TELENOR

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SPECIFICATION

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Access to copper pairs in the access network of Telenor. Specification of the network side of the user-network interface

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Abstract : Specification describing the network side of the user-network interface of access to copper pairs in the access network of Telenor

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CONTENT

1 Scope

This specification describes the network side of accesses to copper pairs in the access network of Telenor, and characteristics of the copper pairs in the access network. The cables in the access network were primarily established for transmission of DC currents and analogue signals in the frequency band up to 4 kHz.

In no event shall Telenor be liable to other parties for any direct, indirect, special, incidental, or consequential damages resulting from errors or defects in these specifications.

2 References

2.1 Normative references

None.

2.2 Informative references

[1] Telenor Nett Specification A21: "Access to the public switched telephone network (PSTN). Specification of the network side of the user-network interface. Ed. 2. Oct. 1999."

3 Definitions and abbreviations

3.1 Definitions

a- and b-wire - The two wires in the copper pair access

Network termination point – The physical point at the boundary of the PSTN intended to accept the connection of a terminal equipment

3.2 Abbreviations

NTP - Network Termination Point

MDF - Main Distribution Frame

4 Interface presentation (plugs/sockets)

The copper pair will at the subscribers premises be terminated at the network termination point (NTP) and on the premises of Telenor in the main distribution frame (MDF), as shown in figure 1.

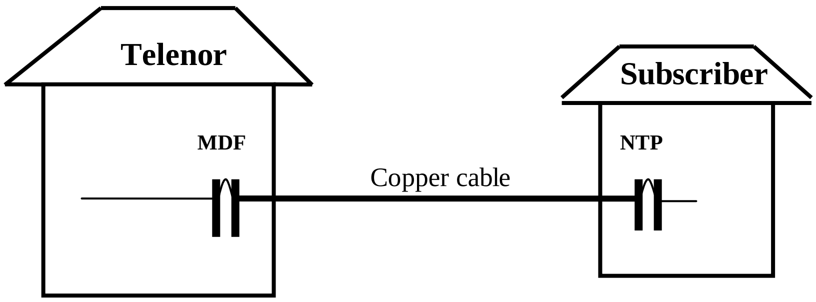

Figure 1. Configuration of the access network.

At the subscriber the user-network interface will be presented in the form of

- screw termination at the interface to an internal subscriber owned cabling system
- insulation displacement connection (LSA+, Trennleist or equivalent) at the interface to an internal subscriber owned cabling system
- socket (female) of the type EN 60603-7/RJ45 at the customers premises. The 2-wire copper pair is connected to pin 4 and 5
- 3-pole socket (female) at the customers premises. This connector type is not used for new installations. The dimensions of the associated 3-pole plug are given in Telenor Nett Specification A21 [1].

At the premises of Telenor, the copper pair will be terminated in the MDF.

5 Characteristics of the copper pairs

The most commonly used cable types in the access network of Telenor have pairs with diameters 0,4 and 0,6 mm. A list of typical cables used in the access network of Telenor is given in table 1.

Table 1. Cable types used in the access network.

Cable type (conducter diameter)	Capacitance (nF/km)	Loop resistance (ohms/km)	Maximum length (km) Note
Buried cable (earth)			
0,4 mm	45	288,0	4,7
0,5 mm	50	184,2	7,0
0,6 mm	45	127,8	7,8
0,9 mm	45	55,6	10,0
Suspended cable (air)			
0,6 mm	45	127,8	7,8
0,9 mm	45	55,6	10,0
Sea cable			
0,6 mm	37	127,8	8,8
0,6 mm	45	127,8	7,8
0,7 mm	62	94,0	6,4
0,9 mm	45	55,6	10,0
0,9 mm	55	55,6	7,8

Note

The maximum lengths given in table 1 apply for the telephony service and may be exceeded for some old cables and in some cases where it has been necessary in order to obtain access for the subscriber. Other services usually will have shorter range of operation than the telephony service.

6 Maximum loop resistance

The loop resistance of the cable pair will normally not exceed 1400 ohms.

