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Public Switched Telephone Network (PSTN); Requirements for handset telephony

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Contents

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Foreword

This ETSI Standard (ES) has been produced by ETSI Project Analogue Terminals and Access (ATA), and is now submitted for the ETSI standards Membership Approval Procedure.

Introduction

The present document is an updated version of I-ETS 300 677 [3] and describes the requirements for handset telephony terminals intended for connection to the Public Switched Telephone Network (PSTN) as described in the Scope. Test methods to verify conformance to the present document are contained in an associated standard (I-ETS 300 480 [2]).

It is recognized that for historical reasons, feed resistances for test purposes, send and receive loudness and for sidetone may have values particular to each country's network. These requirements are specified in a common text which, where necessary, includes parameters to which each country may assign its own national values, which are set out in accompanying tables.

ETSI has derived values for send and receive loudness ratings and for sidetone performance which are currently believed to be reasonable targets for handset telephony requirements in the future, when inter-exchange connections are mostly digital and the only source of loss is in the local analogue access.

The values were derived from the long term objectives for Sending Loudness Rating (SLR) and Receiving Loudness Rating (RLR) as described in ITU-T Recommendation G.121, taking into account R and T pads assumed to be 7 dB and 0 dB respectively, and allowing for an average loss of 4 dB in each local connection due to either the local line or to additional attenuation inserted in the local exchange in the case of connections with short lines.

These have been implemented in TBR 038 [4], a standard for handset telephony terminal equipment which is intended for pan-European approval, and have been incorporated in the present document as "TBR 038 [4] values".

The values given in the tables of national values have been derived by transposing existing national regulatory requirements into values that would be obtained by the new harmonized test methods contained in I-ETS 300 480 [2].

National Administrations were invited to endorse these new national values.

At the Public Enquiry, this introduction stated that:

"If national values are not provided, the national values presently marked "Not Available" will be replaced by the proposed harmonized values in the published I-ETS".

*Where national values were not provided following public enquiry, the TBR 038 [4] values have been inserted and marked with an *.*

1 Scope

The present document specifies those electro-acoustical characteristics that a handset telephony terminal should fulfil to ensure the minimum speech quality when communicating across the European Public Switched Telephone Networks (PSTNs).

The objective of the present document is to ensure interworking between Terminal Equipment (TE) via the public network.

The present document applies in conjunction with the general requirements for PSTN access contained in ETS 300 001 [1]. The requirements of the present document are additional to those for connection to the two-wire interface of the PSTN specified in ETS 300 001 [1].

The requirements of the present document provide real-time (live) two-way speech of a quality consistent with the ITU-T (CCITT) P-series Recommendations.

The testing specification for analogue handset telephony is specified in I-ETS 300 480 [2].

The present document is applicable both to handset telephony terminals and the handset telephony function of a multi-function terminal.

The following functions are outside the scope of the present document:

- handsfree or loudspeaking function;
- cordless telephony;
- telephony for people with audio-related impairments (e.g. telephones with additional receive amplification as an aid for the hard of hearing);
- telephony terminals designed for use in hostile environments;
- key systems or Private Automatic Branch eXchange (PABX) system dependent terminals;
- telephones using non-linear or time variant signal processing techniques.

2 References

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or

c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

2.1 Normative references

[1] ETS 300 001: "Attachments to the Public Switched Telephone Network (PSTN); General Technical requirements for equipment connected to an analogue subscriber interface in the PSTN".

[2] I-ETS 300 480: "Terminal Equipment (TE); Attachments to the Public Switched Telephone Network (PSTN); Testing specification for analogue handset telephony".

2.2 Informative references

For the purposes of the present document, the following references used within the text have been provided for information:

[3] I-ETS 300 677 (1996): "Public Switched Telephone Network (PSTN); Requirements for handset telephony".

[4] prTBR 038: "Public Switched Telephone Network (PSTN); Attachment requirements for a terminal incorporating an analogue handset function capable of supporting the justified case service when connected to the analogue interface of the PSTN in Europe".

[5] ITU-T Recommendation P.10 (1993): "Vocabulary of terms on telephone transmission quality and telephone sets".

[6] CCITT Recommendation P.35 (1988): "Handset Telephones".

[7] 73/23/EEC: "Council Directive of 19 February 1973 on the harmonization of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits".

