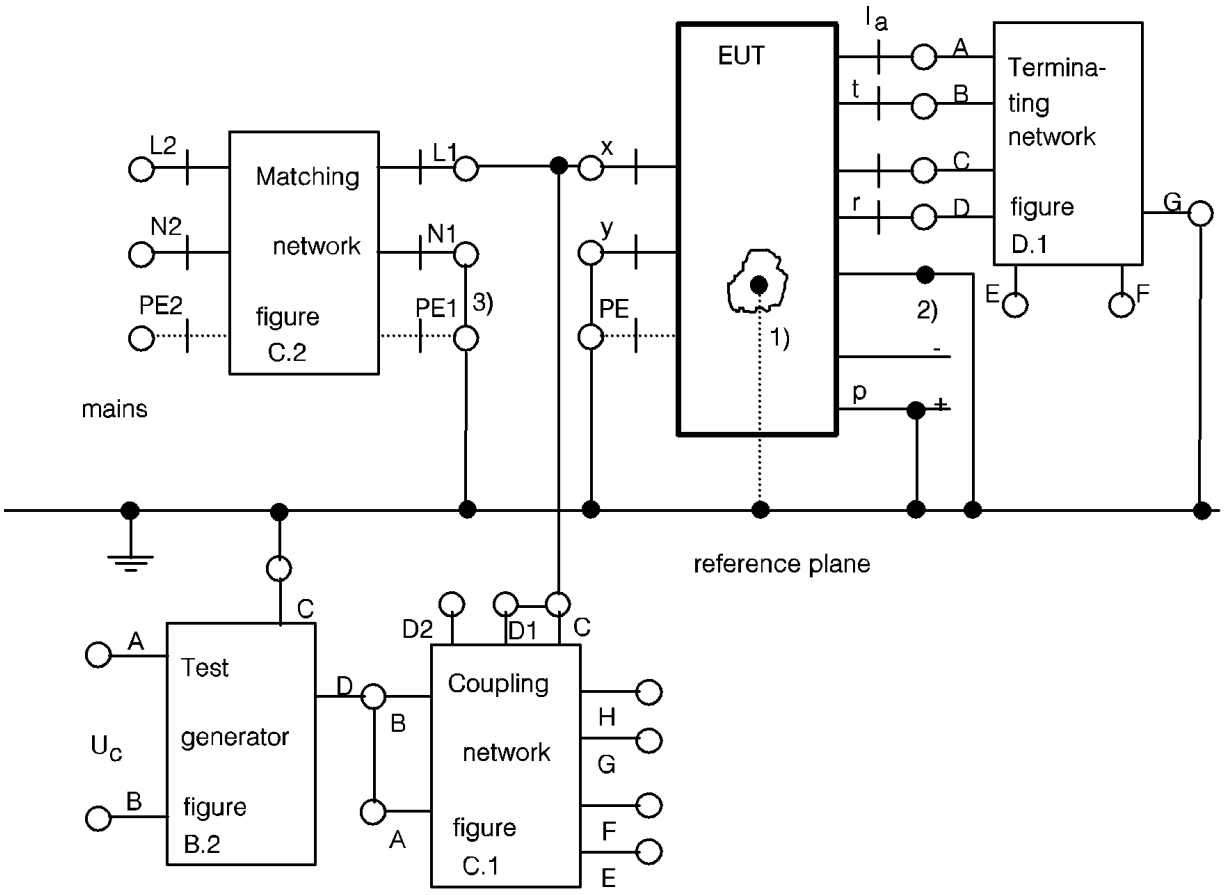
Test circuit:	figures 5 and 6.
Test voltage Uc:	2,5 kV.
Pulse form:	10/700 µs.
Number of applications:	two; one for each polarity.
Compliance criteria:	at the terminating network, figure D.1, the voltage between: - E and G shall not exceed 1 kV peak, - F and G shall not exceed 1 kV peak, - E and F shall 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.
2) Connection point for interface cable shield.

Figure 5: Test circuit for impulse transfer from mains; common mode



1) User-accessible part or metal foil.
2) Connection point for interface cable shield.
3) See subclause 5.3 of ETS 300 046-1 [3].

Figure 6: Test circuit for impulse transfer from mains; transverse mode

5.7.2 Impulse transfer from auxiliary interface

If "bonding" is declared by the manufacturer in compliance with subclause 5.3 of ETS 300 046-2 [4], this test is unnecessary and shall not be carried out.

