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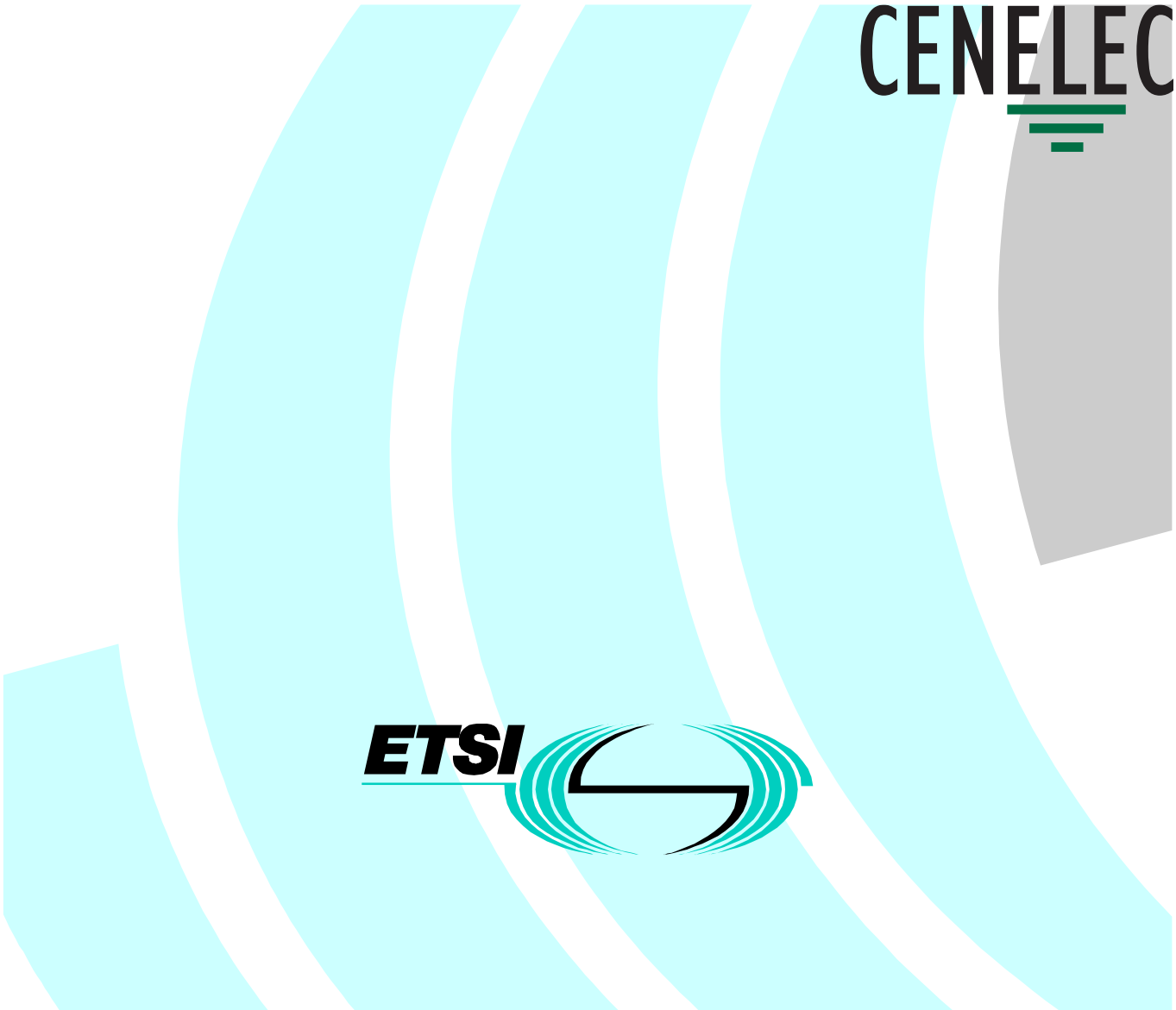
ETSI Guide

Electromagnetic compatibility and Radio spectrum Matters (ERM); Resistibility requirements for equipment having (a) telecommunication port(s)



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Contents

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Foreword

This ETSI Guide (EG) has been established by a joint ad hoc working group, which was set up between CENELEC and ETSI in order to analyse the status quo in the field of standardization concerning resistibility. The group was composed by experts from the following Technical Bodies within CENELEC and ETSI: CENELEC/SC 210A, CENELEC/TC 215, CENELEC/TC81X, CENELEC/TC 74 and ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM) (EMC-WG). The present document is now submitted for the ETSI standards Membership Approval Procedure.

