International Telecommunication Union

Customers requests, technical difficulties or uncertainties, missed requirements

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content

- Problems in resistibility test according to k series
- Resistibility requirements in different country and region.
- Design challenge to compliance with different resistibility requirements.
- Mixed usage of DC-C and DC-I.
- Conclusions and future work suggestions

Problems in resistibility test according to k series

Test configuration photo of the lightning voltage test accroding to k.20 in Huawei EMC lab

Problems in resistibility test according to k series

Test configuration photo of power contact test accroding to k.20 and NEBS GR 1089 in Huawei EMC lab

Problems in resistibility test according to k series

Test configuration photo of lightning current test accroding to k.20 and k.44 in Huawei EMC lab

Problems in resistibility test according to k series

- Definitions of coupling elements parameters need more clarification
- The voltage and current waveform at the EUT port of the CDN network
- Practical test setup for High-speed communication line
- Selection of the agreed primary protector in coordination.
- The test procedures are very complex, not easy to realize.

Problems in resistibility test according to k series

- Definitions of coupling elements parameters need more clarification

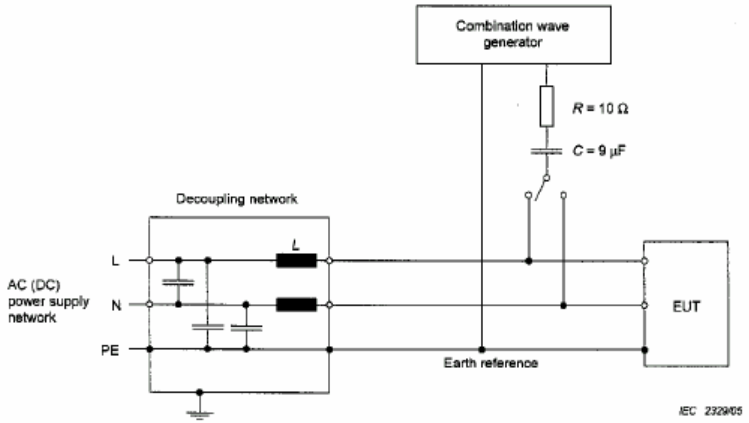
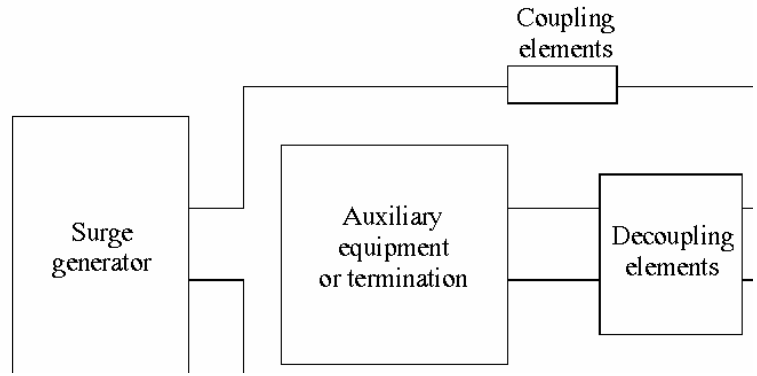


Figure 8 – Example of test setup for capacitive coupling on a.c./d.c. lines; line-to-ground coupling (according to 7.2)

IEC 61000-4-5 coupling network



ITU-T K.44 coupling network

- The coupling element, if required, can be an MOV, a GDT, a capacitor or any other element with an operating voltage in excess of the maximum EUT working voltage---from A.5 k.44
- Different coupling element will cause change of the waveform added to EUT
- Selection of coupling element need more clarification

Problems in resistibility test according to k series

- **Practical test setup for High-speed communication line**
  - No decoupling network is commercially available for High-speed communication lines (Example: xDSL)
  - Prior to the test, the correct operation of the port shall be verified, the external connection line shall then removed and the surge applied directly to the port terminal with no decoupling network
  - After the test, the correct operation of the port shall be again verified
  - The above test setup and procedure are not demonstrated in K.20 or k.44

Problems in resistibility test according to k series

Selection of the agreed primary protector in coordination

- In k.20/k21/k45, coordination test need primary protector.
- If different carrier require different “agreed primary protector”, equipment manufacturer must do the same test item many times. Different primary protector cause different result. It is not easy for equipment manufacturer using one kind of design to comply with requirement for different carrier.
- It is recommended to provide the method to choose agreed primary protector by equipment manufacturer

Problems in resistibility test according to k series

- The test procedures are very complex, not easy to realize

  - Example 1: The requirement in chapter 7.1.3 in k.44: “This test is performed with all untested ports (both internal and external) terminated, with each type of external port, including a port of the same type, grounded via a coupling element, in turn.”
  - If the port will be grounded in turn under test, the procedures will become very complex.
  - It is recommended to ground all the port at the same time to make test procedures more acceptable.

Problems in resistibility test according to k series

- Some test procedures may cost a long time, not easy to realize

- Example 2: In 4.3.1.a of table 4b of k.20, the test resistor in power induction test are 10, 20, 40, 80, 160, 300, 600, 1000Ω. It will take very long time to finish the test in 4.3.1.a.

- It is recommended to reduce the number of test resistor. For example: 10, 80, 600.

Resistibility requirements in different country and region

- In GR1089，There are many different over-voltage and over-current test requirements.
- Example：AC power fault test in GR1089：
- The manufacturer should adopt different circuit for different requirements, it will increase the cost of equipment.

