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Technical requirements for connection of terminal equipment to leased copper line in a public telecommunication network

Tekniska krav för anslutning av terminalutrustning till hyrd kopparledning i ett allmänt tillgängligt telenät

Contents

0 Introduction

This edition results from a review of the previous edition of this standard in order to align its mandatory content with the requirements of the terminal directive (91/263/EEC).

By this edition the Swedish language version of SS 63 63 51 is withdrawn.

1 Scope

This standard covers technical requirements imposed on terminal equipment intended for connection to a leased copper line in a public telecommunication network in Sweden. As used here, copper line means a galvanic and unloaded pair of conductors of constant or variable dimensions.

The object of the requirements set forth in this standard is to prevent the equipment from causing damage to the telecommunication network or undue disturbance of network functions.

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2 Normative reference

The following standard contains requirements which, through reference, also constitute requirements of this standard. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standard listed below.

ITU-T Recommendation:

G.117 (2/96) Transmission aspects of unbalance about earth (definitions and methods).

3 General

The requirements apply to all states following physical connection (quiescent state, initiation process, active sending and termination process).

The requirements set forth in clauses 4, 5, and 6 refer to all simultaneously transmitted signals, including harmonics and interference.

In clause 4 requirements are imposed on the output level of a periodic signal, i.e. a signal that contains single frequency components. In clause 5 requirements are imposed on the output level of a non-periodic signal, i.e. a signal that contains a continuos power spectrum. A composite (periodic/non-periodic) signal shall fulfil the requirements of both clauses 4 and 5. A signal which maybe either periodic or non-periodic depending on the content of the source signal, shall, if periodic, fulfil the requirements set forth in clause 4 and, if non-periodic, the requirements set forth in clause 5.

Where test methods other than those specified are used the test report shall include statements that uniquely identify the selected test methods. However, full technical details of the test methods need not be included in the test report.

NOTE – This is intended to allow traceability where alternative test methods are used.

4 Output level of periodic signals

4.1 Frequencies in the 0-50 Hz band

A DC voltage or the peak value of DC voltage pulses or the r.m.s. value of the AC voltage at frequencies up to 50 Hz, measured across 600 Ω, shall not exceed 60 V, except for ringing signals which shall not exceed 80 V.

4.2 Frequencies in the 50-200 Hz band

The r.m.s. value of the AC voltage of a single frequency within the 50-200 Hz band, measured across 600 Ω, shall not exceed the limits shown in figure 1 and table 1.

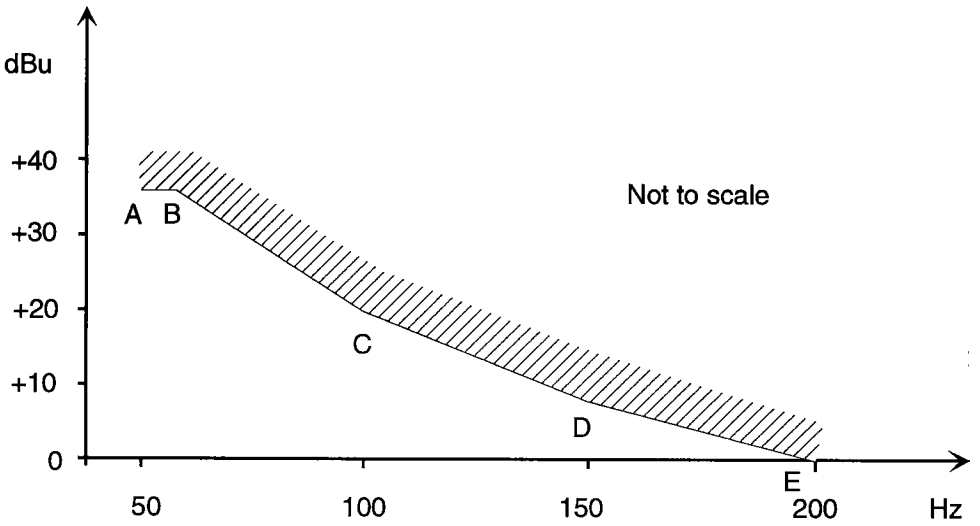


Figure 1- Maximum permissible level for a frequency in the 50-200 Hz band

Table 1 – Maximum permissible level for a frequency in the 50-200 Hz band

Point	Frequency Hz	Level dBu
A	50	+36
B	60	+36
C	100	+20
D	150	+ 8
E	200	0
NOTE – Limits for intermediate frequencies can be found by drawing a straight line between the break points on a linear (Hz) - linear (dBu) scale		