7 Resistance between a- and b-wire

The resistance between the a- and b-wire will normally be more than 1,0 Mohm. For old cables and in special circumstances, the resistance may be lower.

8 Resistance towards earth

The resistance between the a-wire and earth and between the b-wire and earth will normally be more than 1,0 Mohm. For old cables and in special circumstances, the resistance may lower.

9 Input impedance

The input impedance into the subscriber line will be dependent on the type of cable, the length and the terminating impedance. Figures 3 and 4 show the impedance seen into the subscriber line for different lengths of 0,4 and 0,6 mm, 45 nF/km, cable in the frequency band 0 to 20.000 Hz. The impedance has been calculated assuming a terminating impedance equal to the impedance Z given in figure 2.

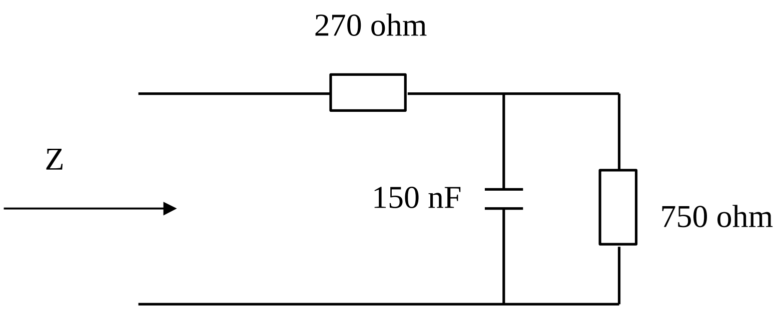

Figure. 2. Nominal impedance Z.

Figures 5 and 6 show the impedance seen into the line for different lengths of 0,4 and 0,6 mm, 45 nF/km, cable in the frequency band 1 kHz to 1 MHz. The impedance has been calculated assuming a terminating impedance of 135 ohms.

The impedance given in figures 3 to 6 are typical values. Often the lines will include different types of cable in cascade, giving other values for the input impedance. Especially in the frequency band above 20 kHz the variation will be large and the input impedance may have large deviations from the values given in figures 5 and 6.