[8] ITU-T Recommendation P.57 (1993): "Artificial ears".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following definitions apply:

acoustic shock: Any temporary or permanent disturbance of the functioning of the ear, or of the nervous system, which may be caused to the user of a telephone earphone by a sudden sharp rise in the acoustic pressure produced by it (see ITU-T Recommendation P.10 [5]).

artificial ear: A device for the calibration of earphones incorporating an acoustic coupler and a calibrated microphone for the measurement of sound pressure and having an overall acoustic impedance similar to that of the average human ear over a given frequency band (see ITU-T Recommendation P.10 [5]).

handset: A combination of telephone microphone and receiver in a form convenient for holding simultaneously to mouth and ear, which, when in use, retains the microphone in a position fixed in relation to the receiver.

handsfree function: A function whereby telephony transmission and reception is facilitated by the use of microphone(s) and loudspeaker(s) placed at a distance from the user. No handset is required to be used and normally the handset is not active.

loudness rating: A measure, expressed in decibels, for characterizing the loudness performance of complete telephone connections or of parts thereof such as sending system, line, receiving system (see ITU-T Recommendation P.10 [5]). An increase in a loudness rating corresponds to a decreasing subjective impression of loudness and vice versa.

loudspeaking function: A function whereby the incoming signal is presented to the user(s) from loudspeaker(s) and the handset is used simultaneously for sending in its normal speaking position.

Mouth Reference Point (MRP): A point 25 mm in front of and on the axis of the lip position of a typical human mouth (or artificial mouth) (see ITU-T Recommendation P.10 [5]).

Not Mandatory (NM): Indicates that the requirement in the common text with which the table is associated is not subject to mandatory compliance testing in that country, and that no parameter value has been assigned to it.

Sidetone Masking Rating (STMR): A rating whereby the perceived loudness of the sidetone attributable to a telephone is calculated as the loudness of the speech via the electrical path masked by the speech via the natural paths (bone conduction and leakage at the ear).

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

d.c.	direct current
e.m.f.	electromotive force
MRP	Mouth Reference Point
NM	Not Mandatory
PABX	Private Automatic Branch eXchange
PSTN	Public Switched Telephone Network
RLR	Receiving Loudness Rating
SLR	Sending Loudness Rating
SPL	Sound Pressure Level
STMR	SideTone Masking Rating
TE	Terminal Equipment

4 Speech transmission aspects

4.1 General

4.1.1 Polarity independence

The Terminal Equipment (TE) shall conform to the requirements of the present document for both polarities of line feeding voltage.

Compliance shall be checked by reversal of the d.c. voltage applied to the terminal under test between changes of test configuration.

4.1.2 Feed resistance

Unless otherwise specified, tests shall be carried out over the following range of feed resistance chosen from those given in subclause 4.2 of I-ETS 300 480 [2]. Sending and receive sensitivity (response) and sidetone test "b" shall be carried out at the feed resistance values specified.

Table 1: Range of feed resistance for testing purposes

Country	Value of feed resistor R_f (Ω)				
	Upper limit R_f max	**For response test**	**For sidetone term "b"**	**Middle R_f mid**	**Lower limit R_f min**
Austria	2 800	1 600	1 600	1 600	500
Belgium	1 600	1 600	1 600	1 600	500
Bulgaria	2 800*	1 000*	1 000*	1 000*	500*
Cyprus	2 800	1 600	1 600	1 600	500
Czech Republic	2 800	1 600	1 600	1 600	800
Denmark	2 800	1 600	1 600	1 600	500
Finland	2 000	1 300	1 300	1 300	800
France	1 300	500	800	800	500
Germany	2 000	1 600	1 600	1 600	800
Greece	2 300	1 300	1 300	1 300	800
Hungary (1 and 2)	2 000	500	1 000	1 000	500
Iceland	2 800	1 600	1 600	1 600	500
Ireland	2 000	1 600	1 600	1 600	500
Italy	2 000	1 300	1 000	1 300	800
Luxembourg	2 800	1 600	1 600	1 600	500
Malta	2 800*	1 000*	1 000*	1 000*	500*
The Netherlands	2 800	1 600	1 600	1 600	500
Norway	2 800	1 000	1 000	1 000	500
Poland	2 800	1 600	1 600	1 600	800
Portugal	2 800*	1 000*	1 000*	1 000*	500*
Romania	2 000	1 600	1 000	1 300	500
Russia	2 800*	1 000*	1 000*	1 000*	500*
Slovak Republic	2 800	1 600	1 600	1 600	800
Slovenia	2 800*	1 000*	1 000*	1 000*	500*
Spain	1 600	500	1 000	1 000	500
Sweden	2 800	1 600	2 000	2 300	1 600
Switzerland	2 300	2 300	1 000	NM	500
Turkey	2 800	1 600	1 600	1 600	500
United Kingdom	1 600	1 000	1 000	1 000	500
NOTE 1: Hungary (1 and 2) define two acceptable alternative loudness control characteristics which in this case are the same.					
NOTE 2: Harmonized values of feed resistor R_f can be found in TBR 38 [4].					