In case of simultaneous emission of several frequencies within the 50-200 Hz band, the weighted total level shall not exceed 0 dBu, based on the following weighting formula

$$L_{tot} = 10 \times \log_{10} \sum_{i=1}^{n} 10^{(L_i - L_{i\max})/10}$$

where

L_{tot} = weighted total level

n = number of emitted frequencies (including harmonics) in the 50-200 Hz band

L_i = level of the voltage component at the frequency f_i

$L_{i\max}$ = maximum permissible level at the frequency f_i shown in figure 1

Example:

Two frequencies, 80 Hz and 150 Hz, are transmitted at the levels +22 dBu and +6 dBu, respectively.

$$L_{tot} = 10 \times \log_{10}(10^{-0,6} + 10^{-0,2}) = -0,54 \text{ dBu} < 0 \text{ dBu}$$

4.3 Frequencies in the 200-4000 Hz band

The output level of a single frequency component in the 200-4000 Hz band, measured across 600 Ω, shall not exceed -6 dBm. In case of simultaneous emission of several single frequency components, each at a level not exceeding -6 dBm, the total output level in the 200-4000 Hz frequency band, measured across 600 Ω, shall not exceed 0 dBm.

4.4 Frequencies above 4000 Hz

The output level of a single frequency component above 4000 Hz, measured across 120 Ω shall not exceed the limits shown in figure 2 and table 2.

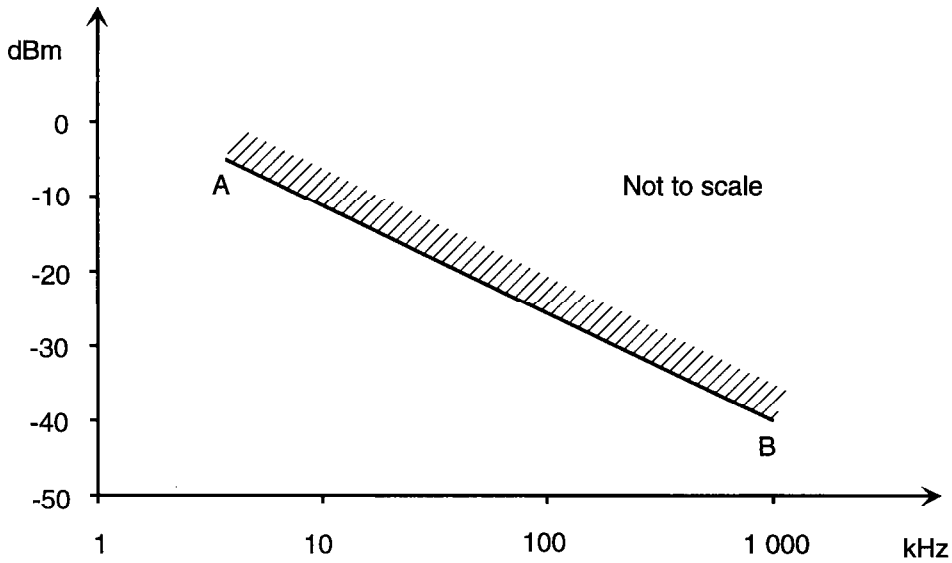


Figure 2 – Maximum permissible level for a frequency above 4000 Hz

Table 2 – Maximum permissible level for a frequency above 4000 Hz

Point	Frequency kHz	Level dBm
A	4	-6
B	1000	-40
NOTE – Limits for intermediate frequencies can be found by drawing a straight line between the break points on a logarithmic (Hz) - linear (dBm) scale		

In case of simultaneous emission of several frequencies, each with a level below the one indicated above, the total output level in the band above 4000 Hz, measured across 120 Ω, shall not exceed 0 dBm.