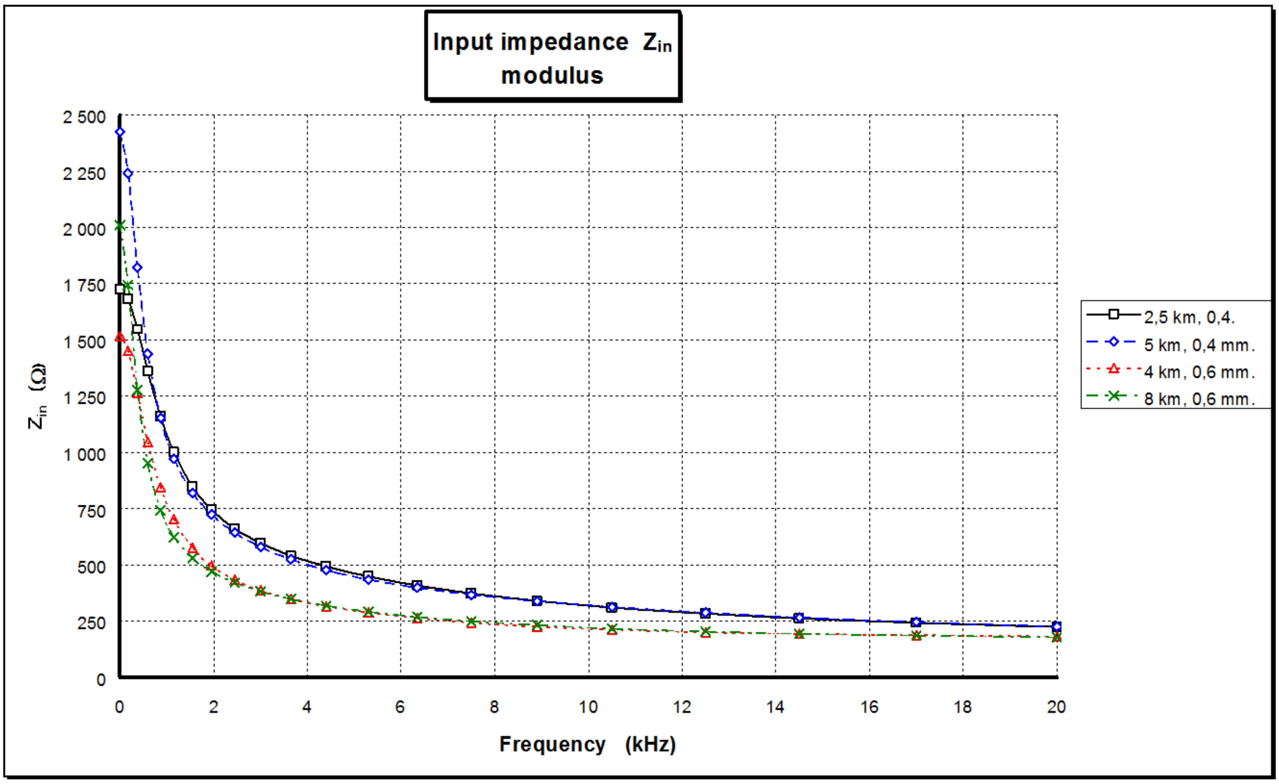

Figure 3. Input impedance (modulus) for 0,4 and 0,6 mm cable (45 nF). 0 to 20 kHz.

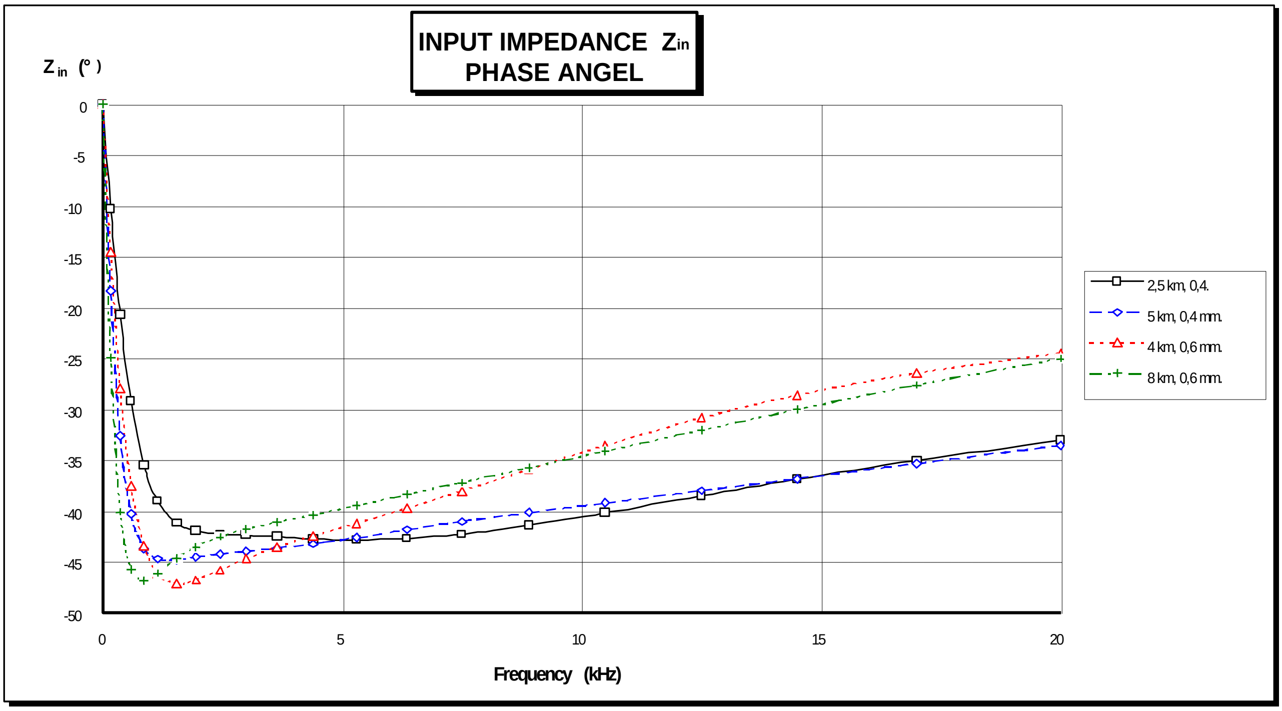

Figure 4. Input impedance (phase angle) for 0,4 and 0,6 mm cable (45 nF). 0 to 20 kHz.