4.1.3 Power supply

Where the terminal requires an additional power supply in order for the handset telephony function to operate, the requirements of the present document shall be met with the power supply connected and operative.

4.1.4 Volume control

Unless stated otherwise, the requirements apply for all positions of the user-controlled receiving volume control, if provided.

Compliance tests shall be carried out at the "nominal" setting of the volume control as described in subclause 4.2.2.3 unless otherwise specified in the appropriate requirement.

4.2 Speech performance characteristics

4.2.1 Sensitivity - frequency response

The requirements for sending and receiving sensitivity - frequency responses shall be met at the nominated value of R_f specified as "for response test" in table 1.

4.2.1.1 Sending

The sending sensitivity, when plotted against frequency, shall be not greater than the upper limit and not less than the lower limit given in table 2 and shown in figure 1.

Compliance shall be checked by the test described in subclause 4.2.1.1 of I-ETS 300 480 [2].

Table 2: Co-ordinates of sending sensitivity limit curves

	Frequency (Hz)	dB relative to arbitrary level
Upper limit	100	-9
	2 000	+4
	4 000	+4
	8 000	-16
Lower limit	300	-14
	2 000	-6
	3 400	-11

Limits for intermediate frequencies are found by drawing a straight line between the breakpoints on a logarithmic (Hz) - linear (dB) scale.

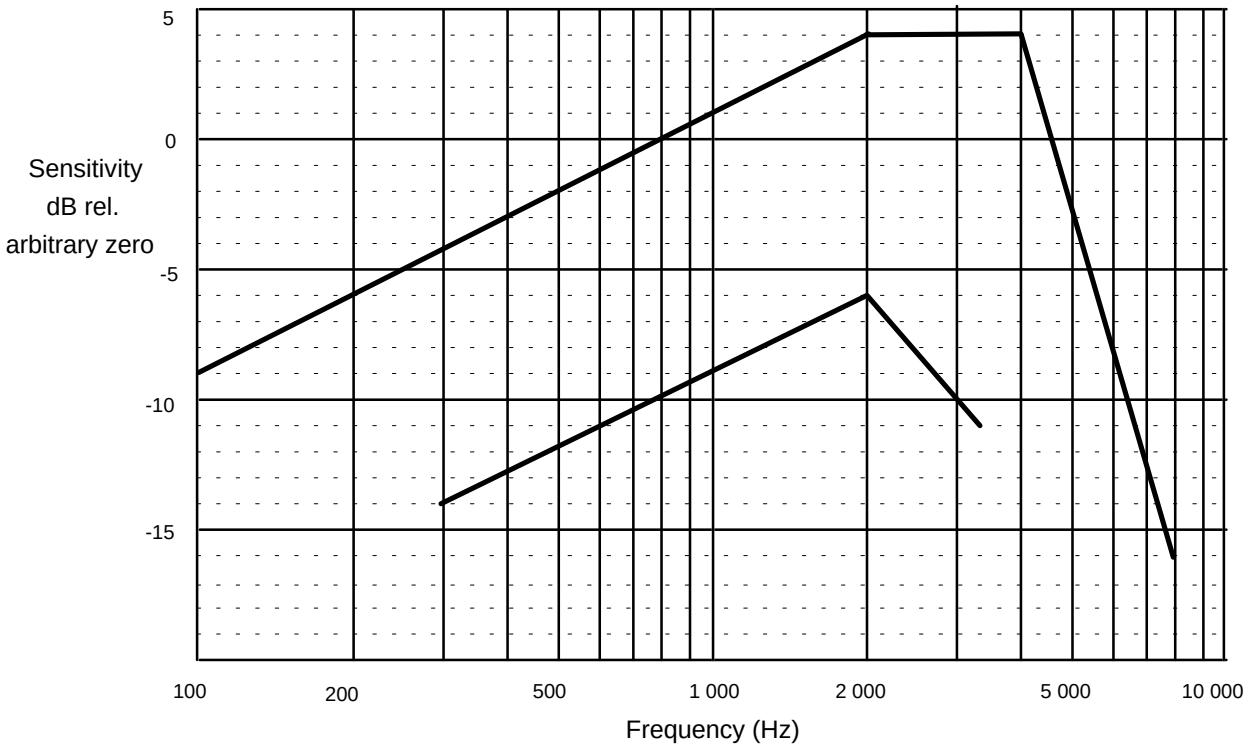

Figure 1: Sending sensitivity/frequency limits

4.2.1.2 Receiving

The receiving sensitivity, when plotted against frequency, shall be not greater than the upper limit and not less than the lower limit given in table 3 and shown in figure 2.