Introduction

As defined in the CENELEC/ETSI Technical Report R0BT-001/ETR 238, resistibility of equipment shall be treated in the context of electromagnetic phenomena. In general, the resistibility requirements should be considered as voluntary requirements for agreement between the customers and the manufacturers. Product committees that consider resistibility requirements essential for their products, should include these requirements in their EMC standards.

Resistibility should be viewed as a necessary consideration to be taken when designing a product for its intended installation or environment. As in general the resistibility is considered as a quality issue, this may involve various mitigation techniques which a manufacturer has to determine via a dialogue with his intended customers.

Quality testing aspects are usually not addressed by the essential requirements of New Approach Directives of the European Union. However, these aspects may also be included in product standards following the provisions in CENELEC/ETSI Technical Report R0BT-001/ETR 238 (i.e. not to be included in the normative annex).

1 Scope

The present document is intended to act as guidance for technical committees with respect to:

a) the possible need to include levels of resistibility as well as immunity requirements in standards;

b) what resistibility standards and regulations exist;

c) identifying inconsistencies in the resistibility and immunity aspects of telecommunications EMC standards, which require resolution;

d) the identification of any additional basic standards which may be required;

e) identifying the relevant committees for each of the above.

Safety (electrical etc.) is excluded from the scope of the present document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, subsequent revisions do apply.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] EN 50082-1: "Electromagnetic compatibility - Generic immunity standard - Part 1: Residential, commercial and light industry".

[2] IEC 60050-701: "International Electrotechnical Vocabulary - Chapter 701: Telecommunications, channels and networks".

[3] prEN 50174-2 (1998): "Information technology - Cabling installation - Part 2: Installation planning and practices inside buildings".

[4] prEN 50303 (1998): "Application of equipotential bonding and earthling at premises with information technology equipment".

[5] HD 625.1 S1: "Insulation co-ordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests (IEC 60664-1:1992, modified)".

[6] ETR 238: "ETSI/CENELEC standardization programme for the development of Harmonized Standards related to Electro-Magnetic Compatibility (EMC) in the field of telecommunications".

[7] Directive 89/336/EEC: "Council Directive of 3 May 1989 on the approximation of the laws of the Member States relating to Electromagnetic Compatibility".

[8] Directive 91/263/EEC: "Council Directive of 29 April 1991 on the approximation of the laws of the Member States concerning telecommunications terminal equipment, including the mutual recognition of their conformity".

[9] Directive 92/31/EEC: "Council Directive 92/31/EEC of 28 April 1992 amending Directive 89/336/EEC on the approximation of the laws of the Member States relating to Electromagnetic Compatibility".

[10] Directive 93/97/EEC: "Council Directive 93/97/EEC of 29 October 1993 supplementing Directive 91/263/EEC in respect of satellite earth station equipment".

[11] ETS 300 386-1: "Equipment Engineering (EE); Telecommunication network equipment; Electro-Magnetic Compatibility (EMC) requirements; Part 1: Product family overview, compliance criteria and test levels".

[11A] ETS 300 386-1/C1: Equipment Engineering (EE); Telecommunication network equipment; Electro-Magnetic Compatibility (EMC) requirements; Part 1: Product family overview, compliance criteria and test levels".

[12] ETR 127: "Equipment Engineering (EE) - Electrostatic environment and mitigation measures for Public Telecommunications Network (PTN)".

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

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

[15] CCITT Recommendation K.17: "Tests on power-fed repeaters using solid-state devices in order to check the arrangements for protection from external interference".

[16] ITU-T Recommendation K.25: "Protection of optical fibre cables".

[17] IEC 61312-1: "Protection against lightning electromagnetic impulse - Part 1: General principles".

[18] IEC 61163-1: "Reliability stress screening - Part 1: Repairable items manufactured in lots".

[19] EN 60099-1: "Surge arresters; Part 1: Non-linear resistor type gapped surge arresters for a.c. systems (IEC 60099-1:1991)".

