

ITU-T Study Group 5 (Environment and climate change) Study Periods, Organization and Recommendations

End of Study Period 2009-2012

Beginning of Study Period 2013-2016

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PROTECTION
ENGINEERS
GROUP CONFERENCE

March 19-21, 2013
San Ramon, CA

Updates to ITU-T Recommendations
for Telecommunication Equipment
and SPDs

Study Periods

- Study Group 5 works in four-year Study Periods
- The first meeting of a Study Period defines the organisation and projected Recommendations to be created or revised
- Study Period 2009-2012 effectively ended at the April 2012 meeting
- Study period 2013-2016 began with the January 2013 meeting

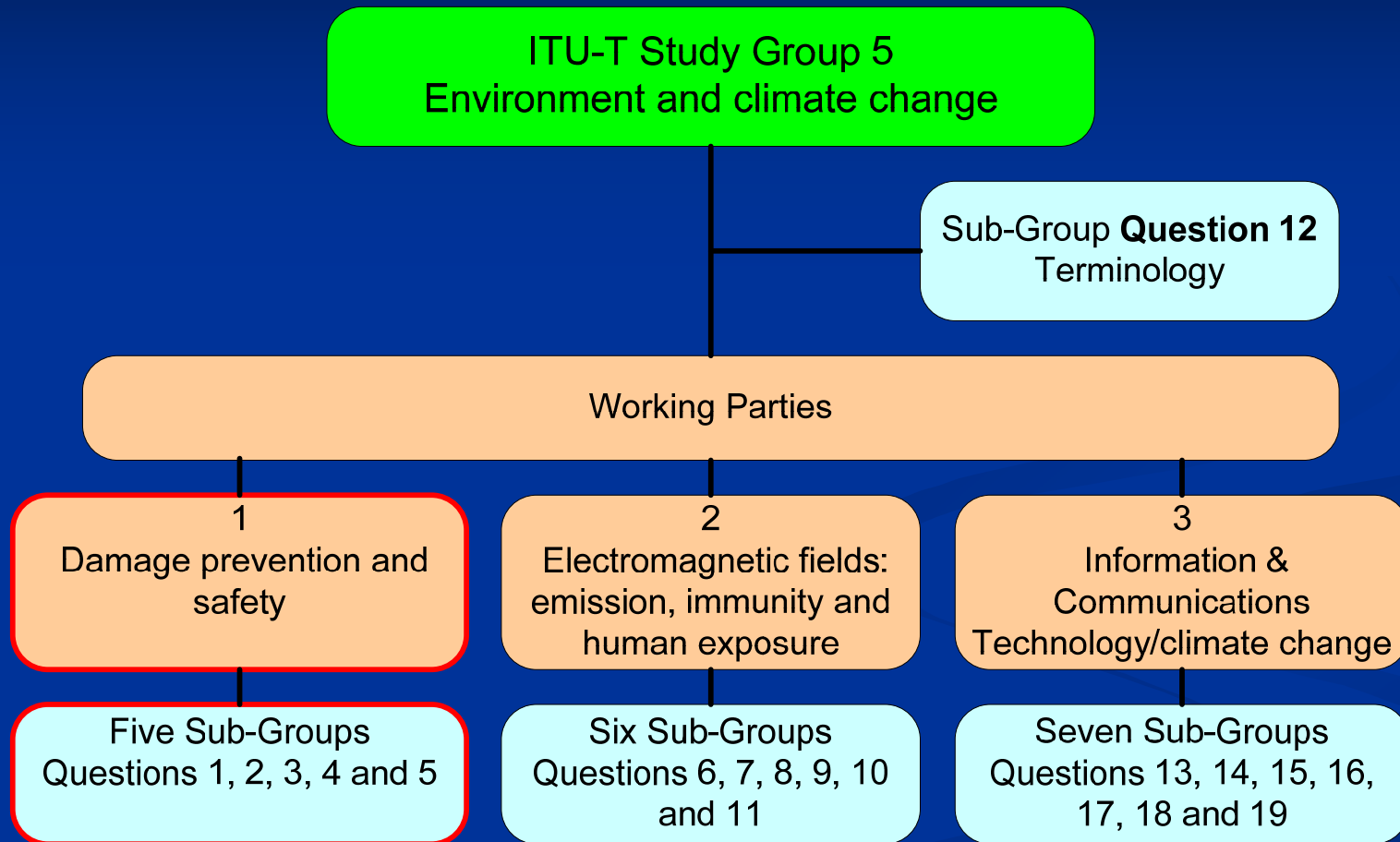


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Structure of ITU-T Study Group 5



Working Party 1/5

“Damage prevention and safety”

WP1/5 is responsible for studies relating to protection of telecommunication installations in order to reduce damages and achieve safety of telecom personnel and users of telecom services.