Additionally, the sensitivity at 8 kHz shall be at least 25 dB below the sensitivity at 1 kHz.

Compliance shall be checked by the test described in subclause 4.2.1.2 of I-ETS 300 480 [2].

Table 3: Co-ordinates of receiving sensitivity limit curves

	Frequency (Hz)	dB relative to arbitrary level
Upper limit	100	-10
	200	+2
	4 000	+2
	8 000	-18
Lower limit	300	-9
	1 000	-7
	3 400	-12

Limits for intermediate frequencies are found by drawing a straight line between the breakpoints on a logarithmic (Hz) - linear (dB) scale.

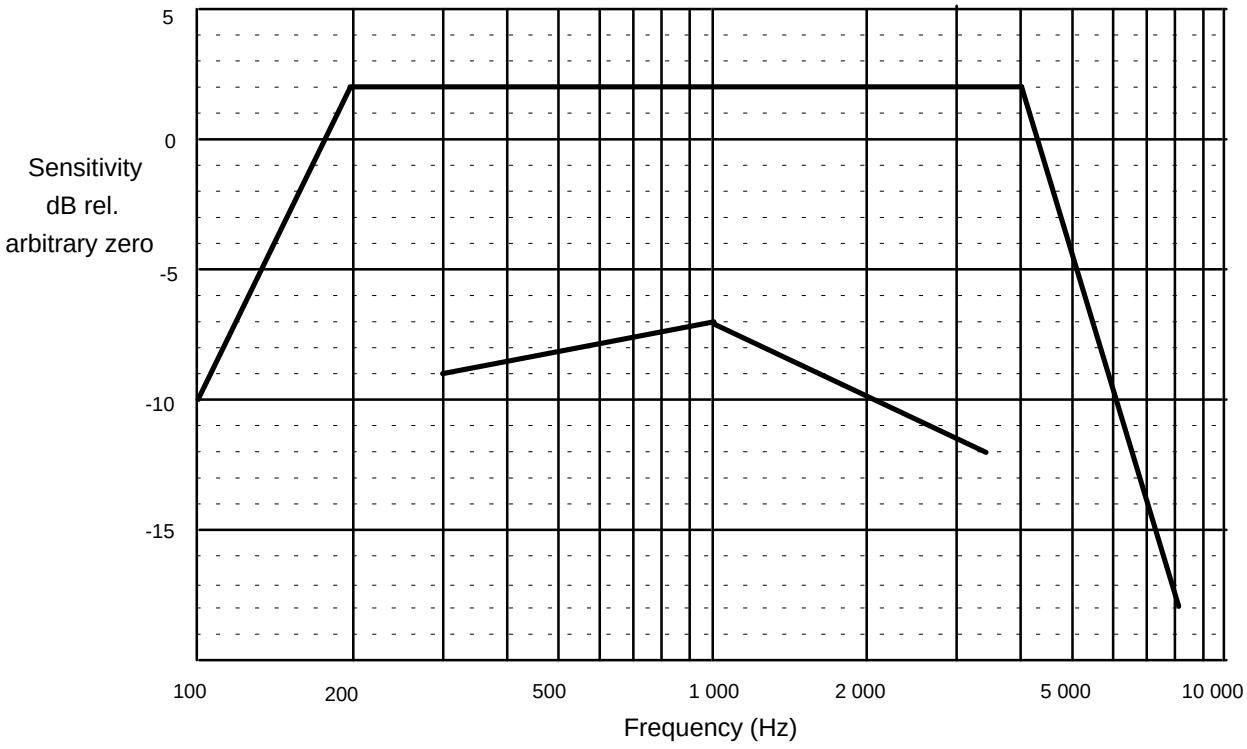

Figure 2: Receiving sensitivity/frequency limits

4.2.2 Sending and Receiving Loudness Ratings

The values shown in tables 4 and 5 are those measured at terminals A and B in figure 1 of I-ETS 300 480 [2], and **do not** include any attenuation due to a local telephone line.

4.2.2.1 Sending Loudness Rating

The Sending Loudness Rating (SLR), expressed as a function of feed resistance R_f shall conform to the values shown in table 4.

Compliance shall be checked by the test described in subclause 4.2.2.1 of I-ETS 300 480 [2].

