International Telecommunication Union

Introduction to Resistibility Testing

Philip Day

Telstra Corporation, Australia

ITU-T Technical Session "Resistibility Requirements and Testing"
23 May 2006, Osaka, Japan

Contents

- Questionnaire on usage of K.20
- Major changes from the year 2000
- Testing costs
- SG 5 philosophy on protection
- Linkages between recommendations
- Operator experience
- Misinterpretation of K.20 etc and K.44
- Proposed changes to K.20 etc and K.44
- Following presentations

Questionnaire

- Question on usage of K.20 1996
  1. In 1998 feedback was provide on K.20 1996
  2. 11 operators and 3 manufacturers
  3. 7 operators used K.20 but only 3 considered it adequate
  4. 3 operators used K.20. 1 thought it adequate, 1 commented the need to design for a world market

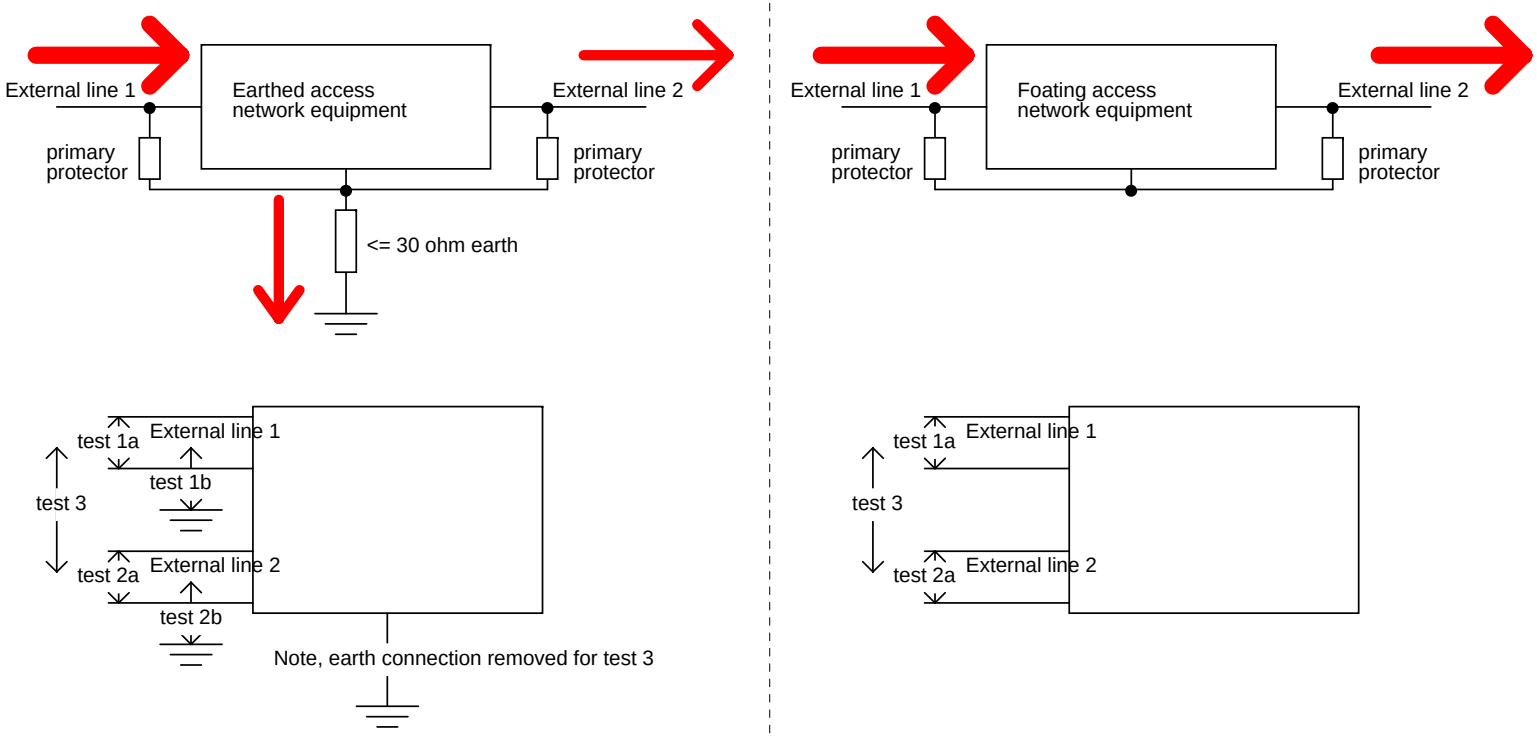
Major Changes in 2000/2003

- K.44
  1. Incorporated common text from K.20 and K.21
  2. Opportunity to add more information and rationale
  3. Introduction of Special Test Protector
  4. Basic and Enhanced requirements
  5. Improved test schematics