[20] EN 61000-4-2: "Electromagnetic compatibility (EMC); Part 4: Testing and measurement techniques; Section 2: Electrostatic discharge immunity test - Basic EMC Publication (IEC 61000-4-2:1995)".

[21] EN 61000-4-4: "Electromagnetic compatibility (EMC); Part 4: Testing and measurement techniques; Section 4: Electrical fast transient/burst immunity test - Basic EMC Publication (IEC 61000-4-4:1995)".

[22] EN 61000-4-5: "Electromagnetic compatibility (EMC); Part 4: Testing and measurement techniques; Section 5: Surge immunity test (IEC 61000-4-5:1995)".

[23] EN 61000-4-16: "Electromagnetic compatibility (EMC); Part 4-16: Testing and measurement techniques - Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz (IEC 61000-4-16:1998)".

[24] ENV 61024-1: "Protection of structures against lightning - Part 1: General principles (IEC 61024-1:1990, modified)".

[25] EN 50083: " Cabled distribution systems for television and sound signals".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document the following definitions apply.

antenna port: Port, where a radio frequency antenna is connected to equipment.

coaxial cable port: Port, where a coaxial cable (providing for non-symmetrical transmission) is connected to equipment.

NOTE 1: For the purposes of the present document the use of both indoor and outdoor coaxial cables is considered separately by distinguishing between *internal* and *external coaxial cable* respectively.

enclosure port: The physical boundary of the apparatus through which electromagnetic fields may radiate or impinge. [EN 50082-1]

NOTE 2: For the purposes of the present document the case that enclosures can be located both indoor and outdoor is considered separately by distinguishing between *internal* and *external enclosure* respectively.

immunity (to a disturbance): The ability of a device, equipment or system to perform with a specified degradation in the presence of an electromagnetic disturbance.

mains port: Port, where the mains supply is provided to equipment.

optical fibre cable port: Port, where an optical fibre cable is connected to equipment.

resistibility: The ability of equipment having (a) telecommunication port(s) to withstand the effects of electrical, magnetic and electromagnetic phenomena in accordance to a specified criterion.

NOTE 3: See 4.1 of the present document for further explanation.

symmetrical cable port: Port, where a twisted pair cable (providing for symmetrical transmission) is connected to equipment.

NOTE 4: For the purposes of the present document the use of both indoor and outdoor twisted pair cables is considered separately by distinguishing between *internal* and *external symmetrical cable* respectively.

telecommunications: Any transmission, emission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems. [701-01-05 of IEC 60050-701:1988]

telecommunication network: A metallically terminated transmission medium intended for communication between equipments that may be located in separate buildings.

NOTE 5: The term telecommunication network is defined in terms of its functionality, not its electrical characteristics.

NOTE 6: A telecommunication network may be:

- publicly or privately owned;
- subject to transient overvoltages due to atmospheric discharges and faults in power distribution systems;
- subject to permanent longitudinal (common mode) voltages induced from nearby power lines or electric traction lines.

NOTE 7: Examples of telecommunication networks are:

- a public switched telephone network;
- a public data network;
- an ISDN network;
- a private network with electrical interface characteristics similar to the above.

telecommunication port: Port which is intended to be connected to telecommunication networks, Local Area Networks (e.g. Ethernet, Token Ring) and similar networks, either through physical connection (cable optical fibber) or radio connection.

NOTE 8: In the latter case the antenna port is the telecommunication port.

3.2 Abbreviations

For the purposes of the present document the following abbreviations apply:

CATV	Community Antenna TeleVision
CBN	Common Bonding Network
CLC	CeneLeC
EE	Equipment Engineering
EEC	European Economic Community
EMC	Electro-Magnetic Compatibility
ESD	Electrostatic discharge
EUT	Equipment Under Test
I	Installers
IEC	International Electrotechnical Commission
LEMP	Lightning electromagnetic pulse
M	Manufacturers
MESH	MEdical Subjects Headings
NEMP	Nuclear electromagnetic pulse
O	Operator/owner of the network
PTN	Public Telecommunications Network
PABX	Private Automatic Branch eXchange
TC	Technical Committee
TTE	Telecommunication terminal equipment
U	Users
WG	Working Group

4 Considerations

4.1 Clarification of the term resistibility

This subclause provides for general clarification of the term "resistibility" of telecommunication equipment working within networks. In order to avoid any misinterpretation or confusion on the subject, it is considered necessary to not only provide a definition, but also to offer a more exhaustive explanation.

