UL 60950-21

STANDARD FOR SAFETY

Information Technology Equipment – Safety – Part 21: Remote Power Feeding

UL Standard for Safety for Information Technology Equipment – Safety – Part 21: Remote Power Feeding, UL 60950-21

First Edition, Dated November 10, 2003

Summary of Topics

This revision of ANSI/UL 60950-21 is being issued to reaffirm approval as an American National Standard. No changes in requirements are involved

As noted in the Commitment for Amendments statement located on the back side of the title page, UL and CSA are committed to updating this harmonized standard jointly. However, the revision pages dated July 8, 2016 will not be jointly issued by UL and CSA as these revision pages only address UL ANSI approval dates.

UL 60950-21 is an adoption of IEC 60950-21, Information Technology Equipment – Safety – Part 21: Remote Power Feeding (First Edition, issued December 2002).

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated March 25, 2016.

The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the preface. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a ″SUPERSEDED REQUIREMENTS″ notice.

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Information Technology Equipment – Safety – Part 21: Remote Power Feeding

November 10, 2003

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This national standard is based on publication IEC 60950-21, First Edition (2002).

Approved by

Standards Council of Canada
Conseil canadien des normes

Approved American National Standard
ANSI

ANSI/UL 60950-21-2007 (R2016)

Commitment for Amendments

This standard is issued jointly by the Canadian Standards Association (operating as "CSA Group") and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to CSA Group or UL at anytime. Revisions to this standard will be made only after processing according to the standards development procedures of CSA Group and UL. CSA Group and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

This Standard is subject to review five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquires@csagroup.org and include ″Proposal for change″ in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

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This ANSI/UL Standard for Safety consists of the First Edition including revisions through July 8, 2016. The most recent designation of ANSI/UL 60950-21 as a Reaffirmed American National Standard (ANS) occurred on July 8, 2016. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at http://csds.ul.com.

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PREFACE DE

This is the common CSA and UL Standard for Information Technology Equipment – Safety – Part 21: Remote Power Feeding. It is the first edition of CAN/CSA-C22.2 No. 60950-21 and the first edition of UL 60950-21. This standard is based on IEC 60950-21, first edition. DE

This common standard was prepared by the Canadian Standards Association (CSA) and Underwriters Laboratories Inc. (UL). The efforts and support of representatives of leading industry companies and organizations are gratefully acknowledged. DE

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard. DE

This Standard was reviewed by the CSA Subcommittee on Safety of Electronic Equipment within the Field of Audio/Video, Information, and Communication Technology, under the jurisdiction of the Technical Committee on Consumer and Commercial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee. DE

This Standard has been approved as a National Standard of Canada by the Standards Council of Canada. DE

This Standard has been approved by the American National Standards Institute (ANSI) as an American National Standard. DE

Note: Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose. DE

Level of harmonization DE

This standard adopts the IEC text with national differences. This standard is published as an equivalent standard for CSA and UL. DE

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes. DE

All national differences from the IEC text are included in the CSA and UL versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ. DE

Reasons for differences from IEC DE

The national differences in this binational Part 21 Standard are included to reference the binational version of IEC 60950-1, which is designated as CAN/CSA-C22.2 No. 60950-1/UL 60950-1 and to address issues related to references to the first and second editions of CSA/UL 60950-1. DE

Interpretations DE

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent. DE

CSA effective date DE

The effective date for CSA International will be announced through CSA Informs or a CSA certification notice. DE

UL effective date DE

The effective date for UL is available on UL's website at www.ul.com. DE

General DE

National differences from the text of the International Electrotechnical Commission (IEC) Publication 60950-21, Information Technology Equipment – Safety – Part 21: Remote Power Feeding, Copyright 2002, are indicated by the following margin notations: DE

There are six types of national differences, as noted below. The national difference type is noted in the margin next to the affected text. The standard may not include all types of these national differences. DE

D1 – national differences based on national regulatory requirements which result in equivalent or more stringent requirements than in IEC 60950-21. DE

D2 – national differences based on other than national regulatory requirements which result in equivalent or more stringent requirements than in IEC 60950-21. DE

DI – national differences based on IEC final draft international standards (FDIS). DI national differences may be less stringent than, equivalent to, or more stringent than requirements in IEC 60950-21. DE