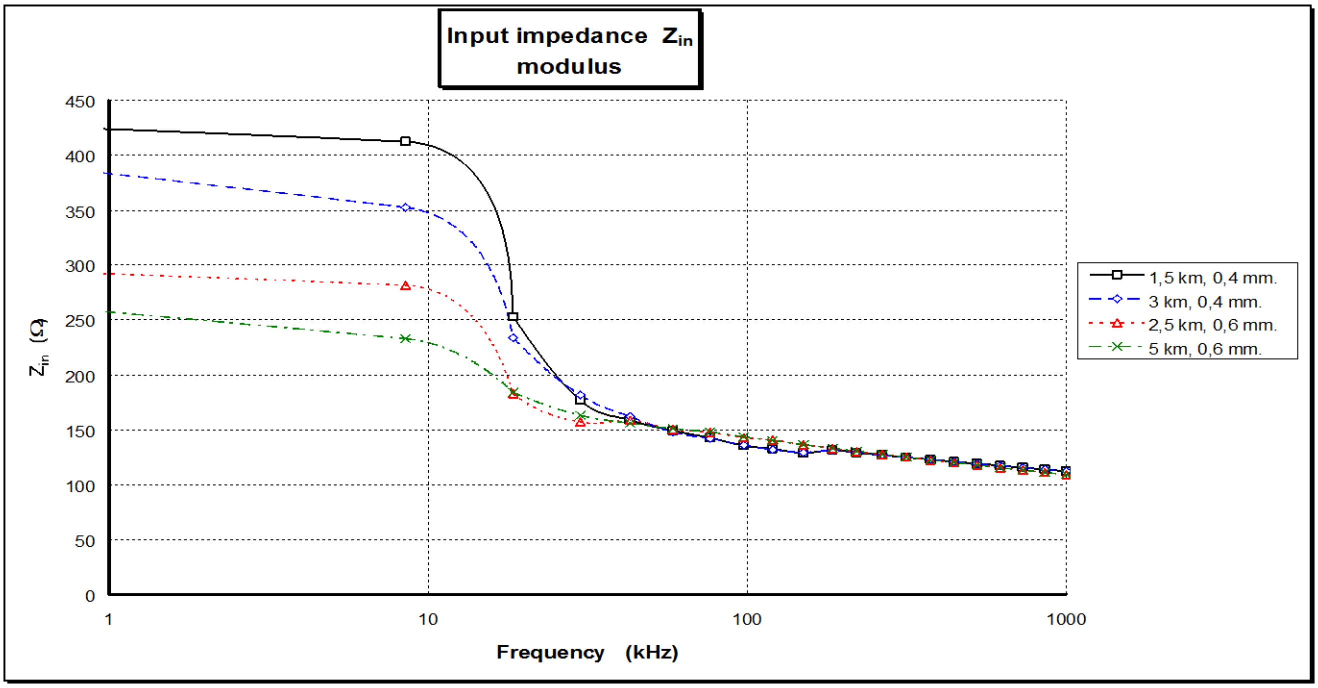

Figure 5. Input impedance (modulus) for 0,4 and 0,6 mm, 45 nF/km cable. 1 kHz to 1 MHz.