Major Changes in 2000/2003 (cont)

- K.44
  6. Information on coupling/decoupling elements
  7. Special test protector must operate to achieve coordination
  8. Introduced external port to external port tests (2003)
     1. Based on K.17
  9. Added internal ports (2003)

Major changes in 2000/2003 (cont)



External port to External port test

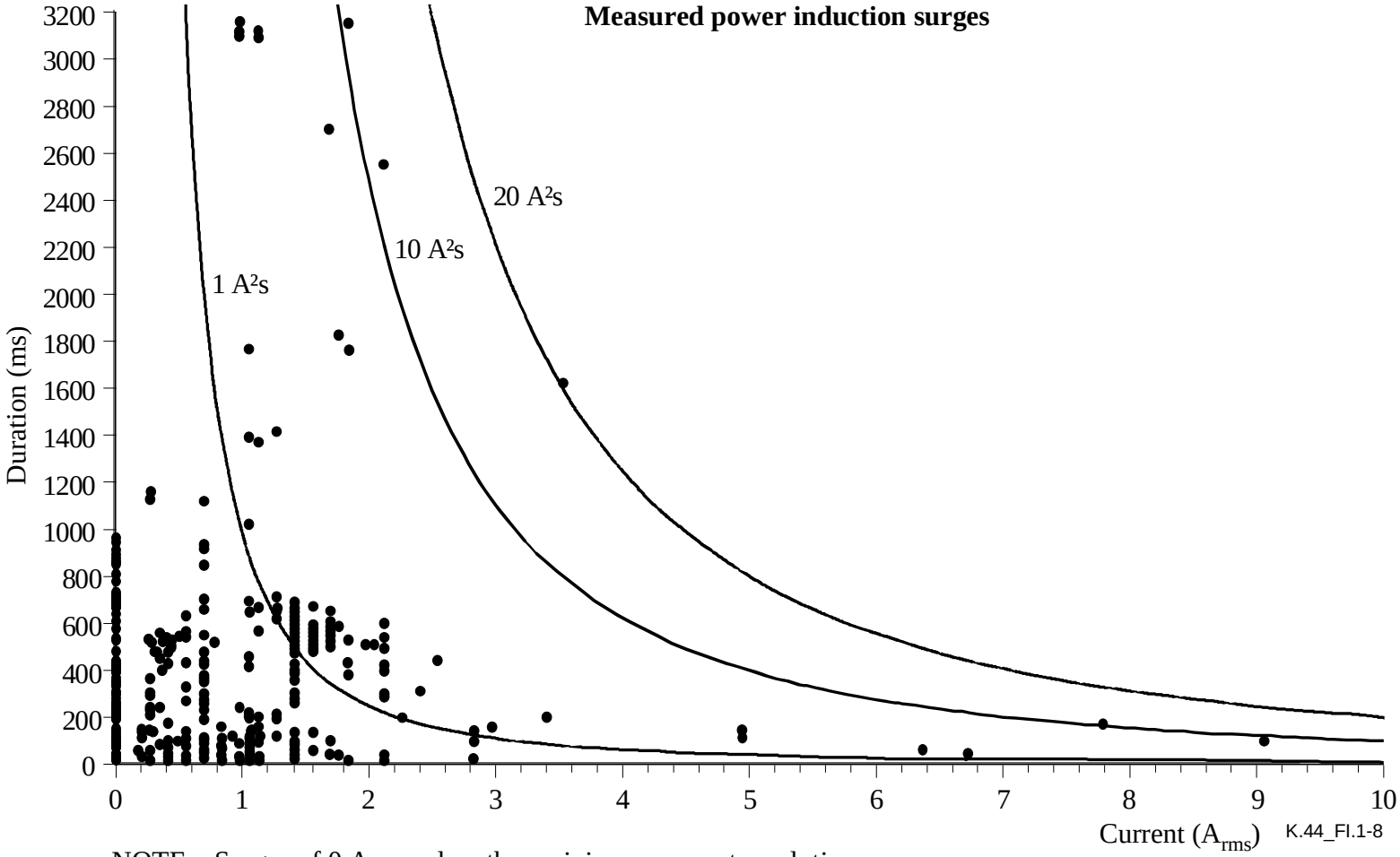
Major Changes in 2000/2003 (cont)