Table 4: Sending Loudness Rating

Country	Value of Sending Loudness Rating					
	SLR (dB) R_f max	**Tol. dB**	**SLR (dB) R_f mid**	**Tol. dB**	**SLR (dB) R_f min**	**Tol. dB**
Austria	+3,5	±2,0	NM	NM	+3,5	±2,0
Belgium	+3,0	±4,0	+3,0	±4,0	+3,0	±4,0
Bulgaria	+3,0*	±4,0*	+3,0*	±4,0*	+3,0*	+7,0-4,0±
Cyprus	+3,0	±4,0	+3,0	±4,0	+3,0	±4,0
Czech Republic	+2,5	±2,5	+2,5	±2,5	+2,5	±2,5
Denmark	+2,0	±3,0	+2,0	±3,0	+2,0	±3,0
Finland	+3,25	±4,25	+3,5	±4,0	+6,25	±3,25
France	+2,0	±4,0	+5	±4,0	+7,0	±4
Germany	+4,0	±3,0	+4,0	±3,0	+4,0	±3,0
Greece	+3,0	±3,0	+3,0	±3,0	+3,0	±3,0
Hungary (1)	+2,0	±3,0	+4,0	±3,0	+5,0	±3,0
Hungary (2)	+2,0	±3,0	+4,0	±3,0	+7,0	±3,0
Iceland	+3,0	±4,0	+3,0	±4,0	+3,0	±4,0
Ireland	+1,0	+4,0 -6,0	+1,0	+4,0 -6,0	+5,0	±4,0
Italy	+1,0	±3,0	+2,0	±3,0	+4,0	±3,0
Luxembourg	+3,0	±4,0	+3,0	±4,0	+3,0	±4,0
Malta	+3,0*	±4,0	+3,0*	±4,0	+3,0*	+7,0-4,0±
The Netherlands	+6,5	±4,5	+6.5	±4,5	+6,5	±4,5
Norway	0	±4,0	0	±3,0	0	±3,0
Poland	+4,0	±4,0	+4,0	±4,0	+4,0	±4,0
Portugal	+3,0*	±4,0*	+3,0*	±4,0*	+3,0*	+7,0-4,0±
Romania	-1,0	±5,0	-0,5	±5,0	+4,5	±4,5
Russia	+3,0*	±4,0*	+3,0*	±4,0*	+3,0*	+7,0-4,0±
Slovak Republic	+2,5	±2,5	+2,5	±2,5	+2,5	±2,5
Slovenia	+3,0*	±4,0*	+3,0*	±4,0*	+3,0*	+7,0-4,0±
Spain	+2,5	±3,5	+4,5	±3,5	+6,5	±3,5
Sweden	0	+4,0 -2,5	0	+4,0 -2,5	+5,0	+4,0 -2,5
Switzerland	+5,0	±3,5	NM	NM	+5,0	±3,5
Turkey	+3,0	±4,0	+3,0	±4,0	+3,0	±4,0
United Kingdom	0	±4,5	0	±4,5	+3,5	±4,5
NOTE 1: Hungary (1) and (2) define two acceptable alternative loudness control characteristics. **NOTE 2: Harmonized values for Sending Loudness Rating can be found in TBR 38 [4].**						

4.2.2.2 Receiving Loudness Rating

The Receiving Loudness Rating (RLR), expressed as a function of feed resistance R_f, shall conform to the values shown in table 5.

Compliance shall be checked by the test described in subclause 4.2.2.2 of I-ETS 300 480 [2].