Sub-Group Work areas (Questions):

- Q1/5 - Copper cables, networks and fibre-optic connection hardware for broadband access
- Q2/5 - Protective components and assemblies
- Q3/5 - Interference to telecommunication networks due to power systems and electrified railway systems
- Q4/5 - Resistibility and safety in telecommunications
- Q5/5 - Lightning protection and earthing of telecommunication systems



Question 1/5 (1 of 3)

Copper Cables, Networks and Fibre-Optic Connection Hardware for Broadband Access

This Question will prepare requirements and guidance for outside and indoor network elements related to broadband applications.

Study items to be considered include, but are not limited to:

- Definition of Requirements for copper loop in order to guarantee various access technologies or services quality (for example, xDSL, IPTV, HN, etc.);
- Develop guidance for planning, performance evaluation and construction of copper networks, including indoor and structured cabling, for broadband access on FTTx or any other topologies;
- Studying characteristics of connection hardware, copper cables/wires and other network elements for broadband access.



Question 1/5 (2 of 3)

Copper Cables, Networks and Fibre-Optic Connection Hardware for Broadband Access

The following Recommendations and Handbooks, in force at the time of approval of this Question, fall under its responsibility:

- L.1, L.3, L.4, L.5, L.6, L.7, L.8, L.9, L.18, L.19, L.71, L.75, L.76.
- Jointing of Plastic-Sheathed cables,
- Jointing of Telecommunication Cable Conductors,
- Outside Plant Technologies for Public Networks.

Tasks include, but are not limited to:

- Maintenance and enhancement of the existing L-series Recommendations, if needed;
- Developing of the test procedures and specifications for broadband network elements such as connection hardware, cables, wires and other elements.



Question 1/5 (3 of 3)

Copper Cables, Networks and Fibre-Optic Connection Hardware for Broadband Access

Proposed Recommendations

- Test procedures and specifications for broadband network elements such as connection hardware, cables, wires and other elements
- L.75 Test, acceptance and maintenance methods of copper subscriber pairs, indoor network and structured cabling



Question 2/5 (1 of 5)

Protective components and assemblies

This Question will establish Recommendations for specifications, test methods and principles of application for protective components and assemblies intended to mitigate effects of lightning, power induction, ESD, fast transients and power faults that may cause permanent damage. These protective components and assemblies are related to both telecommunication and power supply circuits of telecommunication equipment.

Study items to be considered include, but are not limited to:

- Protective component changes to comprehend safety requirements, such as a thermal disconnect switch incorporated into a metal-oxide varistor;
- Coordination of overcurrent protection components with the system current capability;
- Protector parameters needed for broadband protection;
- Coordination of overvoltage and overcurrent protection;



Question 2/5 (2 of 5)

Protective components and assemblies

(Study items continued)

- Considerations intended to facilitate the selection of most effective protection method (e.g. source and intensity of overvoltages and overcurrents);
- Use of insulation barriers as a means of blocking longitudinal/common-mode voltage surges;
- Transients generated by the operation of switching-type overvoltage protectors;
- Reduction of equipment resistibility due to the use of “green” power saving techniques.

The following Recommendations and Handbooks, in force at the time of approval of this Question, fall under its responsibility:

- K.11, K.12, K.28, K.36, K.55, K.65, K.69, K.77 and K.82.
- Directives, Volume VIII

Question 2/5 (3 of 5)

Protective components and assemblies

Tasks include, but are not limited to:

- New Recommendations on the application of new protection elements and/or assemblies;
- New Recommendations on the basis of the following criteria:
 - Basic requirements, based on K.11 and K.36;
 - Product requirements, based on K.12, K.28, K.30, K.55, K.65, K.77 and K.82.
- New Recommendation on lightning isolation transformers with high impulse voltage ratings;
- New recommendation on thyristor components used for overvoltage protection;
- New Guides/Handbooks on the application of components and assemblies for protection of telecommunications installations/equipment;
- Maintenance of the existing recommendations under the responsibility of the Question;



Question 2/5 (4 of 5)

Protective components and assemblies

(Tasks continued)