- Product recommendations
  1. K.45 introduced for Access Networks
  2. K.20 now for telecommunication centres
     1. Contains both external and internal cable port requirements (K.41 deleted)
  3. K.21 now for Customer Premises
     1. Contains both external and internal cable port requirements (K.22 deleted)

Major Changes in 2000/2003 (cont)

- Product recommendations
  4. Power induction requirement increased from 1 A^2s (basic) to 10 A^2s (enhanced)
  5. Coordination test now ensures equipment is protectable
  6. K.15 and K.17 requirements added to K.45 and K.44.

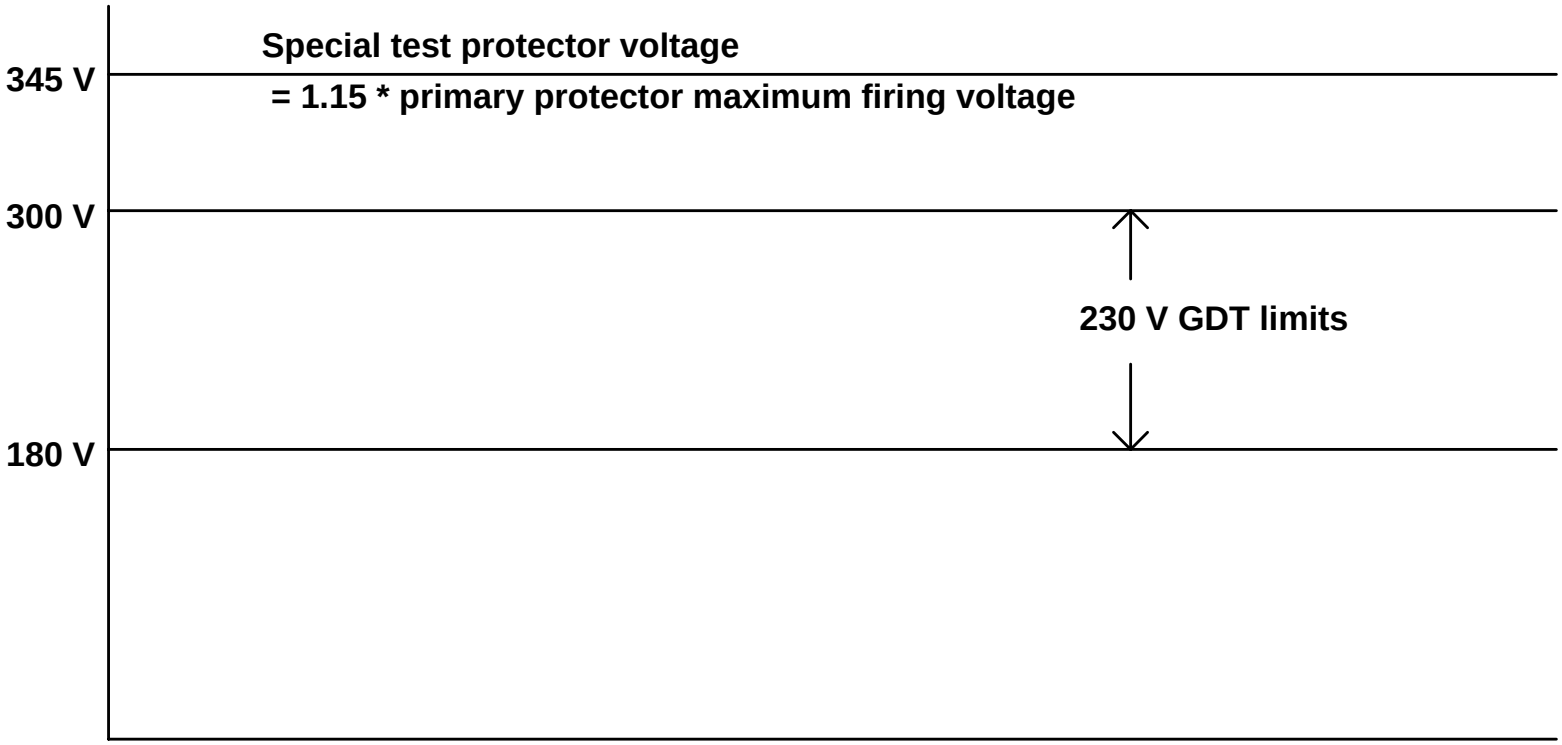
Major changes in 2000/2003 (cont)