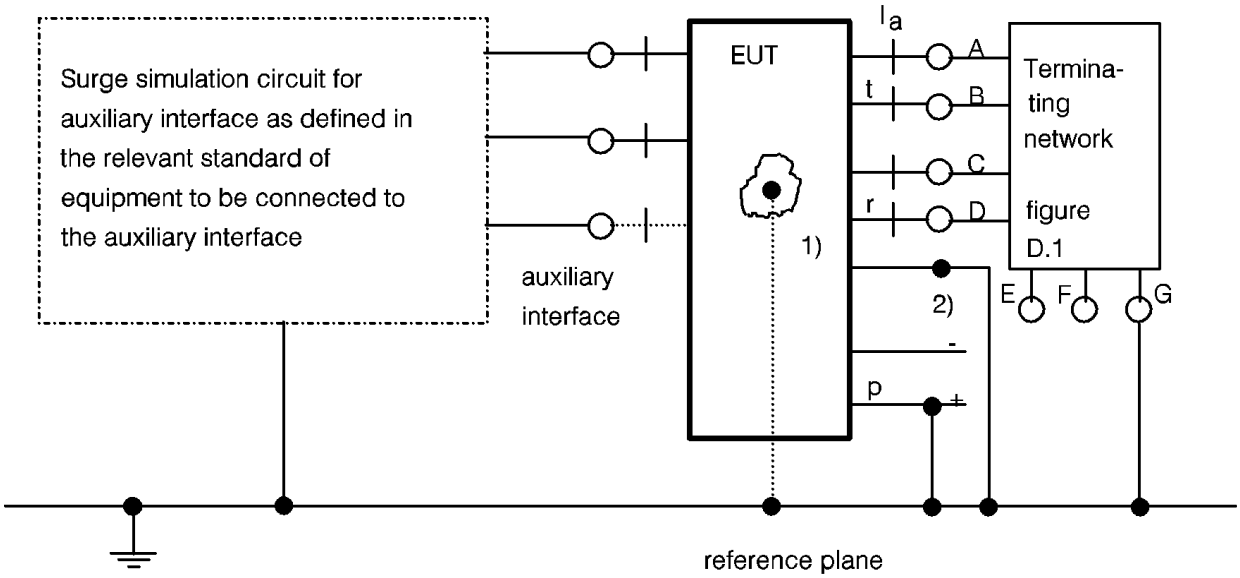
The test shall be applied to each type of construction of auxiliary interface, but only where the interface has a specified maximum withstand test voltage greater than 250 V in common or transverse mode.

The test shall be carried out with no connection of connection point 1) to the reference plane.

The test shall be carried out with connection point 2) connected to the reference plane as shown and repeated with connection point 2) disconnected from the reference plane.

Test circuit:	figure 7.
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.
2) Connection point for interface cable shield.

Figure 7: Test circuit for impulse transfer from auxiliary interfaces

5.7.3 Conversion of common mode to transverse mode

The test shall be carried out with connection point 2) connected to the reference plane as shown. Except where "bonding" is declared by the manufacturer (see subclause 5.3 of ETS 300 046-2 [4]) the test shall be repeated with connection point 2) disconnected from the reference plane.

Test circuit: figure 1.

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 shall not exceed 250 V peak.

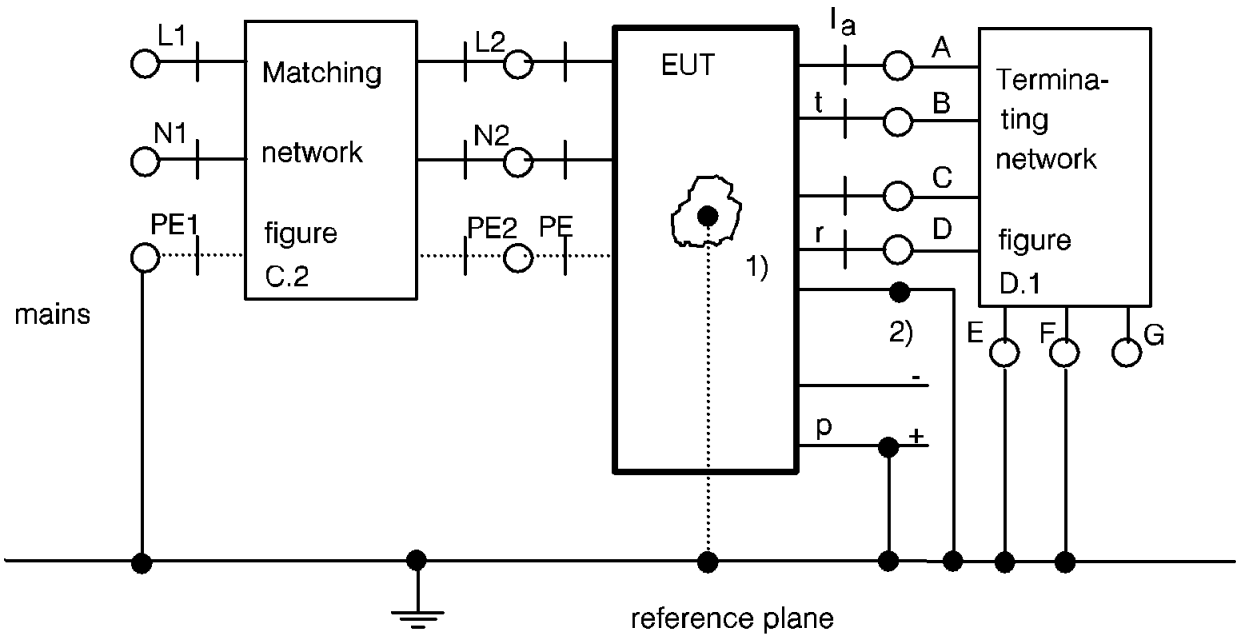
5.8 Electrostatic Discharge (ESD)

For this test IEC 801-2 [6] 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 (see subclause 5.3 of ETS 300 046-2 [4]), the test shall be carried out with no connection to connection point 1).