Table 4-6 First-Level AC Power Fault (Telecommunications Port)

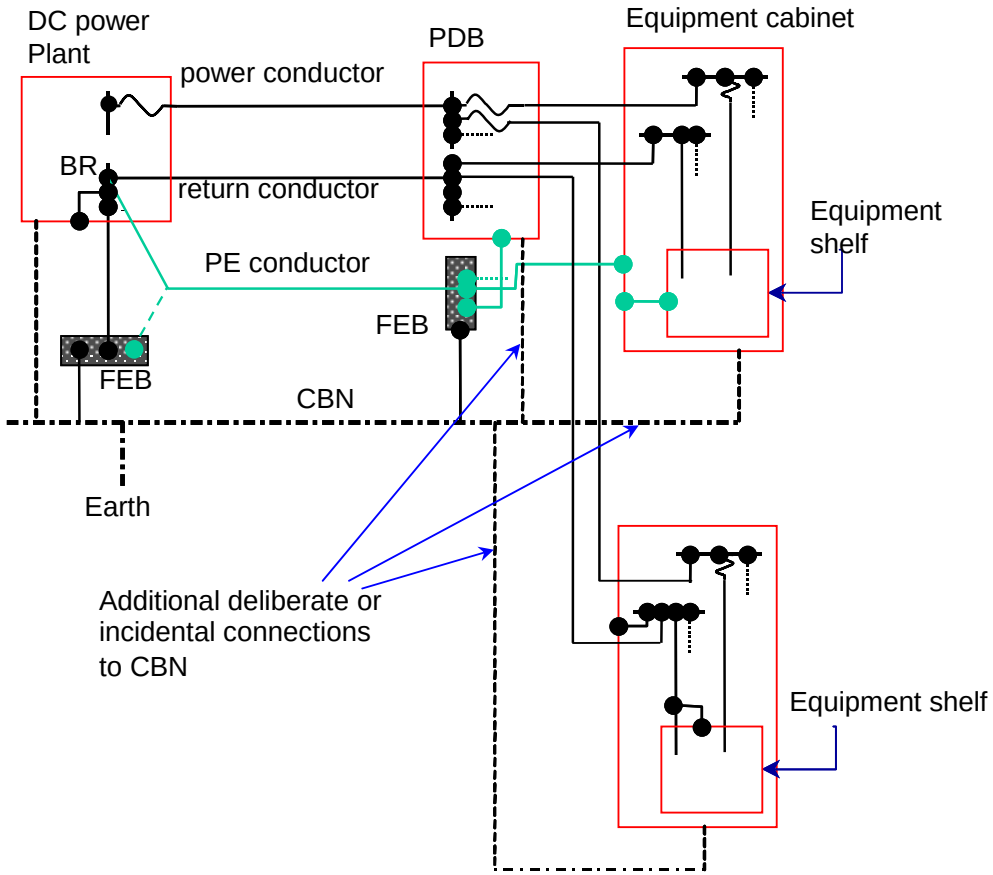
Test	Voltage (Vrms)[1]	Short-Circuit Current Per Conductor[4] (Amperes)	Applications	Duration	Primary Protectors	Test Connections Per Table 4-1
1	50[2]	0.33[3]	1	15 minutes	Removed	A
2	100[2]	0.17[3]	1	15 minutes	Removed	A
3	200, 400, and 600[2,5]	1[3] (at 600 V)	60	1s of each voltage	Removed	A
4	1000[6]	1	60	1s	Operative Protector in Place	B
5	See Figure 4-4[7]	See Figure 4-4	60	5s	Removed	See Figure 4-4
6	600	0.5	1	30s	Removed	A
7	440	2.2	5	2s	Removed	A
8	600	3	5	1.1s	Removed	A
9	1000	5	5	0.4s	Operative Protector in Place	B

Resistibility requirements in different country and region

- Some National or carrier standards also have some test requirement different from k series.
- It is recommended that as a international organization, ITU do some coordination and unification work in equipment resistibility test between each standard organization.

Mixed usage of DC-C and DC-I

Earthing and bonding handbook:



Mixed usage of DC-C and DC-I

ETSI EN 300 253

6.1 DC power distribution of secondary supply

The DC power distribution shall use (+) and (-) conductors routed close together. Each DC return conductor serving a telecommunication system shall be bonded to the CBN at least at the main earthing terminal, at the service panel of the DC power plant and to the MESH-BN to at least one point of the SRPP.

Mixed usage of DC-C and DC-I

- In fact, different carrier have different opinion on Mixed DC-C/DC-I system. Some carrier allow Mixed DC-C/DC-I system, while some carrier only allow DC-I system.

- Many telecommunication site in China use mixed DC-C/DC-I system, no EMC problem, also no any safety problem.

Mixed usage of DC-C and DC-I

- It is recommended to give more study on the mixed usage of DC-C and DC-I. For example: Adding the figure and application guide of Mixed usage of DC-C/DC-I into k.27 .

- ITU and IEC are different international standard organization. For telecommunication site, the DC power distribution system in ITU and IEC standards some times are defined as DC-C and DC-I, while some times are defined as TN-S and TN-C. It is recommended to do some compare and discuss between the two type of definition.

Conclusions and future work suggestion

- ITU-T K series are adopted by many countries, many regions, and many carriers. There are some questions on how to perform the test by equipment manufacturers themselves according to k series. It is recommended to do some study to make the resistibility test in k series easier to perform.

- It is recommended to engage test equipment manufacturer to join SG5 for developing generators and CDN network conform with ITU, reduce the uncertainty in test result.

- For telecommunication equipment, different standard organization have different resistibility requirement. As the international standard organization, ITU could do some coordinate work between different standard organization