

# GERMAN ADVISORY NOTE

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**German Advisory Note Number: DE 09**

**Subject:** Impedance during DTMF signalling

## APPLICABILITY

This note is applicable for Terminal Equipment intended for connection to the German Public Switched Telephone Networks, in addition to:



" CTR 21" (When published)

**NOTE:** Until CTR 21 is available, reference should be made to ETSI document prTBR 21 (Sept 1997) or, when it is available, to TBR 21.

## Appendix to this Note:

A: Additional requirements and tests for attachment to the German PSTN

**In consideration of the following:**

- For the German network, return loss of at least 14 dB against ZR is necessary between 600 Hz and 1 700 Hz when performing DTMF signalling to the network.
- This value could be expected where the TE presents a complex impedance close to ZR, even if a value of only 8 dB against ZR, as required by TBR21, is measured in the range from 300 Hz to 4 000 Hz.
- However, this might not be the case, if other impedance characteristics apply. (For example only resistive (real) impedance.).
- Not achieving a 14 dB return loss in the band between 600 Hz and 1 700 Hz could cause incorrect dialling in the German network

**Germany advises the following:**

For the frequency range from 600 Hz to 1 700 Hz, the impedance during DTMF dialling should be measured separately and comply with the requirements in Appendix A of this advisory Note.

To ensure inter-working with the German Public Switched Telephone Network, the TE shall, in addition to the requirements of CTR 21, comply with the requirements found in Appendix A of this Advisory Note.

It is the responsibility of the supplier to provide information for users as to whether the Terminal Equipment complies with the additional requirements for the German Public Switched Telephone Network specified in this Advisory Note.

Appendix A also specifies the method to assess compliance with the additional requirement, including reference to the additional tests to be performed to dynamically assess compliance with the additional requirements.

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## Appendix A

to

German Advisory Note Number: DE 09

**Subject:** Impedance during DTMF signalling

## A.1 INTRODUCTION

Terminal Equipment approved to CTR 21 may not inter-work properly with the German Public Switched Telephone Network.

This Appendix specifies requirements to which a TE shall comply, in addition to the requirements of CTR 21 to ensure interwork with the German Public Switched Telephone Network. It also specifies the method to assess compliance with these additional requirements, including reference to additional tests to be performed to dynamically assess compliance with the additional requirements.

## A.2 REFERENCES

- [1] CTR 21; Terminal Equipment (TE). Attachment requirements for pan-European approval for connection to the analogue Public Switched Telephone Networks (PSTNs) of TE (excluding TE supporting the voice Telephony Service) in which network addressing, if provided, is by means of Dual Tone Multi-Frequency (DTMF) signalling.

NOTE: This document makes reference to CTR 21. Until CTR 21 is available, reference should be made to the base ETSI documents prTBR 21 (Sept 1997) or, when it is available, to TBR 21.

## A.3 REQUIREMENTS and ASSOCIATED TESTS

### A.3.1 General loop steady state requirements

NOTE: The following requirements are in addition to the requirements of CTR 21 Clause 4.7.2 and the associated tests in Clause A.4.7.2.

#### A.3.1.1 Impedance (Requirement - based on CTR 21: Clause 4.7.2)

**Justification:** 91/263/EEC, Article 4(f); Inter-working with the PSTN is assured by requiring the TE to present an impedance which allows proper functioning of call control.

**Requirement:** during DTMF dialling the return loss calculated with respect to the reference impedance  $Z_R$  (at the same frequency) shall not be less than 14 dB at frequencies greater than 600 Hz but less than or equal 1 700 Hz.

**Test:** The test shall be conducted according to A.3.1.2.

#### A.3.1.2 Impedance (Test - based on CTR 21: Clause A.4.7.2)

**Requirement:** Subclause A.3.1.1

**Purpose:** To verify that the return loss of the input impedance of the TE ( $Z_i$ ) in relation to the reference impedance  $Z_R$  is within the limits specified below.

#### Measurement principle:

**Preamble:** Set the TE in loop state and, either signalling DTMF-digits or presenting the impedance that would be presented during DTMF-signalling.

**Test state:** Loop state.

Test configuration:

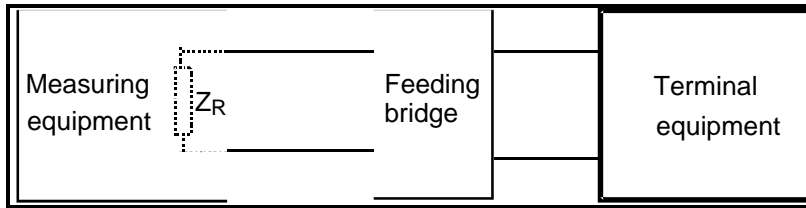


Figure A.12

DC feeding arrangement:

Feed voltage: 50 V. Feed resistance: each of the following: 230 W, 850 W, 2 050 W, and 3 200 W. Polarity shall be switched between each feed resistance.

AC termination of TE:  $Z_R$

Measurement points:

The test signal shall be sinusoidal with a constant voltage, whose level shall be pre-set to that required to achieve a level of  $-10$  dBV at the TE terminals.

$f_{\min} = 600$  Hz,  $f_{\max} = 1\,700$  Hz with step intervals of not more than  $1/3$  of an octave.

Measurement execution:

When the TE has been in the loop state for at least 1,2 s, measure modulus of the voltage and current flowing at the measurement frequency. Calculate the complex impedance ( $Z_i$ ) of the TE.

**Formal processing:** Return loss  $a = 20 \log_{10} \left| \frac{Z_R + Z_i}{Z_R - Z_i} \right|$  where  $Z_R$  is the reference impedance and  $Z_i$  is the impedance of the TE.

**Verdict:** If the return loss is greater than or equal to 14 dB;  
then Pass; else Fail.

**Guidance:** None.

### A.3.1.3 Requirements Table (CTR-RT)

The requirements table of CTR 21, Annex B is still applicable.