DC – national differences based on UL and CSA component requirements. DC national differences may be less stringent than, equivalent to, or more stringent than component requirements in IEC 60950-21. DE

D3 – national differences based on binational requirements which result in less stringent requirements than in IEC 60950-21. DE

DE – editorial national differences that correct typographical errors in IEC 60950-21 or revise the terminology, but do not alter the technical intent of the requirements. This notation is also used for informative statements such as the Preface and Foreword. DE

National differences have been incorporated into the body of the standard. If national differences necessitate the deletion of IEC 60950-21 text, the IEC 60950-21 text has been retained but has been ~~lined out~~. Text added as a result of national differences has been <u>underlined</u>. Text added as the Preface is not underlined. DE

The text, figures, and tables of International Electrotechnical Commission Publication 60950-21, Information Technology Equipment – Safety – Part 21: Remote Power Feeding, Copyright 2002, are used in this standard with the consent of the International Electrotechnical Commission. DE DE DE

The International Electrotechnical Commission Foreword and Introduction are not a part of the requirements of this standard but are included for information purposes only. DE DE

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INFORMATION TECHNOLOGY EQUIPMENT – SAFETY – Part 21: Remote power feeding

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.

3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60950-21 has been prepared by IEC technical committee 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology

The text of this standard is based on the following documents:

FDIS	Report on voting
108/22/FDIS	108/42/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

In this standard, the following print types are used:

– requirements proper and normative annexes: in roman type;

– *compliance statements and test specifications: in italic type;*

– notes and other informative matter: in smaller roman type;

– normative conditions within tables: in smaller roman type;

No Text on This Page

– Terms that are defined in Clause 2 and in IEC 60950-1: SMALL CAPITALS.

The committee has decided that the contents of this publication will remain unchanged until 2005-11. At this date, the publication will be

• reconfirmed;

• withdrawn;

• replaced by a revised edition, or

• amended.

INTRODUCTION

This Part 21 of IEC 60950 is intended to be used with IEC 60950-1, hereafter referred to as ″Part 1″. The subclauses of IEC 60950-1 apply as far as reasonable. Where safety aspects are similar to those of Part 1, the relevant clause or subclause of IEC 60950-1 is shown for reference in parentheses after the clause or subclause title in this Part 21. Where a requirement in this Part 21 refers to a requirement or criterion of Part 1, a specific reference to IEC 60950-1 is made. All references to clauses and subclauses in IEC 60950-1 are to the second edition. If DE
the relevant clause or subclause has been renumbered in IEC 60950-1, second edition, the first DE
edition reference is identified in parentheses directly after the second edition reference. DE

INFORMATION TECHNOLOGY EQUIPMENT – SAFETY – Part 21: Remote power feeding

1 Scope

This part of IEC 60950 applies to information technology equipment intended to supply and receive operating power via a TELECOMMUNICATION NETWORK, where the voltage exceeds the limits for TNV CIRCUITS.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. All references to IEC 60950-1 in this standard are replaced by the equivalent UL and CSA 60950-1 binational Standards as listed below. (Either the first or second editions of CSA/UL 60950-1 may be used.) All relevant Standards referenced in the Part 1 Standard (Annex P, including P.1 and P.2) also apply to this Part 21 Standard and are not listed below. All references to clauses and subclauses in IEC 60950-1 are to the second edition. If the relevant clause or subclause has been renumbered in IEC 60950-1, second edition, the first edition reference is identified in parentheses directly after the second edition reference. D2

~~IEC 60950-1:2001, *Information technology equipment – Safety – Part 1: General requirements*~~ D2

CAN/CSA-C22.2 No. 60950-1-03 or CAN/CSA-C22.2 No. 60950-1-07, *Information Technology Equipment – Safety – Part 1: General Requirements* D2

UL 60950-1, First or Second Edition, *Information Technology Equipment – Safety – Part 1: General Requirements* D2

3 Definitions

For the purposes of this International Standard, the terms and definitions given in IEC 60950-1 and the following apply.