The term resistibility has both electrical aspects and economic implications:

a) Electrical aspects:

- Resistibility (often referred as protection) is, like EMC, often related to electromagnetic phenomena. It is essential not to mix up the resistibility of a product with its electrical safety (which is covered by EN 60950).

- Some EMC tests on ports have apart from the EMC aspect (immunity) an aspect of resistibility, i.e. protection against damage or malfunction.

EXAMPLE 1: Telecommunication port with 1,5 V signal voltage tested with a fast transient of 500 V and a surge of 1 kV 10/700 µs, 40 Ω: This is both an EMC test **and** a resistibility test. Rationale: Besides the function related disturbance criteria of e.g. "no loss of stored data" the resistibility related criterion "no damage" is required.

EXAMPLE 2: Telecommunication port with 48 V power feeding tested with 3 V conducted continuous disturbance voltage: This is only a test for EMC (immunity). Rationale: The disturbance test level is much lower than the signal/power supply voltage.

EXAMPLE 3: Telecommunication port with 48 V power feeding voltage tested with 4 kV surge 10/700 µs, 40 Ω: Applying the functional related disturbance criterion "no loss of connection in adjacent ports" this is only a test for EMC (immunity). Applying the additional resistibility requirement, "no damage," this is also a **resistibility** test.

EXAMPLE 4: Telecommunication port with 48 V power feeding voltage tested with 300 V power induction voltage and resistibility related criterion "no damage": This is only a resistibility test.

b) Economic implications:

- The resistibility requirement of telecommunication equipment and systems also depend on economic aspects such as:

  1) risk assessment (high repair costs of low protected equipment versus no repair costs of highly protected equipment, probability of occurrence of damaging electromagnetic phenomena);

  2) intended application;

  3) the mitigation methods in installations;

  4) continuity of the service;

  5) serviceability of the equipment (equipment installed in difficult to reach places, e.g. high mountains).

- Due to this aspects it can be necessary to apply higher test levels than for immunity testing.

4.2 General aspects

The present document considers resistibility (i.e. protection from damage) addressed to the needs of the whole of the telecommunication network, i.e. all types of networks, public and private, including telecommunication terminal equipment. The conclusion is that resistibility requirements:

1) are based on electromagnetic phenomena;

2) depend on nearness of power grid (e.g. medium voltage/low voltage transformers);

3) are not specific to telecommunication terminal equipment, satellite earth station equipment and all other telecommunication equipment.

On examining a representative picture of the telecommunications network (public and private) there are no indications that resistibility requirements (e.g. lightning, traction contact) should be considered as specific to telecommunication terminals as required by the TTE Directive [8].

Resistibility of telecommunication equipment from damage:

- is related to electromagnetic phenomena;
- is related to nearness of power grid;
- is related to mitigation methods in installation;
- covers public and private networks;
- covers all active or passive technical components of a network;
- deals with the continuity of a service.

This large number of considerations implies the definition of several levels of resistibility requirements.

It is considered that product standards have to be used in engineering practice together with standards offering system approaches, mitigation methods etc. in a consistent manner. Not every aspect of resistibility needs to be covered by product standards, however, for the planning and installation of a telecommunications network these product standards will provide for the relevant information concerning the equipment's resistibility.

Table 1 summarizes, how resistibility and mitigation methods can be managed with such a system approach in the context of premises cabling.

In general, three different types of electromagnetic environments can be identified, which obviously require different measures depending on the kind and/or complexity of the terminals attached or the installations concerned.

The notes in table 1 refer to the relevant matrix element(s), which is (are) identified by the indicated row(s) and column(s). For example, note 2 refers to the entries in column "Old Buildings" for both "controlled" and "uncontrolled environment".