Table 5: Receiving Loudness Rating

Country	Value of Receiving Loudness Rating					
	RLR (dB) R_f max	**Tol. dB**	**RLR (dB) R_f mid**	**Tol. dB**	**RLR (dB) R_f min**	**Tol. dB**
Austria	-11,0	±2,0	NM	NM	-11,0	±2,0
Belgium	-8,0	±4,0	-8,0	±4,0	-8,0	±4,0
Bulgaria	-8,0*	±4,0*	-8,0*	±4,0*	-8,0*	+7,0 -4,0±
Cyprus	-8,0	±4,0	-8,0	±4,0	-8,0	±4,0
Czech Republic	-8,0	+5,0 -3	-8,0	+5,0 -3	-8,0	+5,0 -3
Denmark	-8,0	±3,0	-8,0	±3,0	-8,0	±3,0
Finland	-7,25	±3,75	-7,5	±3,5	-4,25	±2,75
France	-12	±4,0	-9,0	±4	-7,0	±4
Germany	-7,0	±3,0	-7,0	±3,0	-7,0	±3,0
Greece	-8,0	±3,0	-8,0	±3,0	-8,0	±3,0
Hungary (1)	-9,0	±3,0	-8,0	±3,0	-7,0	±3
Hungary (2)	-9,0	±3,0	-7,0	±3,0	-4,0	±3
Iceland	-8,0	±4,0	-8,0	±4,0	-8,0	±4,0
Ireland	-11,0	+3,0 -5,0	-11,0	+3,0 -5,0	-7,0	±3
Italy	-12,0	±3	-9,0	±3	-7,0	±3
Luxembourg	-8,0	±4,0	-8,0	±4,0	-8,0	±4,0
Malta	-8,0*	±4,0*	-8,0*	±4,0*	-8,0*	+7,0 -4,0±
The Netherlands	-6,5	±4,5	-6,5	±4,5	-6,5	±4,5
Norway	-8,0	±4,0	-8,0	±3,0	-8,0	±3,0
Poland	-6,0	±4,0	-6,0	±4,0	-6,0	±4,0
Portugal	-8,0*	±4,0*	-8,0*	±4,0*	-8,0*	+7,0 -4,0±
Romania	-8,5	±4,0	-8,0	±4,5	-3,5	±4,5
Russia	-8,0*	±4,0*	-8,0*	±4,0*	-8,0*	+7,0 -4,0±
Slovak Republic	-8,0	+8,0 -3,0	-8,0	+8,0 -3,0	-8,0	+8,0 -3,0
Slovenia	-8,0*	±4,0*	-8,0*	±4,0*	-8,0*	+7,0 -4,0±
Spain	-8,5	±3,5	-6,5	±3,5	-5,5	±3,5
Sweden	-12,0	+4,0 -2,5	-12,0	+4,0 -2,5	-7,0	+4,0 -2,5
Switzerland	-8,0	±3,5	NM	NM	-8,0	±3,5
Turkey	-8,0	±4,0	-8,0	±4,0	-8,0	±4,0
United Kingdom	-8,0	±3,5	-8,0	±3,5	-4,5	±3,5
NOTE 1: Hungary (1) and (2) define two acceptable alternative loudness control characteristics. **NOTE 2: Harmonized values of Receiving Loudness Rating can be found in TBR 38 [4].**						

4.2.2.3 Volume control

Where a user-controlled receiving volume control is provided, the RLR shall meet all the relevant values shown in table 5 for one setting of the control.

The position of the volume control which achieves RLRs as close as possible to their nominal values is to be taken as the "nominal" setting of the volume control.

NOTE: It is not necessary to strive to achieve values closer than 1 dB.

With the volume control set to the minimum position, the RLR shall not be greater than (quieter than) 18 dB.

Compliance shall be checked by measurement of the RLR as described in subclause 4.2.2.2 of I-ETS 300 480 [2].

4.2.3 Sidetone

The SideTone Masking Rating (STMR) shall conform to the value shown in table 6 when tested with the terminations and feed resistances shown in that table. Where a user-controlled receiving volume control is provided, at its "nominal" setting the STMR shall conform to the value shown in table 6.

Compliance shall be checked by the test described in subclause 4.2.3 of I-ETS 300 480 [2].

Table 6: Sidetone rating

Country	Value of SideTone Masking Rating (dB)		
	Termination a and $R_f$min	Termination b and R_f for sidetone	Termination c and $R_f$max
	STMR	STMR	STMR
Austria	≥ +5	≥ +10	≥ +5
Belgium	≥ +5	≥ +10	≥ +5
Bulgaria	≥ +5*	≥ +10*	≥ +5*
Cyprus	≥ +5	≥ +10	≥ +5
Czech Republic	≥ +5	≥ +5	≥ +5
Denmark	≥ +5	≥ +10	≥ +5
Finland	≥ +5	≥ +10	≥ 7
France	≥ +10	≥ +10	≥ +5
Germany	≥ +5	≥ +10	≥ +5
Greece	≥ +7	≥ 12	≥ 7
Hungary (1 and 2)	≥ +5	≥ +10	≥ +5
Iceland	≥ +5	≥ +10	≥ +5
Ireland	≥ +5	≥ +7	≥ +7
Italy	≥ +5	≥ +10	≥ +4
Luxembourg	≥ +5	≥ +10	≥ +5
Malta	≥ +5*	≥ +10*	≥ +5*
The Netherlands	≥ 0	≥ 0	≥ 0
Norway	≥ +5	≥ +10	≥ 0
Poland	≥ +5*	≥ +10*	≥ +5*
Portugal	≥ +5*	≥ +10*	≥ +5*
Romania	≥ +5	≥ +7	≥ 1
Russia	≥ +5*	≥ +10*	≥ +5*
Slovak Republic	≥ +3	≥ +3	≥ +3
Slovenia	≥ +5*	≥ +10*	≥ +5*
Spain	≥ +5	≥ +10	≥ +7
Sweden	≥ +2	≥ +2	≥ +2
Switzerland	≥ +5	≥ +7	≥ +7
Turkey	≥ +5	≥ +10	≥ +5
United Kingdom	≥ +5	≥ +7	≥ +7
NOTE 1: Hungary (1 and 2) define two acceptable alternative loudness control characteristics which in this case are the same.			
NOTE 2: Denmark requires that if the measured values of RLR and SLR are not the nominal values, STMR shall be corrected accordingly, using the formula: STMRcorr.=STMRmeas.-(SLRmeas.-SLRnominal +RLRmeas-RLRnominal)			
NOTE 3: Harmonized values of Sidetone Rating can be found in TBR 38 [4].			