NOTE – Surges of 0 A were less than minimum current resolution.

Figure I.1-8/K.44 – Power induction overcurrents measured in Australia

Major changes in 2000/2003 (cont)



Example of special test protector for a 230 V primary protector

Testing costs

- Manufacturers were concerned by increased number of tests in the new product recommendations
  1. It was felt this would be offset because of the greater acceptance of K.20 and less operator specific requirements
     - It is hoped all operators will accept a test to K.20

SG 5 philosophy on protection

- Inherent protection adequate for most installations
- Primary protection added in damage areas
- Total cost minimized by coordinating
  1. Equipment resistibility costs
  2. Cost of adding protection
  3. Earthing and bonding costs

Linkages between recommendations

- The following recommendations are coordinated
  - K.20 etc (Product resistibility)
  - K.27, K.35 and K.66 (earthing and bonding)
  - K.67 (magnitude and probability of surges)
  - K.12 (Characteristics of GDTs)

Operator experience

- Some operators have advised of equipment damage in exchanges, access networks and customer installations
  - This can indicate
    1. low resistibility requirements
    2. Lack of appropriate protection
    3. Poor earthing and bonding

Operator experience

- Often ISDN NTs are damaged
  1. Often due to no primary protection or a lack of bonding between mains and telecommunication line
- Solution?
  1. Install MSPD. Provides both mains and telecommunication line protection
  2. Install primary SPDs in bad areas to protect the MSPD

Misinterpretation of the test voltage requirements

- Resistibility recommendations require to test the equipment at different voltage level up to U_{cmax}
  - Alcatel Australia have advised that the requirement to test at voltages other than U_{cmax} is not clear
  - Column headings in K.20 etc refer to clause 7/K.44
    - Clause is buried in K.44
    - Requires interpretation
    - Uses the words “if necessary”

Misinterpretation of the test voltage requirements (cont)

- Test houses, unless otherwise instructed, tend to test at U_{cmax} only
- Operators occasionally reject test reports if only tested at U_{cmax}
- Test houses find it difficult to determine test voltage due to lack of knowledge of circuit design

Misinterpretation of the test voltage requirements (cont)

- It is preferable that K.44 gives clear instructions and does not require a brief from the manufacturer

Proposed changes to Recommendation K.44

- Add more information into K.44 of the importance of testing at other voltages for the lightning tests
  - Add the test levels to section 7 e.g.
    - Inherent test
    - Secondary protector coordination test
    - Primary protector coordination test
    - U_{cmax}

Proposed changes to Recommendation K.44 (cont)

- Could summarize some of Appendix I.1 in section 7, or move I.1 to an Annex, to make these tests a requirement.
- Could provide a test result table proforma to reduce likelihood of missed tests.

Proposed changes to Product Recommendations

- Make the requirement to test at lower voltages clearer in the lightning test tables
  - Add specific notes to the test table OR
  - Could add extra lines to the test table e.g.
    - Inherent test
    - **Secondary protector coordination test**
    - **Primary protector coordination test**
    - U_{cmax}

Current proposed changes to K.44 (TD 293)

- Clearer instructions on port testing
- Recommends specific coupling and decoupling networks
- Added internal to internal port test
- Added cheesecloth as an aid to determining criterion B compliance
- Added 10/350 µs current generator
- Added tolerances to power induction and power contact tests

ITU-T

The end