INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

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SERIES P: TELEPHONE TRANSMISSION QUALITY, TELEPHONE INSTALLATIONS, LOCAL LINE NETWORKS

Subscribers' lines and sets

Handset dimensions

ITU-T Recommendation P.350

(Formerly CCITT Recommendation)

ITU-T P-SERIES RECOMMENDATIONS

TELEPHONE TRANSMISSION QUALITY, TELEPHONE INSTALLATIONS, LOCAL LINE NETWORKS

Vocabulary and effects of transmission parameters on customer opinion of transmission quality	Series	P.10
Subscribers' lines and sets	**Series**	**P.30**
		P.300
Transmission standards	Series	P.40
Objective measuring apparatus	Series	P.50
		P.500
Objective electro-acoustical measurements	Series	P.60
Measurements related to speech loudness	Series	P.70
Methods for objective and subjective assessment of quality	Series	P.80
		P.800
Audiovisual quality in multimedia services	Series	P.900

For further details, please refer to the list of ITU-T Recommendations.

ITU-T Recommendation P.350

Handset dimensions

Summary

This Recommandation is the follower of Recommandation P.35 (1988). It contains handset dimensions for traditional corded analogue and digital telephones based on head dimension studies. For very short designs information about the influence on the D-factor is given.

Source

ITU-T Recommendation P.350 was revised by ITU-T Study Group 12 (2001-2004) and approved under the WTSA Resolution 1 procedure on 29 March 2001. Former edition was numbered as CCITT P.35 (1988).

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

		Page
1	Scope	1
2	Abbreviation	1
3	Handset dimensions for analogue and digital telephones	1
3.1	Traditional handset dimensions	1
3.2	Very short handset designs used for both cordless and mobile applications	2

ITU-T Recommendation P.350[1]

Handset dimensions

1 Scope

Handset dimensions for traditional corded analogue and digital telephones are recommended. For very short designs information about the influence on the D-factor is given.

2 Abbreviation

This Recommendation uses the following abbreviation:

LSTR Listener Side Tone Rating

3 Handset dimensions for analogue and digital telephones

In 3.1 recommendations are given on handset dimensions for analogue and digital telephones based on head dimension studies. These recommendations are applicable for traditional handsets mainly used for corded telephone sets. Very short designs are used for telephone sets for both cordless and mobile applications. In 3.2 the dependency of the D-factor and the dimensions is given, based on an investigation.

3.1 Traditional handset dimensions

The shape and the dimension of the handset have an important influence on both send and receive levels. The earpiece must be capable of forming a good seal to the ear and the handgrip of the handset must be such that it will encourage the user to hold it to the head in the optimum position.

An ergonomic study was made in the USA in 1931 on the distribution of the relevant finger and head dimensions; 3889 persons were measured, including both male and female subjects.

A later head dimension study was carried out in the People's Republic of China (1977). A subsequent investigation (1978) shows that, for convenience in use, the mouthpiece of the handset should be somewhat outside (e.g. 10-12 mm) a circle enclosing the centre of the lip of 80% of the 4012 subjects tested. A handset conforming to these dimensions (see Figure 1) will then be acceptable to more than 90% of users. When a longer lip-to-mouthpiece distance is chosen, the signal-to-ambient-noise ratio will be worse, and recommended LSTR values will be more difficult to meet (see ITU-T G.121, P.11, P.76, P.79 and P series Supplement 11). Therefore both signal-to-ambient-noise ratio and mouthpiece position for convenient use must be considered and probably a compromise must be made.

Based on the information given above, the ITU-T recommends that handset telephones conform to the dimensions outlined in Figure 1, with respect to mouthpiece positions and cheek-to-handset clearance.

NOTE – An earpiece with a design that forms a good seal to the Type 1 artificial ear (ITU-T P.57) will facilitate testing both in laboratories and during manufacturing. Experience has shown that earpieces with a good seal to the Type 1 artificial ear also give in most cases a good seal to the human ear.

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[1] This Recommendation is a revision of CCITT P.35 (1988).