5 Output level of non-periodic signals

5.1 General

Live speech signals, recorded or artificial, shall not be subjected to the requirements in this section. Such signals shall fulfil the requirements set forth in section 6.

5.2 DC voltage pulses

The peak value of DC voltage pulses, measured across 600 Ω, shall not exceed 60 V.

5.3 200 - 4000 Hz frequency band

The total output level, in the 200 - 4000 Hz frequency band, measured across 600 Ω shall not exceed +1 dBm.

5.4 Power spectrum above 4 000 Hz

The power spectrum above 4000 Hz of the signal, measured across 120 Ω, shall not exceed the limits shown in figure 3 and table 3. When verifying this requirement appropriate

– measurement bandwidth;

– time of integration;

– length of the pseudo-random sequence;

shall be selected.

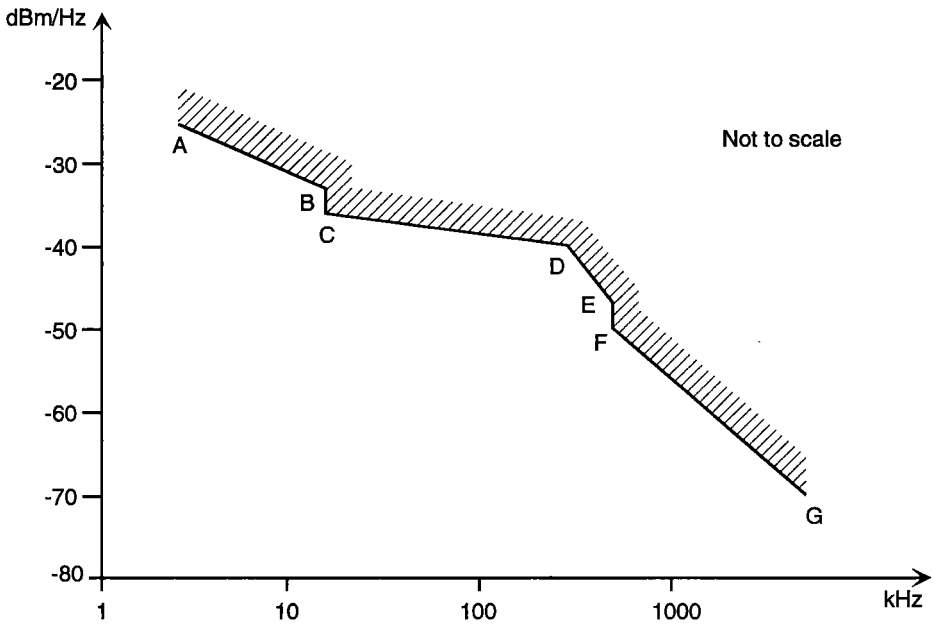


Figure 3 – Maximum limit of permissible power spectrum above 4000 Hz

Table 3 – Maximum limit of permissible power spectrum above 4000 Hz

Point	Frequency kHz	Level dBm/Hz
A	4	-26
B	20	-33
C	20	-36
D	300	-40
E	500	-47
F	500	-50
G	5 000	-70
NOTE – Limits for intermediate frequencies can be found by drawing a straight line between the break points on a logarithmic (Hz) - linear (dBm/Hz) scale		

NOTE – Measured values shall be corrected in view of the selected measurement bandwidth according to the formula

corrected value = measured value - $10 \times \log_{10}$(measurement bandwidth in Hz)

Example:

Measured value is -11 dBm at a measurement bandwidth of 1 kHz centred at 300 kHz.

corrected value = $-11 - 10 \times \log_{10}(1\,000) = -41$ dBm/Hz.

The requirement is fulfilled as the limit at 300 kHz (point D) is -40 dBm/Hz.