The test shall be carried out with connection point 2) connected to the reference plane as shown. Except where "bonding" is declared by the manufacturer (see subclause 5.3 of ETS 300 046-2 [4]) the test shall be repeated with connection point 2) disconnected from the reference plane.

Test circuit: figure 8.
Compliance criterion: A.



1) User-accessible part or metal foil.
2) Connection point for interface cable shield.

Figure 8: ESD test circuit

5.9 Miswiring resistibility test

Short circuit and overload protection for power sources are specified in ETS 300 011 [7].

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 or d.c. in a 120 • terminating resistance connected to either the 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.

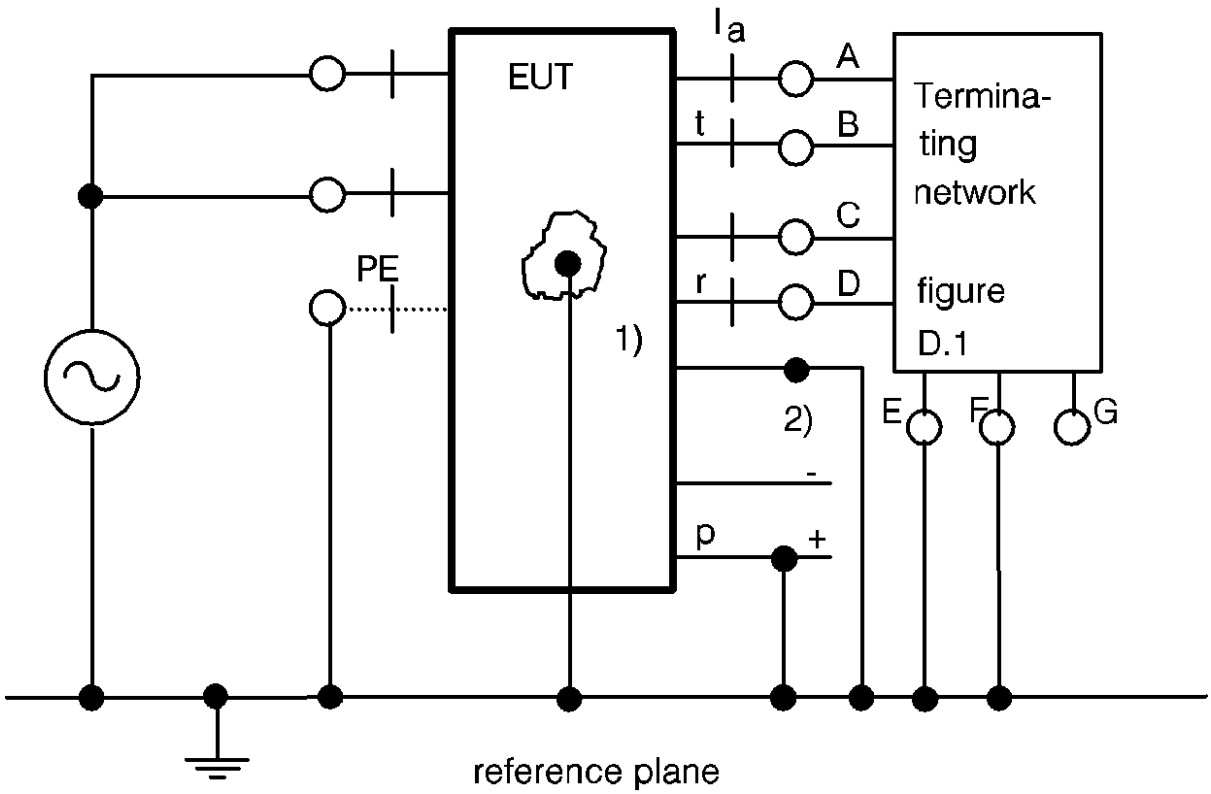
Annex A (normative): Enhanced requirements for "extra-strength equipment"

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 3.
Maximum test voltage Uc:	10 kV.
Pulse form:	10/700 µs.
Number of pulses:	10, with alternating polarity.
Compliance criterion:	A.



1) User-accessible part or metal foil.
2) Connection point for interface cable shield.

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

History

Document history	
August 1992	First Edition
November 1995	Converted into Adobe Acrobat Portable Document Format (PDF)