- Withdraw K.36 when new Guides/Handbooks on the application of components and assemblies available.
- Possible revision of Volume VIII of the Directives with material from new Guides/Handbooks on the application of components and assemblies

Proposed Recommendations

- Surge Protective Component Application Guide - Technology Overview
- Surge Protective Component Application Guide - Gas Discharge Tubes
- Surge Protective Component Application Guide - Metal Oxide Varistors
- Surge Protective Component Application Guide - Silicon PN Junction Components
- Surge Protective Component Application Guide - Self-Restoring Current Limiters



Question 2/5 (5 of 5)

Protective components and assemblies

(Proposed Recommendations continued)

- Directives Volume VIII -Protective devices
- Handbook on Application of Surge Protective Devices
- K.36 Selection of protective devices; deletion/revision of this rec. when application guides are consented.
- Surge Protective Component Application Guide - Lightning Isolation Transformers
- Surge Protective Component Application Guide - Fuses
- Basic requirements for Surge Protective components
- Basic requirements for Surge Protective Devices

Question 3/5 (1 of 5)

Interference to telecommunication networks due to power systems and electrified railway systems

This Question provides Recommendations containing procedures and requirements to mitigate the voltages and currents that may be imposed on the telecom network by nearby high-power electric systems.

Study items to be considered include, but are not limited to:

- Interference caused by power and traction systems to telecommunication systems. (Input to the amendment of the Directives);
- Interference to telecommunication systems by the emergence of harmonics flowing on power systems. (Input to amendment of Volume V of the Directives);
- Method for identifying the transfer potential of EPR occurring in HV and/or MV substation through metallic connection or non-metallic conductive coupling with the earthing system or neutral of LV network. (Input to draft K.hvps1 regarding transfer potential);

NOTE: Magnitude of transferred voltage caused by phase to earth short circuit of MV network with directly earthed neutral and double earth fault of network with not directly earthed neutral have of special importance.



Question 3/5 (2 of 5)

Interference to telecommunication networks due to power systems and electrified railway systems

(Study items continued)

- Method for identifying the effective earth current and earthing resistance of sub-stations with special view of earthing resistance of MV/LV transformer station relevant to transferred potential in urban area. (Input to draft K.hvps2 regarding earth potential rise);
- Interference to telecommunication transmission systems other than POTS, e.g. limits for ISDN and xDSL. Transients occurring on LV supply networks as sources of interference to broadband technologies should also be considered (in collaboration with Question H/5, input to new K.int);
- Managing of the problem of induction into optic fibre cables containing metallic members. e.g. strength members, moisture barrier, screens and tracer tapes etc. (Possible input to Handbook Outside plant technologies for public networks);

Question 3/5 (3 of 5)

Interference to telecommunication networks due to power systems and electrified railway systems

(Study items continued)

- Maintenance of Recommendation K.57 aiming at the more complete coverage of the existing installations. The Recommendation K.57 is focused on the protection requirements for base station hold by towers of HV lines. However, there is an increasing need in the telecommunication market for operators to install antennas of radio base stations and/or equipment on utility poles such as MV tower and LV poles installed in urban areas.

The following Recommendations and Directives, in force at the time of approval of this Question, fall under its responsibility:

- K.5, K.6, K.7, K.8, K.9, K.13, K.14, K.19, K.26, K.54, K.57, K.68
- Directives, except Volume VIII.

Question 3/5 (4 of 5)

Interference to telecommunication networks due to power systems and electrified railway systems

Tasks include, but are not limited to:

- A new Recommendation on interference to telecommunications transmission systems other than POTS, e.g. limits for ISDN and xDSL, with special view of the more extensive use of power electronics in the future smart grids;
- A new Recommendation on transferred EPR and earth potential rise;
- Revision of Volume V of the Directives with regard to emergence of harmonics on power plant;
- Maintenance and enhancement of the relevant Recommendations, definitely K 57;
- Maintenance and enhancement of some other Volumes of the Directives.



Question 3/5 (5 of 5)

Interference to telecommunication networks due to power systems and electrified railway systems

Proposed Recommendations:

- Method for identifying the transfer potential of EPR from HV and/or MV to the earthing system or neutral of LV network
- K.57 Protection measures for radio base stations sited on power line towers
- Method for identifying the effective earth current and earthing resistance of sub-stations with special view of MV/LV transformer station in urban area
- Directives Volume V Inducing currents and voltages in power transmission and distribution systems
- Managing the problem of induction into optic fibre cables containing metallic members
- Limits of interference on telecommunication transmissions on copper other than speech

Question 4/5 (1 of 7)

Resistibility and safety in telecommunications

This question will prepare resistibility requirements for equipment installed in telecommunications centres, in outdoor enclosures in the access and trunk networks and at customer premises. The sources of overvoltages and overcurrents that may cause damage to the equipment include lightning, power induction and mains power contacts. The types of interfaces include symmetric pair, coaxial, dedicated power feeds and mains power ports.