6 Output level of live and artificial speech signals

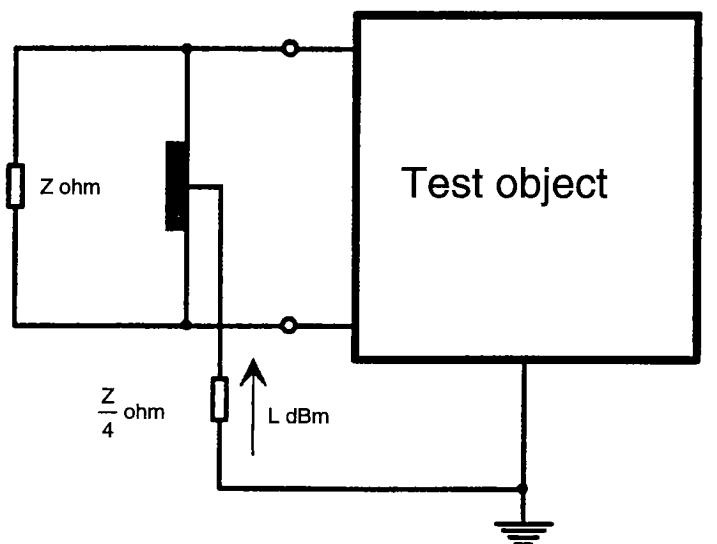
The maximum output signal as a result of any acoustic stimulus or artificial speech, measured across 600 Ω, shall not be greater than 8 V peak to peak.

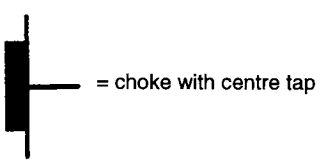
7 Line current

The r.m.s. value of the line current shall not exceed 200 mA under normal operating conditions, and 300 mA in the case of a short-circuited line.

8 Output level of longitudinal signals

Longitudinal signals shall be measured as shown in figure 4.





Z= 600 ohms for frequencies in the band 200-400 Hz
120 ohms for frequencies in the band 4 kHz to 2 MHz

Figure 4 – Test set-up for measurement of longitudinal signals

The permissible total level of longitudinal signals is shown in table 4.

Table 4 – Maximum permissible total level of longitudinal signals in different frequency bands

Frequency band kHz	Level L dBm
0,2 – 4	-25
4 – 100	-30
100 – 500	-40
500 – 2 000	-50

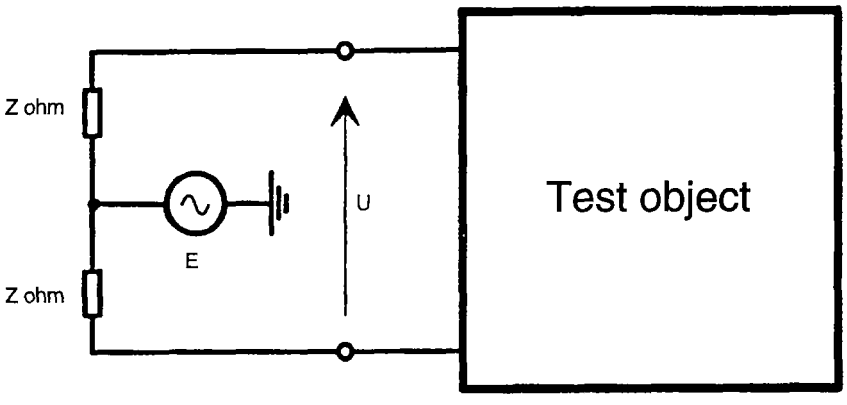
9 Resistance to earth

Where the supplier's instructions state that a connection to earth is intended, the DC resistance between each line terminal of the equipment and earth in quiescent state, when tested at 100 V DC, shall be not less than 10 M Ω.

The requirement does not apply for interfaces that generate DC, e.g. for power feed or wet current purposes.

10 Longitudinal Conversion Loss

The Longitudinal Conversion Loss (LCL) as defined in ITU-T Recommendation G.117 shall be measured as shown in figure 5.



$L =$ 300 ohms for frequencies in the band 15 – 4000 Hz band
60 ohms for frequencies in the band 4 kHz to 1 MHz

$E = 0{,}775$ V

$$LCL = 20 \lg \left| \frac{E}{U} \right| \text{ dB}$$

Figure 5 – Test set-up for measurement of LCL

The minimum permissible LCL is shown in table 5,

Table 5- Minimum permissible LCL

Frequency band	LCL dB
15 – 50 Hz	40
50 – 4 000 Hz	46
4 – 1 000 kHz	40

The requirements shall only apply up to the frequency above which the power is at least 40 dB below the total power (measured on a broadband basis) of the valid signal from the terminal equipment.