4.2.4 Distortion

4.2.4.1 Sending distortion

The "total" harmonic distortion (summed up to the 5th harmonic) shall not be greater than 7 % when measured with an input of -4,7 dBPa.

Compliance shall be checked by the test described in subclause 4.2.4.1 of I-ETS 300 480 [2].

4.2.4.2 Receiving distortion

The "total" harmonic distortion (summed up to the 5th harmonic) shall not be greater than 7 %, when measured with an input electromotive force (e.m.f.) of -12 dBV.

Where a user-controlled receiving volume control is provided, the above requirement applies for the "nominal" setting of the volume control.

Compliance shall be checked by the test described in subclause 4.2.4.2 of I-ETS 300 480 [2].

4.2.4.3 Sidetone distortion

The "total" harmonic distortion (summed up to the 5th harmonic) shall not be greater than 10 % when measured with an input of -4,7 dBPa. Where a user-controlled receiving volume control is provided, the above requirement applies for the "nominal" setting of the volume control.

Compliance shall be checked by the test described in subclause 4.2.4.3 of I-ETS 300 480 [2].

4.2.4.4 Sending power-handling capability

The total harmonic distortion (summed up to the 5th harmonic) shall be not greater than 10 % when a pure tone signal of 1 000 Hz is applied at the Mouth Reference Point (MRP) at a Sound Pressure Level (SPL) of 5 dBPa.

Compliance shall be checked by the test described in subclause 4.2.4.4 of I-ETS 300 480 [2].

4.2.4.5 Receiving power-handling capability

The total harmonic distortion (summed up to the 5th harmonic) of the receiving direction signal shall be not greater than 10 % when a pure sinusoidal signal of 1 V e.m.f. is supplied by the generator at a frequency of 1 000 Hz. Where a user-controlled receiving volume control is provided, the above requirement applies for the "nominal" setting of the volume control.

Compliance shall be checked by the test described in subclause 4.2.4.5 of I-ETS 300 480 [2].

4.2.5 Linearity (variation of gain with input level)

4.2.5.1 Sending

With the value of R_f specified in table 1 as "for response test", the sensitivity determined with an input SPL of -4,7 dBPa shall not differ by more than ±2 dB from the sensitivity determined with an input SPL of -19,7 dBPa.

Compliance shall be checked by the test described in subclause 4.2.5.1 of I-ETS 300 480 [2].

4.2.5.2 Receiving

With the value of R_f specified in table 1 as "for response test", the sensitivity determined with an input signal with an e.m.f. of -12 dBV shall not differ by more than ±2 dB from the sensitivity determined with an input signal with an e.m.f. of -32 dBV.

Where a user-controlled receiving volume control is provided, the above requirement applies for the "nominal" setting of the volume control.

Compliance shall be checked by the test described in subclause 4.2.5.2 of I-ETS 300 480 [2].

4.2.6 Noise

4.2.6.1 Sending noise

The psophometrically weighted noise produced by the apparatus in the sending direction shall not be greater than -64 dBmp.

Compliance shall be checked by the test described in subclause 4.2.6.1 of I-ETS 300 480 [2].

4.2.6.2 Receiving noise

The noise level measured in an artificial ear shall not be greater than -49 dBPa(A). Where a user-controlled receiving volume control is provided, the above requirement applies for the "nominal" setting of the volume control.

Compliance shall be checked by the test described in subclause 4.2.6.2 of I-ETS 300 480 [2].

4.2.7 Echo return loss

The echo return loss shall not be less than 14 dB with respect to the impedance shown in figure 3.