Study items to be considered include, but are not limited to:

- Acceptable period between surges during surge testing and power fault testing of ports (K.20, K.21, K.44 and K.45);
- Review equipment resistibility of other ports (e.g. customer side of ONTs) compared with typical analogue telecommunication ports (K.20/21) for potential exposures currently unaccounted for;
- Review of Recommendation K.85 for correct equipment resistibility in light of any new field studies or data;



Question 4/5 (2 of 7)

Resistibility and safety in telecommunications

(Study items continued)

- Determine equipment resistibility taking into account the effects of new equipment port types connecting to new and different services e.g. mains, symmetric pair telecommunications, services derived within the building, CATV broadband, WLL etc.;
- The EPR test for external coaxial cable ports. It is necessary to consider the impact of networks on the test voltage and generator impedance;
- The protection of mains ports (both the tested and untested ports). It is necessary to check the coordination between the primary protector and equipment SPCs/SPDs;
- The protection of non-earthed equipment with SPCs (that bridge the safety isolation and not allowed by IEC 60950-1);
- Review USB 3.0 implementations for correct equipment resistibility levels and recommendations;

Question 4/5 (3 of 7)

Resistibility and safety in telecommunications

(Study items continued)

- Review Ethernet isolation requirements and benefits against CDEs (Cable Discharge Events), ESD, EFTs, and surges vs. implementing common mode protection and/or transverse protection. Also consider the new PoE non-IEEE 802.3 compliant versions that have up to 100 W specified for delivery;
- Review current field installations and best practices for correct resistibility levels and recommendations;
- Review green field/ new market/ rising economies for proper resistibility levels and recommendations (may already be covered in K.44 for all modes);
- Review impact of wireless growth/changes on wired networks and their susceptibility (example: distributed base stations vs. typical base stations);
- Risk of people injury due to overvoltages and overcurrents on telecommunication lines due to lightning in collaboration with Question B/5;
- Investigate whether IEC 60950-1 and IEC 62368-1 take into account network operator requirements;

Question 4/5 (4 of 7)

Resistibility and safety in telecommunications

(Study items continued)

- Investigate whether IEC TR 62102 takes into account the normal field situation;
- Effects of induced voltages by electric power and railway lines in normal conditions on safety voltage limits on telecommunication lines;
- Specifically review Figures A.6.2.1 through A.6.2.3 for potentially less complicated method (consider connecting coax as in regular use and injecting current onto shield as described in IEC 61000-4-6 for example);
- The safety aspects of DC Remote Power Feeding System for RRU should be considered;
- The introduction of surge suppressors requirements into the latest IEC 60950-1 standard especially regarding the scope of VDR which used in a primary circuit and to bridge the reinforced/double insulation;
- The update of Recommendations K.50, K.51, K.64 and K.75 taking into account IEC 62368-1;

Question 4/5 (5 of 7)

Resistibility and safety in telecommunications

(Study items continued)

- The introduction of surge suppressors requirements into the latest IEC 60950-1 standard especially regarding the scope of VDR which used in a primary circuit and to bridge the reinforced/double insulation;
- The possible update of K.50 and K.64 and or a new recommendation to include the power supply system;
- New voltage protection guide topic;
- Wire current carrying capabilities specifically as applied to new higher power Ethernet – not just fusing of wire but damage thereof;
- Investigate the use of lightning isolation transformers (LITs) for overvoltage protection;
- Current “under study” items in the K.20 and K.21 topics regarding EPR coax testing and other topics will be resolved during this new study period.

Question 4/5 (6 of 7)

Resistibility and safety in telecommunications

The following Recommendations and Handbooks, in force at the time of approval of this Question, fall under its responsibility:

- K.20, K.21, K.44, K.45, K.50, K.51, K.64, K.75, K.89 and K.90
- Resistibility Guide.

Tasks include, but are not limited to:

Review existing K-series safety recommendations to ensure that they remain accurate and appropriate to the telecommunications industry and environment. It will ensure that changes in the environment or in technology (for example the introduction of new broadband systems) will produce an updated version to ensure that these documents remain current and valid.