3.1 RFT circuit **remote feeding telecommunication circuit**

a SECONDARY CIRCUIT within the equipment, intended to supply or receive d.c. power via a TELECOMMUNICATION NETWORK at voltages exceeding the limits for TNV CIRCUITS, and on which overvoltages from TELECOMMUNICATION NETWORKS are possible

3.2 RFT-C circuit

an RFT CIRCUIT which is so designed and protected that under normal operating conditions and single fault conditions, the currents in the circuit do not exceed defined values

NOTE The limit values of current under normal operating and single fault conditions are specified in 6.1

3.3 RFT-V circuit

an RFT CIRCUIT which is so designed and protected that under normal operating conditions and single fault conditions, the voltages are limited and the accessible area of contact is limited

NOTE The limit values of voltage under normal operating and single fault conditions are specified in 6.2

4 General requirements

4.1 Power from a telecommunication network (see also 1.4.11 of IEC 60950-1)

RFT CIRCUITS normally exceed the limit in 2.3.1 b) of IEC 60950-1 and also exceed 15 VA. See 4.7.2 of IEC 60950-1 regarding the possible need for a FIRE ENCLOSURE.

4.2 Access to energized parts (see also 2.1.1.1 of IEC 60950-1)

The equipment shall be so constructed that, in OPERATOR ACCESS AREAS, there is adequate protection against contact with bare parts of RFT CIRCUITS.

These requirements apply for all positions of the equipment when it is wired and operated as in normal use.

Protection shall be achieved by insulation or by guarding or by the use of interlocks.

Compliance is checked as given in 2.1.1.1 of IEC 60950-1.

4.3 Protection in service access areas (see also 2.1.2 of IEC 60950-1)

In a SERVICE ACCESS AREA, bare parts of RFT CIRCUITS shall be located or guarded so that accidental shorting to SELV CIRCUITS or to TNV CIRCUITS, for example, by TOOLS or test probes used by SERVICE PERSONS, is unlikely.

Bare parts of RFT CIRCUITS that involve an energy hazard shall be located or guarded so that unintentional bridging by conductive materials that might be present is unlikely during service operations involving other parts of the equipment.

Any guards required for compliance with 4.3 shall be easily removable and replaceable if removal is necessary for servicing.

Compliance is checked by inspection and measurement. In deciding whether or not unintentional contact is likely, account is taken of the way a SERVICE PERSON needs to gain access past, or near to, the bare parts in order to service other parts.

4.4 Protection in restricted access locations (see also 2.1.3 of IEC 60950-1)

For equipment to be installed in a RESTRICTED ACCESS LOCATION, the requirements for OPERATOR ACCESS AREAS apply, except that contact is permitted with the bare parts of an RFT CIRCUIT by the test finger shown in Figure 2A of IEC 60950-1 (see 2.1.1.1 of IEC 60950-1); however, such parts shall be so located or guarded that unintentional contact is unlikely.

Bare parts that involve an energy hazard shall be located or guarded so that unintentional bridging by conductive materials that might be present is unlikely.

Compliance is checked by inspection and measurement. In deciding whether or not unintentional contact is likely, account is taken of the need to gain access past, or near to, the bare parts.

4.5 Interconnection of equipment

4.5.1 General requirements (see also 3.5.1 of IEC 60950-1)

Interconnection circuits shall be selected to provide continued conformance to the requirements of Clause 6 for RFT CIRCUITS, after making connections.

NOTE It is permitted for an INTERCONNECTING CABLE to contain more than one type of CIRCUIT (for example, SELV, LIMITED CURRENT, TNV, ELV, RFT, or HAZARDOUS VOLTAGE) provided that they are separated as required by IEC 60950-1 and this standard.

4.5.2 Interconnection between RFT circuits (see also 3.5.2 of IEC 60950-1)

RFT-C CIRCUITS in the supply equipment shall be connected only to RFT-C CIRCUITS in other equipment.

RFT-V CIRCUITS in the supply equipment shall be connected only to RFT-V CIRCUITS in other equipment.

For compliance, see 6.4 e).

5 Connection to telecommunication networks

An RFT CIRCUIT is permitted to be directly connected to a TELECOMMUNICATION NETWORK.

6 Remote power feeding

Access to the conductors of the REMOTE FEEDING TELECOMMUNICATION CIRCUIT is restricted to SERVICE PERSONS.

NOTE Clause 6 covers power feeding to remote equipment at voltages in excess of the voltage limits for TNV CIRCUITS. There are two types of circuits as follows:

– RFT-C CIRCUITS provide for safety by limiting the current to 60 mA d.c. and are presently used in Europe;
– RFT-V CIRCUITS provide for safety by limiting the voltage to 200 V d.c. and currents to the same limits as in 6.3 of IEC 60950-1, and are presently used in North America.