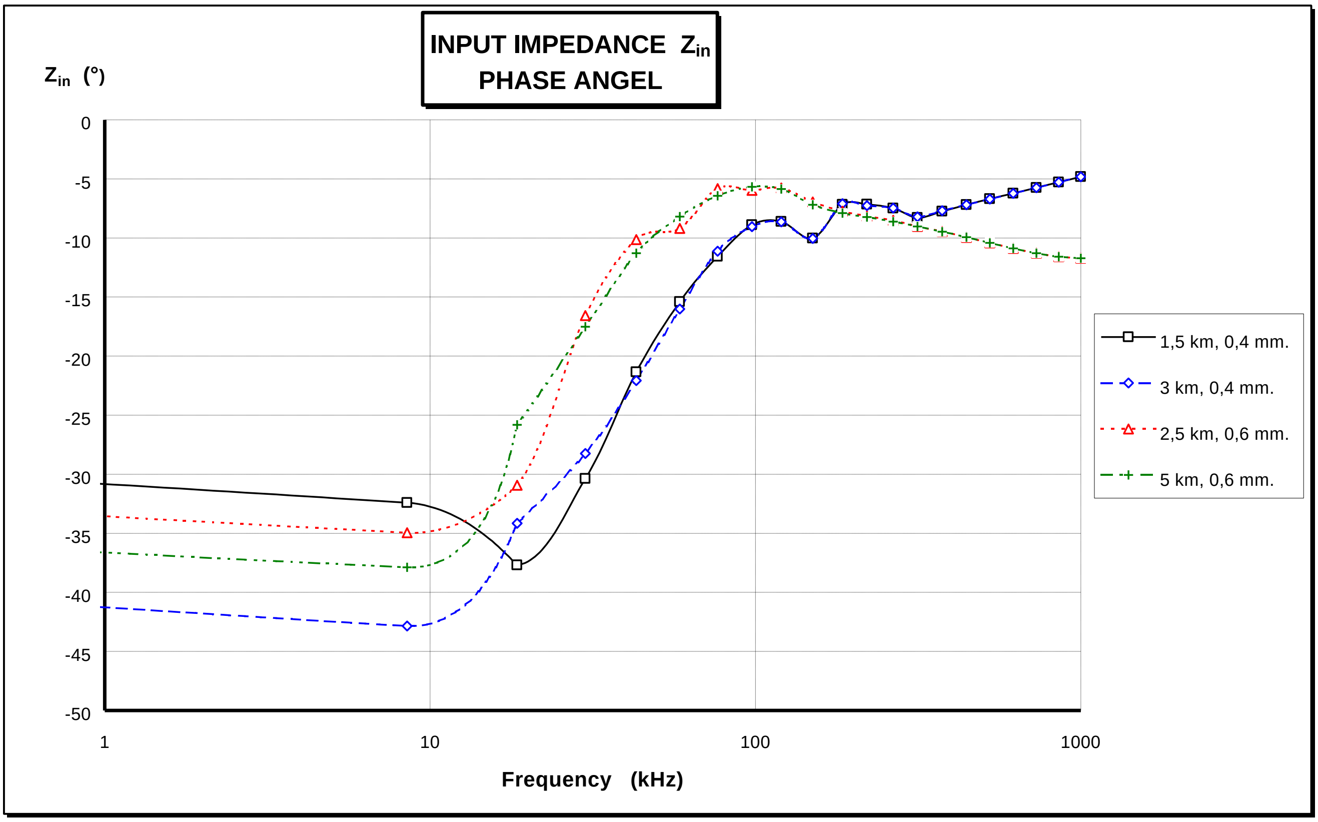

Figure 6. Input impedance (phase angle) for 0,4 and 0,6 mm, 45 nF/km cable. 1 kHz to 1 MHz.

10 Line attenuation

The attenuation on the line will be dependent of the type of cable, the length and the terminating impedances. Figure 7 shows the composite loss for different lengths of 0,4 and 0,6 mm, 45 nF/km, cable in the frequency band 0 to 20 kHz. The composite loss has been calculated using terminating impedances equal to impedance Z given in figure 2.

Figure 8 shows the composite loss for different lengths of 0,4 and 0,6 mm, 45 nF/km, cable in the frequency band 1 kHz to 1 MHz. The composite loss has been calculated using terminating impedances equal to 135 ohms.

The attenuations shown in figures 7 and 8 are typical values. Often the lines will include different types of cable in cascade, giving other attenuation values. Especially in the frequency band above 20 kHz the variation will be large and the attenuation may have large deviations from the values given in figure 8.