Question 4/5 (7 of 7)

Resistibility and safety in telecommunications

Proposed Recommendations

- K.75 Classification of interface for application of standards on resistibility and safety of telecommunication equipment
- Resistibility Guide on the use of the overvoltage resistibility Recommendations
- K.20 Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents
- K.21 Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents
- K.44 Cor.1 Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents – Basic Recommendation - Corrigendum 1
- K.45 Resistibility of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents
- K.50 Safe limits of operating voltages and currents for telecommunication systems powered over the network
- K.51 Safety criteria for telecommunication equipment
- K.64 Safe working practices for outside equipment installed in particular environments



Question 5/5 (1 of 6)

Lightning protection and earthing of telecommunication systems

This Question will produce new or revised Recommendations and Chapters of Handbooks regarding the protection of telecommunication systems against lightning flashes and the earthing and bonding configurations applied to telecommunications installations (telecommunication buildings, remote electronic sites and customer premises).

Study items to be considered include, but are not limited to:

- Protection of fixed telecommunications lines, including the lines made of symmetric conductors, coaxial cables and non-metal-free fibre-optic cables, as well as lines used for remote power feeding of telecommunication equipment;
- Protection of mobile and wireless systems, in particular radio base stations which very often have their antennas installed in high structures exposed to lightning discharges;
- Protection of telecommunication stations (central office), in particular those that make part of the network's backbone and, therefore, require a high reliability;

Question 5/5 (2 of 6)

Lightning protection and earthing of telecommunication systems

(Study items continued)

- Utilization of the data from lightning location systems (LLS) to optimize the network protection;
- Protection of users of telecommunications services from the dangerous effects of lightning discharges;
- Bonding configurations and earthing of telecommunication installations, including earthing of power feeding systems in co-located environment;
- Requirements for earthing and equipotential bonding under transient conditions, as those caused by the fast raising currents associated with subsequent lightning return strokes;
- Maintenance methods of bonding configurations and earthing.

Question 5/5 (3 of 6)

Lightning protection and earthing of telecommunication systems

The following Recommendations and Handbooks, in force at the time of approval of this Question, fall under its responsibility:

- K.25, K.27, K.29, K.35, K.39, K.40, K.46, K.47, K.56, K.66, K.67, K.71, K.72, K.73
- Handbooks on Earthing & Bonding and Lightning

Tasks include, but are not limited to:

- Revision of Recommendation K.29 in order to make reference to the relevant parts of Recommendation K.47, highlighting the coordination aspects (Recommendation K.39 could be deleted with the approval of revised Recommendation K.40, as its subject is now covered by IEC 62305-2);
- Revision of Recommendation K.40 considering IEC62305-3 and IEC62305-4;
- Revision of Recommendation K.67 based on new information available on the surges due to lightning and including an Annex with probability of currents being exceeded;

Question 5/5 (4 of 6)

Lightning protection and earthing of telecommunication systems

(Tasks continued)

- Maintenance and enhancement of Recommendations K.27, K.35, K.66 and K.73 with better linkage and coordination between these recommendations and other Recommendations within the K-series;
- New Recommendation on the protection of installations at the neighbourhood of telecommunication towers;
- New Recommendation on the use of the data from lightning location system (LLS) for network protection;
- One or more new Recommendations on bonding configurations and earthing of remote sites in co-located environment and in telecommunication centre;
- New chapter of the Lightning Handbook (Chapter 11) presenting the rationale for the shielding factors contained in the lightning protection Recommendations;
- Maintenance and enhancement of "Earthing & Bonding Handbook".

Question 5/5 (5 of 6)

Lightning protection and earthing of telecommunication systems

Proposed Recommendations

- K.25 Protection of optical fibre cables
- Handbook on lightning Protection of telecommunication lines and equipment against lightning discharges Chapter 11: Shielding factors for lightning protection
- K.29 Coordinated protection schemes for telecommunication cables below ground
- K.67 Expected surges on telecommunications and signalling networks due to lightning
- Lightning protection of Distribution Base Station
- K.27 Bonding configurations and earthing inside a telecommunication building
- K.35 Bonding configurations and earthing at remote electronic sites

Question 5/5 (6 of 6)

Lightning protection and earthing of telecommunication systems

(Proposed Recommendations continued)

- K.39 Risk assessment of damages to telecommunication sites due to lightning discharges
- K.40 Protection against LEMP in telecommunication centres
- K.66 Protection of customer premises from overvoltages
- K.73 Shielding and bonding for cables between buildings
- Using data of lightning positioning system for network protection
- Protection of neighbourhood of telecommunication towers against lightning