Table 1: Management of resistibility and mitigation methods on premises cabling

Electromagnetic Environment Type	Installation of				
	Terminals without mains (note 1)		Terminals with mains, small PABX and large installations in		
		Responsible (note 4)	Old buildings (notes 2 and 3)	New buildings (note 3)	Responsible
CONTROLLED ENVIRONMENT (notes 1 and 2) (the possible effects of high electromagnetic phenomena are reduced with certain techniques)	• Minimal resistibility required. • User can decide by himself on reinforced resistibility.	(M) (U)	• Normal resistibility corresponding to national specifications and specific criteria according to applications. • Minimal bonding for PABX (EN 50174-2).	• Normal resistibility corresponding to national specifications and specific criteria according to applications. • Normal bonding (CBN) (EN 50303, EN 50174-2).	(M) (I) (U) (I)
UNCONTROLLED ENVIRONMENT (notes 1 and 2)	• Normal resistibility corresponding to national specifications. • Primary protection specified by operator. • User can decide for internal or external protection.	(M) (O) (U)	• Normal protection (For mains category 1 or 2 of HD 625.1 S1). • reinforced resistibility (category 3 of HD 625.1 S1). • Primary protection specified by operator. • And/or external secondary protection. • Minimal bonding (EN 50174-2).	• Normal protection (For mains category 1 or 2 of HD 625.1 S1). • reinforced resistibility (category 3 of HD 625.1 S1). • Primary protection specified by operator. • And/or external secondary protection. • Normal bonding (CBN) (EN 50303, EN 50174-2).	(M) (I) (U) (M) and (O) (I) or (O) (U) (I)
EXTREMELY EXPOSED ENVIRONMENT (notes 1 and 3) (Specific applications and/or recognized geographic sites)	• Normal or reinforced resistibility for terminal. • Isolation for telecom line or high level protection defined by operator. • Minimal precautions for cabling.	(M) (O) (U)	• Reinforced resistibility. • Mains protected. • High level external protection associated with terminal or PABX. • Primary Protection. • Efficient bonding for PABX (prEN50174-2).	• Reinforced resistibility. • Mains protected. • High level external protection associated with terminal or PABX. • Primary Protection. • Reinforced bonding (MESH-CBN) (EN 50303, EN 50174-2).	(M) (I) (O) (O) (I)

NOTE 1: Very low cost protection augmented for external protection.
NOTE 2: Low cost protection to adapt with bonding and primary protection.
NOTE 3: Cost justified by quality assurance following applications (co-ordination for new installations between operator, installer, user and manufacturer).
NOTE 4: (M): Manufacturers (I): Installers (U): Users (O): Operator/owner of the network.

4.3 Management of resistibility and immunity and their relation to electromagnetic phenomena

Resistibility and immunity are closely related to electromagnetic phenomena but they should be treated as different subjects.

The levels set for immunity requirements are the minimum requirements for placing equipment onto the market. Protection of equipment from a high level of electromagnetic phenomena is termed resistibility. The product committees normally should consider the resistibility requirements as a quality issue. Since resistibility levels are often more severe than the corresponding immunity ones, different performance criteria should be produced. Such criteria will normally allow for a reduced performance of the product or even for it to be damaged. Where damage is permitted, a limitation to the spread of damage should be specified and this should not normally be beyond the physical boundary of the product.

Resistibility Testing

The equipment shall withstand the test to a performance criterion chosen from the levels of resistibility specified by the product committee or by the manufacturer, operator, installer or user, if no such committee exists.

During the test The EUT is not always expected to operate.

After the test the EUT shall operate within its specified limits. The test may cause the operation of fuses or other protection devices which may require manual intervention before normal operation is restored. If damage is permitted to occur to the EUT, then such damage is limited to the physical boundary of the EUT.

Mitigation methods may be used to increase a products resistibility and these (e.g. surge protective devices) are sometimeS fitted beyond the boundary of the actual product. An example of such mitigation is the fitting of lightning protection to telecommunication lines near the point that they enter the building. Equipment connected to such lines would normally be beyond the boundary of the equipment. It follows that testing on such an equipment may simulate the typical installation and have the mitigation method as part of the test configuration.

In setting different test levels, as appropriate, to be applied for immunity and resistibility, the product committee shall consider the failure consequences in different electromagnetic environments.

Failure consequences are determined by economic and operational considerations such as priority and continuity of service.