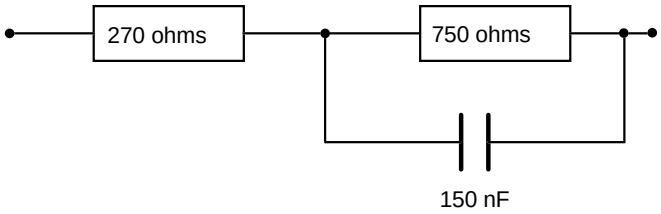

Figure 3: Terminating impedance

Compliance shall be checked by determination of the echo return loss as described in subclause 4.2.7 of I-ETS 300 480 [2] at the maximum and minimum values specified for R_f.

4.2.8 Instability

Instability (sustained audible oscillations) shall not be induced when the apparatus is subjected to the conditions specified in the compliance test described in subclause 4.2.8 of I-ETS 300 480 [2]. Where a user-controlled receiving volume control is provided, the above requirement applies for the maximum setting of the volume control.

5 Physical modules

5.1 Handset

There is no requirement for handset shape.

NOTE: Telephony performance is dependent on good handset characteristics. CCITT Recommendation P.35 [6] contains some recommendations for handset dimensions which are known to give good handset characteristics.

Annex A (normative): Maximum acoustically stimulated output

A.1 Maximum acoustically stimulated output

The maximum signal generated as a result of any acoustic stimulus shall not be greater than 8 V peak-to-peak.

Compliance shall be checked by the test described in clause A.1 of I-ETS 300 480 [2].

NOTE: The signal to line at speech levels occurring in normal use is controlled by the SLR in subclause 4.2.2.1.

Annex B (informative): Acoustic shock

B.1 General

The prevention of acoustic shock is a safety requirement outside the scope of the present document and arising from the Low Voltage Directive (73/23/EEC) [7]. In the absence of any relevant safety standard, a supplier's self declaration may be based on the following recommendations.

The limits advised are based on sound pressure levels measured in an ITU-T Recommendation P.57 [8] type 1 artificial ear. For other types of artificial ear different sound pressure levels may be required.

B.1.1 Continuous signal

The sound pressure level in the artificial ear should not exceed 24 dBPa (rms).

Compliance should be checked by the test described in clause B.1 of I-ETS 300 480 [2].

B.1.2 Peak signal

The receiving equipment should limit the peak sound pressure level in the artificial ear to less than 36 dBPa.

Conformance test methods are for further study. Until such methods exist, compliance should be checked by the suppliers declaration of conformance.

Annex C (informative): Immunity to out-of-band signalling

In Germany and Switzerland, the out-of-band signalling used can seriously effect the speech performance of a connected telephony terminal. The following requirement is used to control the effect of meter pulses which are applied by the network at each termination point.

C.1 Sending

An out-of-band signalling with a pulse ratio (1s "on" and 5s "off") should not cause the output signal to change by more than 1 dB compared with the reference measurements.

Compliance should be checked by the test described in clause C.1 of I-ETS 300 480 [2] using a test signal of either 16 kHz (DE) or 12 kHz (CH) with an e.m.f. of +20 dBV.

C.2 Receiving

An out-of-band signalling with a pulse ratio (1s "on" and 5s "off") should not cause the output signal to change by more than 1 dB compared with the reference measurements.

Compliance should be checked by the test described in clause C.2 of I-ETS 300 480 [2] using a test signal of either 16 kHz (DE) or 12 kHz (CH) with an e.m.f. of +20 dBV.

Annex D (informative): Additional requirement for d.c. characteristics

D.1 Introduction

The main part of the present document does not contain any requirements for d.c. characteristics because such characteristics are normally part of the access requirements.

However, some networks require additional control of the d.c characteristics in order to satisfy requirements for interworking via the network.

This necessitates a restriction in the range of d.c. characteristics of a voice terminal so that the local exchange can make an automatic assessment of the local loop resistance and, depending on the value so determined, insert additional loss in the analogue part of 4-wire path in order to provide improved control of loudness and echo performance on short lines.

This automatic adjustment of loss is analogous to the manual setting of attenuation values of exchange loss pads dependent on the line length that is necessary in some other networks.

D.2 Requirement

As an example of such control of the d.c. characteristics, in the UK the following lower limit is added to the d.c. mask:

> In addition to the requirements of subclause 2.3 of ETS 300 001 [1], when the leads intended for connection to the PSTN are connected to a voltage source of 50 V d.c. in series with a 400 ohm resistor and a variable resistor, the steady-state voltage measured at the terminals of the TE under test should be greater than the limits given in table D.1.

Table D.1: Lower limit curves for d.c.characteristics

Current (mA)	Voltage (V)
12,5	0
12,5	2,3
20,0	6,0
100,0	10,0

History

Document history				
V1.2.1	December 1997	Membership Approval Procedure	MV 9809:	1997-12-30 to 1998-02-27