Normally the attenuation will not exceed the following values (maximum line lengths):

- 1 kHz: 9 dB
- 4 kHz: 17 dB
- 20 kHz: 35 dB
- 40 kHz: 40 dB
- 400 kHz: 80 dB
- 1 MHz: 140 dB

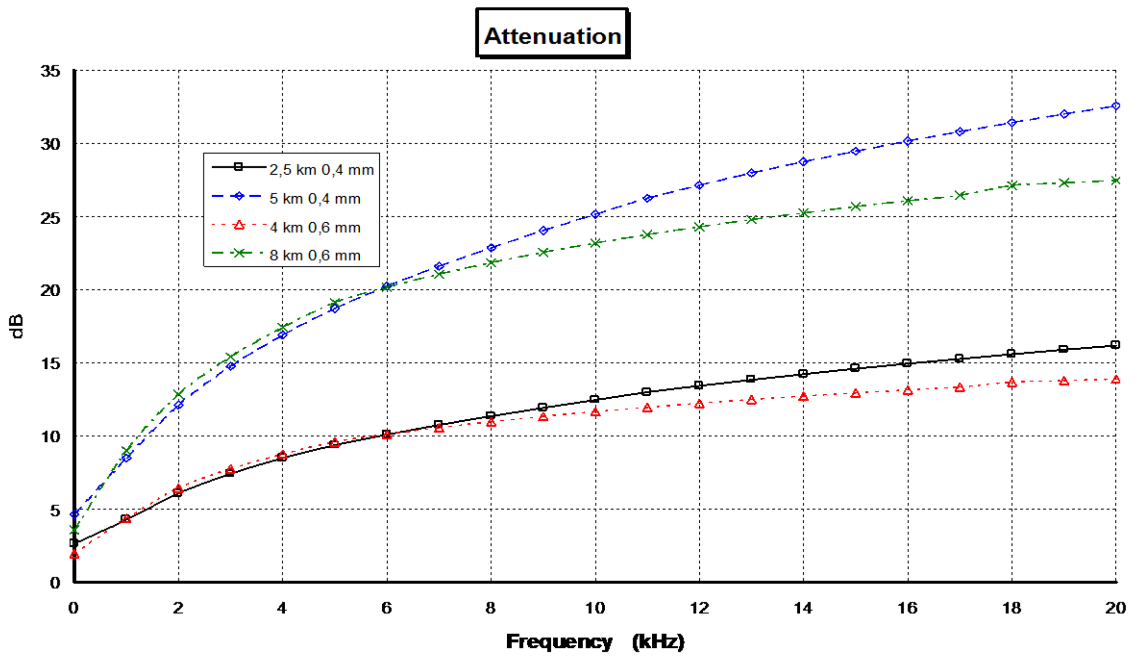

Figure 7. Composite loss in 0,4 and 0,6 mm, 45 nF/km cable. 0 to 20 kHz.