See Annex A.

6.1 RFT-C circuit limits

NOTE Unless the current limits in 6.1.1, 6.1.2 and 6.1.3 are inherently met, the RFT-C CIRCUIT should have a monitoring and control device (for example, a balance control), that operates in such a way as to maintain the required current limits.

6.1.1 Limits under normal operating conditions

Under normal operating conditions, an RFT-C CIRCUIT shall comply with all of the following.

a) The steady state current that can flow from the RFT-C CIRCUIT supply equipment into the TELECOMMUNICATION NETWORK shall not exceed 60 mA d.c. under any load condition.

b) The steady state current that can flow from one conductor of the RFT-C CIRCUIT supply equipment through the TELECOMMUNICATION NETWORK to earth shall not exceed 2 mA d.c.

c) The RFT-C CIRCUIT shall be limited to the voltage rating of the wiring of the TELECOMMUNICATION NETWORK, if this voltage is known.

NOTE 1 If the voltage rating of the wiring of the TELECOMMUNICATION NETWORK is not known, see 6.4 d).

d) The voltage rating of the insulation between conductors and from any conductor to earth in an RFT-C CIRCUIT shall be co-ordinated with the maximum RFT-C CIRCUIT voltage in the RFT-C CIRCUIT supply equipment, if this is known. If this is not known, the insulation shall be suitable for 800 V d.c.

NOTE 2 This insulation level also applies to connectors.

Compliance is checked by inspection and measurement. Point 6.1.1 b) is checked by using a resistor of 2 000 Ω ± 2 %.

6.1.2 Limits under single fault conditions

In the event of a single fault (see 1.4.14 of IEC 60950-1) within RFT-C CIRCUIT supply equipment, or a failure of the insulation between one conductor of the TELECOMMUNICATION NETWORK and earth, the current in an RFT-C CIRCUIT shall not exceed the line-to-earth and line-to-line limits given in Figure 1. Moreover, the limits after 2 s are 25 mA and 60 mA, respectively.

Compliance is checked by inspection and measurement while simulating, one at a time, such failures of components and insulation as are likely to occur in the equipment, and failure of insulation between each connection point for the TELECOMMUNICATION NETWORK and earth. A resistor of 350 Ω ± 2 % is used between conductors and 2 000 Ω ± 2 % is used between one conductor and earth. In Figure 1, the time is measured from the initiation of the failure.

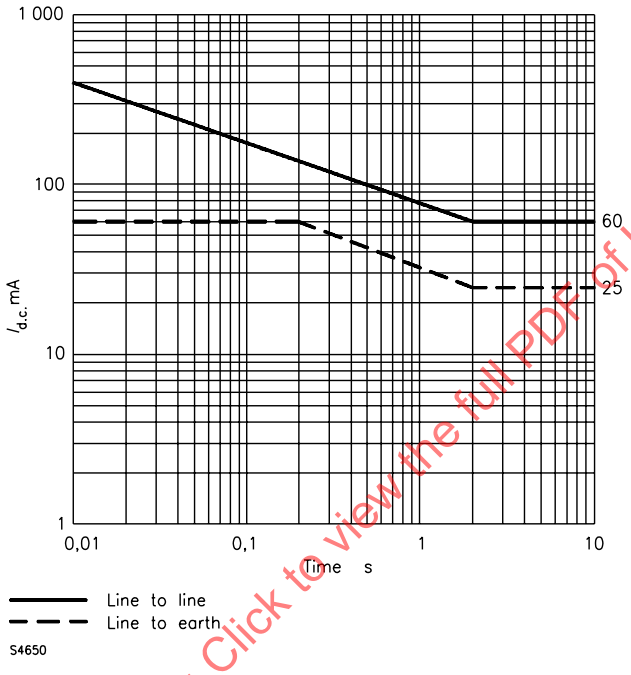

Figure 1 – Maximum current after a single fault

6.1.3 Limits with one conductor earthed

If one conductor of an RFT-C CIRCUIT that normally connects to a TELECOMMUNICATION NETWORK is accidentally earthed:

– the current between the other conductor and earth, measured through a 2 000 Ω ± 2 % resistor, under any external load condition, shall not exceed the relevant line-to-earth limit given in Figure 1 with a limit of 25 mA after 10 s; and

– the open circuit voltage between the other conductor and earth shall not exceed the maximum RFT-C CIRCUIT voltage determined in 6.1.1 c) and 6.1.1 d). The measurement is made after 2 s.