The relevant product committee may decide that, for a given phenomenon, compliance with the relevant immunity test is sufficient to show compliance with the minimum resistibility requirements corresponding to a given level of resistibility.

For example:

For a simple telephone set, failure consequences may determine that immunity and resistibility test levels are identical.

On the other hand, for large switching equipment or banking terminals, failure consequences may require immunity and resistibility test levels to be different.

4.4 Electromagnetic phenomena with respect to physical ports

Table 2 has been developed to identify protection needs and to match these with existing standardization groups and the standards (including projects) they are responsible for, if any.

5 Recommendations

Table 3 contains a summary of the recommendations that are addressed to the relevant Technical (Sub-) Committees of both CENELEC and ETSI, being in charge of standardization of telecommunications equipment.

6 Conclusions

Table 4 summarizes the more general conclusions drawn by the CENELEC/ETSI ad hoc group from their deliberations outlined in the present document.

In addition, the following advice shall be considered:

a) As resistibility is in the context of the electromagnetic phenomena this should not be included in standards or TBRs that are mandatory for the Telecommunications Terminal Equipment Directive 91/263/EEC or its supplement 93/97/EEC concerning Satellite Earth Station equipment.

b) Electrical safety shall be excluded from the scope of the standards produced and (or) amended as a result of the present document. Product committees should be instructed to remove safety aspects from their EMC standards.

c) Resistibility should in general be considered a quality issue and as such should not normally be subject to legislation, as the responsibilities are shared between manufacturers, operators, installers and users.

d) Product committees considering the inclusion of resistibility requirements into an EMC standard should ensure that these requirements are clearly indicated as such.

e) Where low cost „no repair, throw away" products are involved, the cost of protection against external electromagnetic phenomena may not be reasonable. In this case resistibility requirements should not be taken into account by the standardization committees.

f) Direct lightning stroke:

   - mitigation methods shall apply as detailed by CENELEC/TC 81X and other relevant European Standards provided by CENELEC;

   - to check if existing documents being prepared by ITU-T and IEC/CENELEC are covering direct lightning stroke on external enclosures efficiently. CENELEC and ETSI may be requested to send a liaison statement to ITU and IEC/CENELEC, if this topic is not covered;

   - liaison statement to ETSI/TC ERM with reference to direct lightning stroke to antennae.

g) Coaxial cable ports: A basic standard encompassing test methods for all resistibility aspects for coaxial cable ports needs to be prepared. This may cover EMC and resistibility. The relevant CENELEC/TC 210 should be asked to prepare the standard (by setting up a joint working party of experts from both CENELEC and ETSI).

Table 2: Phenomena and physical ports requiring resistibility measures

Phenomenon	Physical port to be covered	Standards groups involved, existing standards	Proposal of ad hoc group for resistibility requirements
Induced disturbance due to lightning.	External symmetrical cable.	CLC/TC 81X, ITU-T Recommendation K-series.	*CLC/SC 210A WG 1 to examine the need of a resistibility test.* For network equipment use, for instance, ETS 300 386-1. *The relevant EMC standards should be used to replace the protection requirements of ETS 300 046 and ETS 300 047 series and relevant TBRs. Some TBRs address safety aspects as "protection" - these issues should be dealt with by CLC/TC 74 (as has been already agreed for the safety parts of ETS 300 046 and ETS 300 047).* Determine resistibility from CLC/TC 81X standards.
	External coaxial cable.	ITU-T Recommendation K.17, CLC/TC 209.	CATV covered by CLC/TC 209 (see EN 50083 series). *CLC/TC 81X, CLC/SC 210A WG 1, ETSI/TC ERM (EMC-WG) to examine the application of their respective standards to coaxial cable.* *Basic standard required which details resistibility test methods for both attached equipment and the cables itself.*
	Internal symmetrical cable.	ITU-T Recommendation K-series, ETS 300 386-1.	CLC/TC 215 should consider in EN 50174 series. ETSI/TC ERM should consider in its relevant standards.
	Internal coaxial cable.	some guidance given in ITU-T Recommendation K. series.	CLC/TC 81X develop EN 502XX. *Basic standard required which details resistibility test methods for both attached equipment and the cables itself.*
	Optical fibre cable (internal, external).	EN 50210:1997 (IEC 81/99/CDV = future IEC 61163-1), ITU-T Recommendation K.25.	Determine resistibility from CLC/TC 81X.
	Mains.	EN 61000-4-5 (IEC 61000-4-5), ETS 300386 -1.	*CLC/SC 210A WG 1 to examine the need of a resistibility test.*
Direct lightning stroke (no test is justified by Article 4b of the EMC Directive).	External symmetrical cable, External coaxial cable, Optical fibre cable (internal, external).	For all types of cables mitigation measures can be applied to reduce effects due to direct lightning stroke (see CLC/TC 81X work, IEC 61312-1). CLC/TC 209. EN 50210:1997 (TC 81X).	*CLC/TC 81X to prepare a document for mitigation measures.* *CLC/TC 81X to examine methods of reducing effects of this phenomenon* Refer to EN 50210.
	External enclosures.		Guidance for mitigation may be required.
	Mains.	EN 60099-1, IEC TC 81 (IEC 61312-1), IEC SC 37A, B.	Refer to IEC/TC 81 and AJWG (IEC TCs 28, 37, 64, 77, 81).
	Antenna.		Guidance for mitigation may be required.
Contact with AC mains. (no test is justified by Article 4b) of the EMC Directive).	External symmetrical cable.	ITU-T Recommendation K-series.	CLC/SC 210A WG 1 and ETSI/TC ERM (EMC-WG) examine the necessity for resistibility requirements.
	External coaxial cable.	CLC/TC 209.	