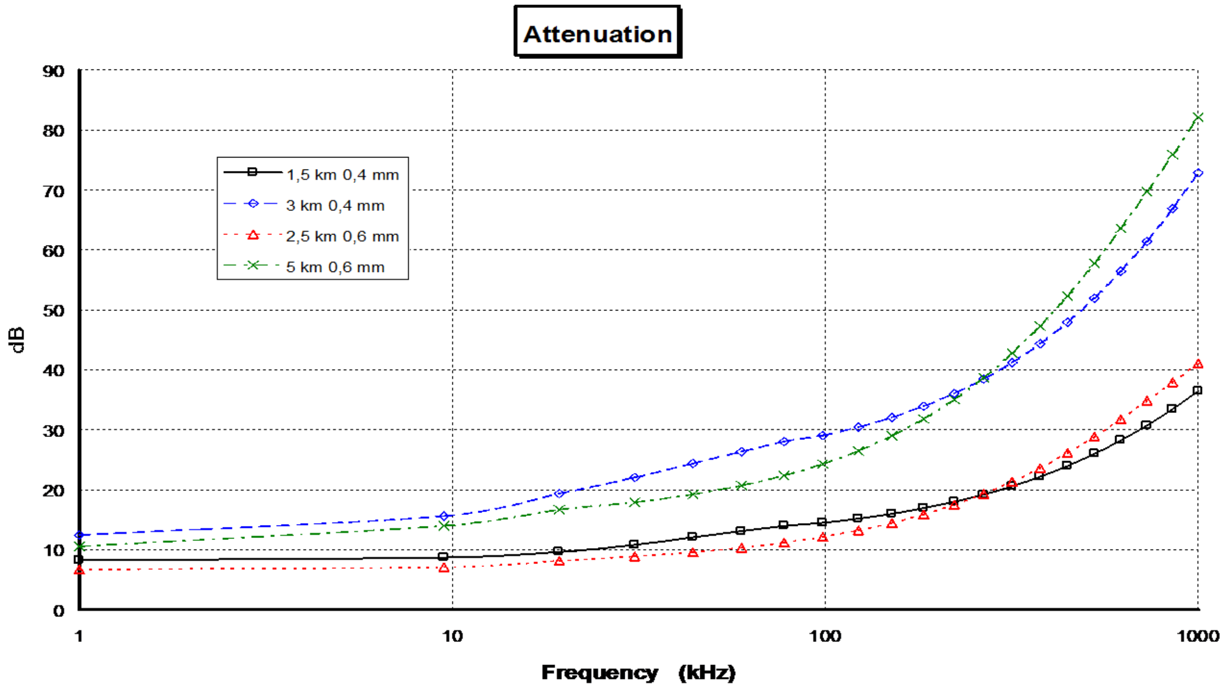

Figure 8. Composite loss in 0,4 and 0,6 mm, 45 nF/km cable. 1 kHz to 1 MHz.

11 Noise

The noise at the user-network interface will normally not exceed –55 dBmp.

12 Power handling capacity

12.1 Introduction

Due to crosstalk couplings within the cables in the access network, a dominant signal fed into one copper pair will influence or even degrade services transported on the adjacent pairs. It is therefore necessary to limit the signal levels into the copper pair.

12.2 Feeding voltage and current

Feeding voltage in the presence of a ringing signal shall not exceed 60 V DC between a- and b-wire. The current, including ringing signal, shall not exceed 100 mA rms.

Where feeding voltage is not present together with a ringing signal, the feeding voltage shall not exceed –55/+55 V DC. The maximum current shall not exceed 40 mA DC.

12.3 Ringing signal

The ringing signal shall not exceed 90 Vrms.

12.4 Signals in the frequency range 0 – 50 Hz

Signals in the frequency range 0 – 50 Hz, ringing signal not included, shall not exceed 60 Vrms.

12.5 Signals in the frequency range 50 – 200 Hz

Signals in the frequency range 50 – 200 Hz shall not exceed the following values, measured over a resistance of 600 ohms:

50 Hz:	≤ 36 dBu
60 Hz:	≤ 36 dBu
100 Hz:	≤ 20 dBu
150 Hz:	≤ 8 dBu
200 Hz:	≤ 0 dBu

The maximum value for intermediate frequencies can be found by linear interpolation (linear frequency and dBu scale).

12.6 Signals in the frequency band 200 Hz – 4 kHz

The mean sending level in the frequency band 200 Hz to 4 kHz shall not exceed –6 dBm, measured over 600 ohm.

The peak-to-peak instantaneous voltage shall not exceed 5 V.

12.7 Signals in the frequency band 4 kHz – 20 kHz

The mean sending level in the frequency band 4 kHz to 20 kHz shall not exceed –6 dBm, measured over 600 ohm.

The peak-to-peak instantaneous voltage shall not exceed 5 V.

12.8 Signals in the frequency band above 20 kHz

The power spectral density above 20 kHz shall not exceed:

- –30 dBm/Hz (20 – 50 kHz)
- -39 dBm/Hz (50 – 300 kHz)
- -40 dBm/Hz (0,3 – 1,1 MHz).

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Annex 1: Document history

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1	24.3.2000	Produced by Stein Hagen/NT.SX