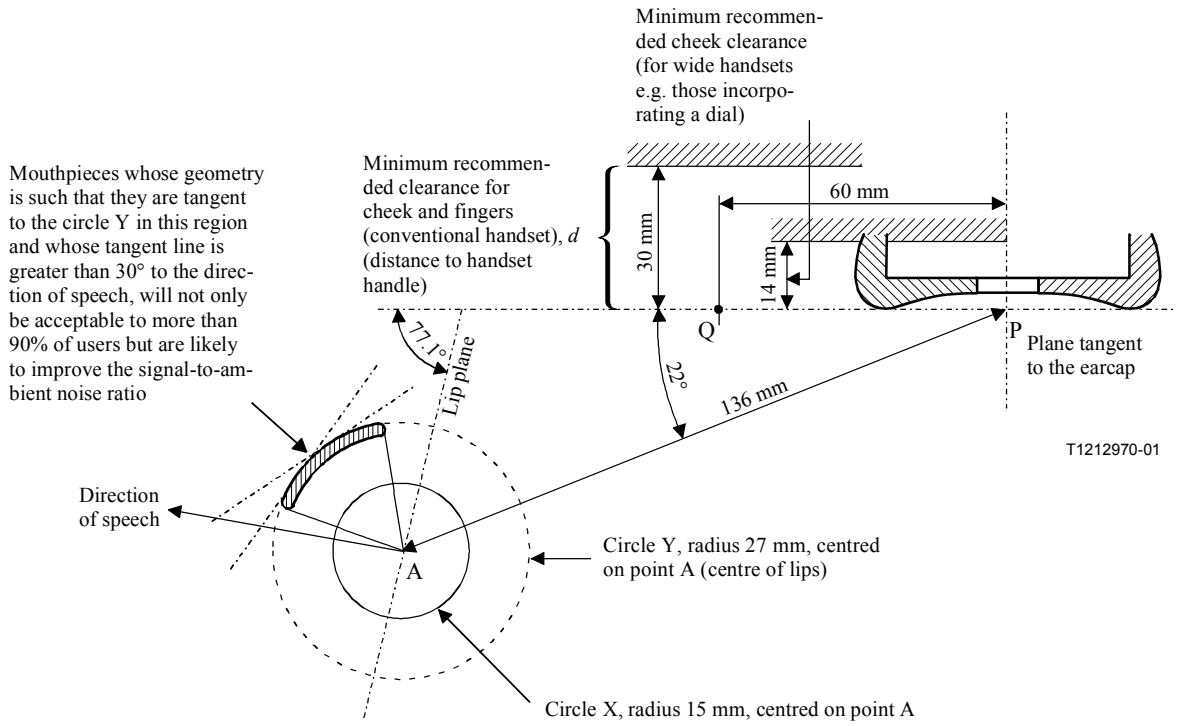

Figure 1/P.350

When using the dimensions given in Figure 1 usually a D-factor with a positive value can be expected.

In 1991 it was shown that for handsets of "conventional form" and with linear microphone circuitry, the D-factor can be estimated by Equation 3-1, using the distance *d* between the centre of the external opening for the microphone on the surface of the handset and the centre of the lipring of the artificial mouth. However, for designs other than close to "conventional form", the deviation from the results of the formula can be relatively large.

$$D = 20 \cdot \lg\left(\frac{do}{d}\right) \quad \text{in dB} \tag{3-1}$$

Where:

do = 45 mm.

3.2 Very short handset designs used for both cordless and mobile applications

Cordless and mobile telephone sets very often do not follow the dimensions given in Figure 1. Short and flat designs are used. In that case, additional attention should be given to the influence of the design on the D-factor.

The change of the D-factor, if the microphone positions change along the head up to the mouth, was studied in 2000 by using a flat design and an omnidirectional microphone. The results are given in Equation 3-2 where *l* is the distance between the centre of the external opening for the microphone on the surface and the centre of the external opening for the earphone:

$$D(l) = Do + Fx \cdot (l - lo) + Fy \cdot (l - lo)^2 + Fz \cdot (l - lo)^3 \tag{3-2}$$

Where:

lo = 145 *mm*

Do = –5.3 *dB*

$$Fx = \ 0.050845 \frac{dB}{mm}$$

$$Fy = \ -0.001115 \frac{dB}{mm^2}$$

$$Fz = \ 0.00000057285 \frac{dB}{mm^3}$$

are fixed values.

The D-factor can be improved by using a directional microphone. However, the degree of improvement is less than the difference of the microphone free field sensitivities would suggest. There is a strong dependency on how the microphone is mounted in the handset.

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	**Telephone transmission quality, telephone installations, local line networks**
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure and Internet protocol aspects
Series Z	Languages and general software aspects for telecommunication systems

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