Compliance is checked by inspection and measurement.

6.2 RFT-V circuit limits

6.2.1 Limits under normal operating conditions

Under normal operating conditions, an RFT-V CIRCUIT shall comply with the following:

– the steady state open circuit voltage between earth and each conductor that normally connects to a TELECOMMUNICATION NETWORK shall not exceed

- 140 V d.c., or
- 200 V d.c., provided that a monitoring and control device is used that limits the current to earth in accordance with 6.2.3;

– the maximum available power ~~that can be supplied to any load connected to the TELECOMMUNICATION NETWORK shall be limited to 100 W after 1 s~~ and current from an RFT-V CIRCUIT shall be in accordance with Table 1; D3 D3 D3

– the steady state current that can be supplied to the TELECOMMUNICATION NETWORK shall comply with 6.3 of IEC 60950-1;

– the voltage rating of the insulation of an RFT-V CIRCUIT receiving power via the TELECOMMUNICATION NETWORK shall be suitable for 400 V d.c. between conductors and 200 V d.c. between any conductor and earth.

NOTE This voltage rating also applies to connectors.

Compliance is checked by inspection and measurement.

Table 1 – RFT-V CIRCUITS, power and current limitations D3

Output voltage [a] Uoc	Maximum output current [b]			Rated output [e]	Maximum power output [f]		D3 D3 D3 D3
	Inherently limited	If provided with an overcurrent protective device [c]					
		Maximum overcurrent protection	Maximum current from the source [d]		Inherently limited	Overcurrent protective device	D3 D3 D3
V dc	A			VA			D3
≤ 100	≤ 1,3	≤ 1	≤ 1 000/Uoc	≤ 100	≤ 150	≤ 250	D3
> 100 and ≤ 200						≤ 150	D3 D3

Notes: D3

[a] Uoc is the greatest open circuit voltage between any conductor of the RFT-V CIRCUIT and earth with a 1 megaohm resistor connected across the terminals of the measuring instrument. D3 D3

[b] In this context, "overcurrent protection device" refers to devices such as fuses, circuit breakers or other devices that would permit higher short-term energy levels through the device without opening or limiting the energy, such as can occur during intermittent arcing conditions. D3 D3 D3

[c] The maximum continuous current from RFT-V CIRCUIT that may be supplied to telecommunication wiring unless the system is designed for higher currents and the ampacity of the wiring is specified and controlled. D3 D3

[d] Maximum current under any condition of overload with the overcurrent protection device bypassed. D3

Table 1 – RFT-V CIRCUITS, power and current limitations Continued on Next Page

Table 1 – RFT-V CIRCUITS, power and current limitations Continued D3

Output voltage [a] Uoc	Maximum output current [b]			Rated output [e]	Maximum power output [f]		D3
	Inherently limited	If provided with an overcurrent protective device [c]					D3
		Maximum overcurrent protection	Maximum current from the source [d]		Inherently limited	Overcurrent protective device	D3

[e] Functional design rated output as declared by the manufacturer. Paralleling of power sources over multiple telecommunications wires for the purpose of delivering power in excess of 100 VA to a single load circuit is not permitted. D3

[f] Maximum power under any non-capacitive load measured 1 s after application of the load with the overcurrent protection device bypassed (if provided). D3

6.2.2 Limits under single fault conditions

In the event of a single fault (see 1.4.14 of IEC 60950-1,) within RFT-V CIRCUIT supply equipment, with and without any conductor of the RFT-V CIRCUIT that normally connects to a TELECOMMUNICATION NETWORK being earthed:

– during the first 200 ms, the output voltage between each conductor and earth or between conductors shall not exceed the limits of Figure 2F of IEC 60950-1, (Figure 2D in IEC 60950-1, first edition), measured across a 5 000 Ω ± 2 % resistor with all load circuits disconnected; and DE DE

– after the first 200 ms, the limits of 6.2.1 shall be met.

Compliance is checked by inspection and measurement while simulating failure of components and insulation such as are likely to occur in the equipment.