Phenomenon	Physical port to be covered	Standards groups involved, existing standards	Proposal of ad hoc group for resistibility requirements
Mains induced.	External symmetrical cable.	ITU-T Recommendation K-series, CLC/TC 210 WG 3, EN 61000-4-16.	Resistibility to be examined by : CLC/TC 210 WG 3, ETSI/TC ERM (EMC-WG) , CLC/SC 210A WG 1.
	External coaxial cable.	ITU-T Recommendation K-series (repeaters are covered by K.17), CLC/TC 210 WG 3.	*Basic test methods are required.*
Induced by traction.	External symmetrical cable.	ITU-T Recommendation K-series, CLC/TC 210 WG 3, EN 61000-4-16.	*Resistibility to be examined by* : CLC/TC 210 WG 3, ETSI/TC ERM (EMC-WG) , CLC/SC 210A WG 1.
	External coaxial cable.	ITU-T Recommendation K-series (repeaters are cove-red by K.17), CLC/TC 210 WG 3, EN 61000-4-16.	*Basic test methods are required. CLC TC210 WG 3 to prepare requirements for transient effects during normal operation.*
Rise in earth potential.	External symmetrical cable, External coaxial cable.	ITU-T Recommendation K-series, CLC/TC 210 WG 3 EN 61000-4-5.	*Resistibility to be addressed by CLC/SC 210A WG 1 and ETSI/TC ERM (EMC-WG) taking into account the environmental conditions described by CLC/TC 210 WG 3.* *CLC/TC 210 WG 3 to describe both the controlled and uncontrolled environment.*
ESD.	External symmetrical cable, External coaxial cable, Internal symmetrical cable, Internal coaxial cable.	ETR 127, EN 61000-4-2.	*Resistibility to be addressed by:* ETSI/TC ERM (EMC-WG), and CLC/SC 210A WG 1. Mitigation measures as in ETR 127 to be applied.
	External enclosures.	EN 61000-4-2.	
	Internal enclosures.	EN 61000-4-2.	
	Antenna.	ETR 127.	Resistibility to be addressed by ETSI/TC ERM (EMC-WG).
Continuous RF (no mandatory testing required for resistibility).	All except Optical fibre cable (internal, external).	The application of this phenomena is insignificant compared to the other phenomena.	Site engineering should take this phenomenon into account at the time of installation.
LEMP (no mandatory testing required for resistibility).	Internal symmetrical cable.	Draft ITU-T Recommendation $K_{L.}$	May be covered by methods against induced disturbance due to lightning.
	Internal coaxial cable.		
	External enclosures.	ENV 61024-1.	
	Internal enclosures.	ENV 61024-1.	
Surges due to high voltage switching (need for mandatory testing to be determined by product committees).	Internal symmetrical cable.		*Basic test methods are required. CLC/TC210 WG 3 to prepare requirements for transient effects during normal operation* (wide spread shapes of pulse. frames).
	Internal coaxial cable.		
	Mains.		May be covered by EN 61000-4-5.
Burst (need for mandatory testing to be determined by product committees).	External symmetrical cable, External coaxial cable, Internal symmetrical cable, Internal coaxial cable, Mains.	Is covered by EMC testing, EN 61000-4-4.	May be covered by immunity testing and the criterion "no damage".
NEMP (no mandatory testing required for resistibility).	All.		