Study Group 5 WP 1

Recommendations from last 2012 meeting

Revised Recommendations

- K.28 Parameters of thyristor-based surge protective devices for the protection of telecommunication installations
- K.44 Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents – Basic Recommendation
- K.46 Protection of telecommunication lines using metallic symmetric conductors against lightning induced surges
- K.47 Protection of telecommunication lines against direct lightning flashes

New Recommendations

- K.89 Protection of persons inside a structure using telecommunication services provided by metallic conductors against lightning - Risk management
- K.90 Evaluation techniques and working procedures for compliance with limits to power-frequency (DC, 50 Hz, and 60 Hz) electromagnetic field exposure of network operator personnel

Study Group 5 WP 1

Recommendations from first 2013 meeting

Most of the meeting was spent in structuring and staffing the Sub-Groups. Few Recommendations were sent for approval.

Revised Recommendations

- K.44 Amendment: Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents – Basic Recommendation

Revised Guide

- K.20/21/44/45 Implementors' Guide on the use of the overvoltage resistibility Recommendations (can be downloaded from K.44 area)



Study Group 5 WP 1

K.20/21/44/45 Implementors' Guide

Guide on the use of the overvoltage resistibility Recommendations

The 88 page Resistibility Guide assists test laboratories in implementing the correct tests for ITU-T K.20, K.21, and K.45 compliance testing. It has four sections:

- 1) Introduction with general comments
- 2) Definition of terms
- 3) **General test plan flow charts**
- 4) Test circuits



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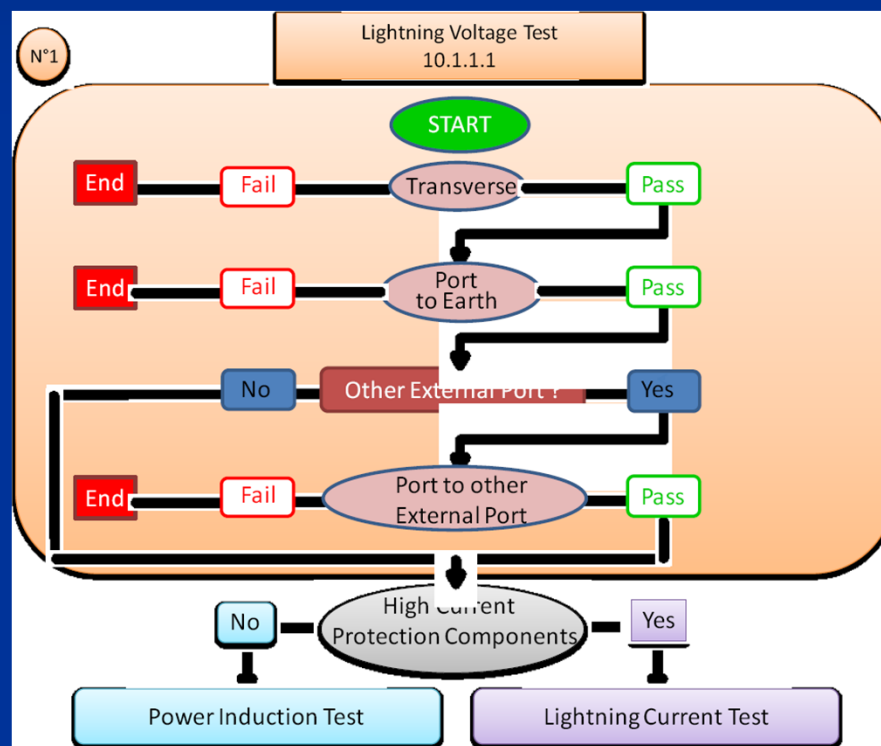
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Updates to ITU-T Recommendations
for Telecommunication Equipment
and SPDs

Study Group 5 WP 1

K.20/21/44/45 Implementors' Guide Example

First of 4 flow charts for symmetric pair port testing



ITU-T Study Group 5 K & L series Recommendations

ITU-T Recommendations are Free!

Once published these Recommendations can be
downloaded from:

http://www.itu.int/ITU-T/recommendations/index_sg.aspx?sg=5

ITU-T Study Group 5 home page URL is:

<http://www.itu.int/en/ITU-T/studygroups/2013-2016/05/Pages/default.aspx>

The next ITU-T Study Group 5 meeting is due to be held
15-24 October 2013