6.2.3 Limits with one conductor earthed

If one conductor of an RFT-V CIRCUIT that normally connects to a TELECOMMUNICATION NETWORK is earthed:

– the open circuit voltage between the other conductor and earth shall not exceed the maximum RFT-V CIRCUIT supply voltage after 200 ms; and

– for RFT-V CIRCUITS whose open circuit voltage exceeds 140 V d.c. under normal operating conditions, the current between the other conductor and earth, measured through a 2 000 Ω ± 2 % resistor, under any external load condition, shall not exceed the relevant line-to-earth limit given in Figure 1. Moreover, this current shall not exceed 10 mA d.c. after 10 s.

Compliance is checked by inspection and measurement.

6.3 Separation from other circuits and parts

Within the equipment, RFT CIRCUITS shall be separated from

– other RFT CIRCUITS by FUNCTIONAL INSULATION, provided that neither circuit exceeds the limits of 6.1 and 6.2 if this insulation is short-circuited. Otherwise, the circuits shall be separated as if one were at a HAZARDOUS VOLTAGE;

– ELV CIRCUITS by SUPPLEMENTARY INSULATION;

– earthed accessible parts, earthed SELV CIRCUITS and earthed TNV CIRCUITS by BASIC INSULATION;

NOTE 1 For requirements in Norway, see 1.7.2.1, Note 6 of IEC 60950-1 (1.7.2, Note 4 of IEC 60950-1 , first edition). DE

– unearthed accessible parts, unearthed SELV CIRCUITS, unearthed TNV CIRCUITS and circuits at HAZARDOUS VOLTAGES by one or both of the following:

- DOUBLE INSULATION or REINFORCED INSULATION;
- BASIC INSULATION, together with protective screening connected to the main protective earthing terminal.

NOTE 2 For requirements in Norway, see IEC 60950-1, 1.7.2.1, Note 6 (1.7.2 Note 4 in IEC 60950-1, first edition) and 6.1.2.1, Note 2 (6.1.2.1, note in IEC 60950-1, first edition). DE DE

Compliance is checked by inspection and measurement.

6.4 Installation instructions

For equipment using an RFT CIRCUIT, the installation instructions shall specify all of the following:

a) the RFT CIRCUIT voltage;

b) the effective capacitance of the EUT:

1) between the connection points for the conductors of the TELECOMMUNICATION NETWORK, and

2) between the connection point for one conductor of the TELECOMMUNICATION NETWORK and earth;

c) that at the time of installation, a system assessment shall be carried out to ensure that the effective capacitance of the total system, including the capacitance of the EUT, does not exceed the values specified in Figure 2;

d) that at the time of installation, it shall be checked that the voltage rating of the wiring of the TELECOMMUNICATION NETWORK is adequate for the normal RFT CIRCUIT voltage, together with superimposed transients;

e) that at the time of installation, it shall be checked that the circuits to be connected together are either all RFT-C CIRCUITS or all RFT-V CIRCUITS.

Compliance is checked by inspection.