Table 3: Summary of recommendations to Technical (Sub-) Committees of CENELEC and ETSI

Recommendation	Committee					
	CENELEC					ETSI
	TC 74	TC 210	SC 210A	TC 215	TC 81X	TC ERM (EMC-WG)
5.1 examine resistibility test for "induced disturbance due to lightning" on port "external symmetrical cable" in appropriate standards.			X (WG 1)			
5.2 extract protection requirements for "induced disturbance due to lightning" on port "external symmetrical cable" from ETS 300 046/7 series and put them in the appropriate standards.			X (WG 1)			X
5.3 review TBRs to ensure that safety aspects on port "external symmetrical cable" are not included (safety to be dealt with by CLC/TC 74).	X					
5.4 "induced disturbance due to lightning" resistibility requirements for long internal symmetrical cable (port) to be examined.				X (WG 2)		X
5.5 "induced disturbance due to lightning" resistibility requirement for coaxial cable port to be examined.			X (WG 1)		X	X
5.6 "induced disturbance due to lightning" resistibility level to be examined for the mains port in appropriate standards.			X (WG 1)			
5.7 "direct lightning stroke" mitigation methods to be developed for symmetrical, coaxial and fibre optic cables.					X	
5.8 "direct lightning stroke" mitigation methods to be referenced.	X		X (WG 1 and WG 3)	X		X
5.9 Necessity for resistibility requirements concerning "Contact with AC mains" for ports "external symmetrical cable" and "external coaxial cable" to be examined.			X (WG 1)			X
5.10 Resistibility requirements concerning "mains induced" for "external symmetrical cable" to be examined for the standards of		X (WG 3)	X (WG 1)			X
5.11 Resistibility requirements concerning "induced by traction" for "external symmetrical cable" to be examined in the standards of		X (WG 3)	X (WG 1)			X
5.12 Resistibility requirements concerning "induced by traction" for transient effects during normal operation on "external symmetrical cable" to be prepared by		X (WG 3)				
5.13 Resistibility concerning "Rise in earth potential" at ports "external symmetrical cable" and "external coaxial cable" to be addressed taking into account the environmental conditions described by CLC/TC 210 WG 3.			X (WG 1)			X
5.14 Resistibility concerning "ESD" for all ports except "optical fibre port" and "mains port" to be addressed by			X (WG 1)			X
5.15 Resistibility concerning "ESD" for port "antenna" to be addressed.						X
5.16 Resistibility requirements for transient effects during normal operation concerning "Surges due to high voltage switching" at ports "internal symmetrical cable", "internal coaxial cable" and "mains" for wide-spread shapes of pulse frames to be prepared.		X (WG 3)				

Table 4: Summary of conclusions

Recommendation	Committee					
	CENELEC					ETSI
	TC 74	TC 210	SC 210A	TC 215	TC 81X	TC ERM (EMC-WG)
6.1 Basic standard for "induced disturbance due to lightning" required which details resistibility for both attached equipment and the cables when using external coaxial cables			X (WG 1)		X	X
6.2 Basic standard for "induced disturbance due to lightning" required which details resistibility for both attached equipment and the cables when using internal coaxial cables			X (WG 1)		X	X
6.3 basic standard with test methods for "mains induced" on external coaxial cable port required		X				
6.4 basic standard with test methods for "induced by traction" on external coaxial cable port required		X				
6.5 Description of both the controlled and uncontrolled environment		X (WG 3)		X	X	
6.6 Standard with basic test methods for "surges due to high voltage switching" is required		X				

History

Document history				
V1.1.1	July 1998	Membership Approval Procedure	MV 9837:	1998-07-14 to 1998-09-11