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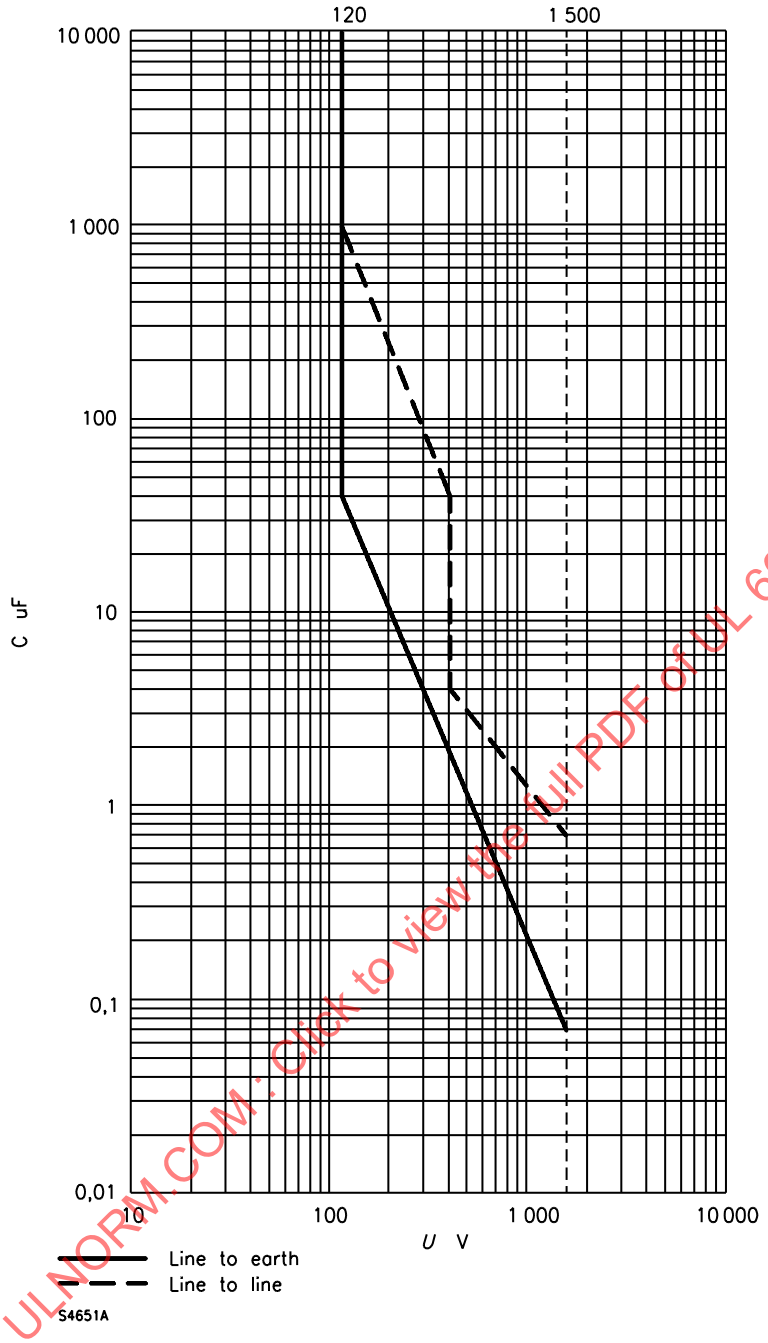

Key

U Voltage of the RFT CIRCUIT

NOTE See A.5.3.

Figure 2 – Limits for capacitance values of RFT CIRCUITS of the total system

Annex A
(informative)
Remote power feeding[1]

A.1 Overview

The two alternative types of RFT CIRCUIT, RFT-C CIRCUIT and RFT-V CIRCUIT, reflect satisfactory experience in different parts of the world. RFT-C CIRCUITS are typically floating and used in Europe, while RFT-V CIRCUITS are typically balanced and used in North America. Some RFT-V CIRCUITS are not balanced but utilize an earthed conductor. The conductors of a floating RFT CIRCUIT are isolated from earth by a large resistance, while the conductors of a balanced RFT CIRCUIT are isolated from earth only by the voltage source.

Remote power feeding at 50 V d.c. to 60 V d.c. is well known on the analogue telephone system. It has also been used at higher voltages for many years for long distance lines in many countries. The safety requirements have been specified in national standards, for example, in Germany in DIN VDE 0800-3.

Such higher voltage remote feeding is planned to be expanded to subscriber lines. One example is HDSL (high bit rate digital subscriber line).

RFT-C CIRCUITS with d.c. currents up to 60 mA and d.c. voltages up to several hundreds of volts in floating circuits have been used without creating hazards. RFT-V CIRCUITS operating at up to 140 V d.c. per conductor to earth, or 200 V d.c. per conductor to earth with monitoring and control devices, have also been used without creating hazards.

Requirements are specified in this standard for a newly defined concept, namely the RFT CIRCUIT (REMOTE FEEDING TELECOMMUNICATION CIRCUIT) for use in such applications.

A.2 Operational considerations

Remote feeding with voltages exceeding the voltage limits of TNV CIRCUITS and currents exceeding the current limits of LIMITED CURRENT CIRCUITS is needed to supply a useful amount of power via a TELECOMMUNICATION NETWORK.

However, it is not practical, in all cases, to prevent access by SERVICE PERSONS to an RFT CIRCUIT. SERVICE PERSONS should be permitted to work under live conditions (without switching off the power) on the TELECOMMUNICATION NETWORK, as well as on an RFT CIRCUIT supply equipment and on RFT CIRCUIT load equipment.

[1] See Clause 6.