

Infra-red free air application —

Part 1: General

ICS 33.100

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Committees responsible for this Draft for Development

The preparation of this Draft for Development was entrusted to Technical Committee EPL/84, Equipment and systems in the field of audio, video and audiovisual engineering, upon which the following bodies were represented:

Association of British Theatre Technicians
Audio Engineering Society
British Broadcasting Corporation
British Educational Supplies Association
British Radio and Electronic Equipment Manufacturers' Association
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Federation of British Audio
Federation of the Electronics Industry
Independent Television Association
Institution of Electrical Engineers
International Association of Broadcasting Manufacturers
National Council for Educational Technology (NCET)
Professional Lighting and Sound Association
Royal Institute of British Architects
Royal National Institute for Deaf People
Society of Cable Television Engineers

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Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
Foreword	2
Text of ENV 50185-1	3
List of references	Inside back cover

National foreword

This Draft for Development has been prepared by Technical Committee EPL/84 and is the English language version of ENV 50185-1:1995 *Infra-red free air application — Part 1: General*, published by the European Committee for Electrotechnical Standardization (CENELEC).

This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature because there is an urgent need for guidance on how standards in the field of infra-red transmissions should be used to meet an identified need. It should be applied on this provisional basis so that information and experience of its practical application may be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the European organization responsible for its conversion to a European Standard. A review of this publication will be initiated 2 years after its publication by the European organization so that a decision can be taken on its status at the end of its three-year life. The commencement of the review period will be notified by an announcement in *BSI News*.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into a European Standard, to extend the life of the prestandard or to withdraw it. Comments should be sent in writing to the Secretary of BSI Committee EPL/84 at BSI, 389 Chiswick High Road, London W4 4AL giving the document reference and clause number and proposing, where possible, an appropriate revision of the text.

Cross-references

Publication referred to	Corresponding British Standard
EN 27498:1989	BS 6568 <i>Reference model of Open Systems Interconnection</i> Part 1:1988 <i>Basic reference model (incorporating connectionless-mode transmission)</i>
IEC 50 (60):1970	BS 4727 <i>Glossary of electrotechnical, power, telecommunication, electronics, lighting and colour terms</i> Part 3 <i>Terms particular to telecommunications and electronics</i> Group 05:1971 <i>Propagation and media terminology</i>

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the ENV title page, pages 2 to 18, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

English version

Infra-red free air application Part 1: General

This European Prestandard (ENV) was approved by CENELEC on 1994-09-01 as a prospective standard for provisional application. The period of validity of this ENV is limited initially to three years. After two years the members of CENELEC will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard (EN).

CENELEC members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This European Prestandard has been prepared by CENELEC BTTF 71-3, Infra-red free air applications.

The text of the draft was voted on and approved by CENELEC as ENV 50185-1 on 1994-09-01.

The following date was fixed:

- latest date of announcement of the ENV at national level (doa) 1995-04-15

Contents

	Page
Foreword	2
1 Scope	3
2 Normative references	3
3 Definitions	3
4 Symbols	4
5 Classification	4
5.1 Parameters	4
5.2 Product groups	7
5.3 User areas	8
5.4 Graphical representation of IR systems	8
6 Method for minimizing mutual interferences	10
7 Marking	10
Annex A (informative) Bibliography	11
Annex B (informative) Example for possible prioritization	11
Annex C (informative) Examples of λ/f -diagrams	11
Figure 1 — Spectral emission and definition of optical bandwidth	6
Figure 2 — Spectral emission and definition of electrical bandwidth	6
Figure 3 — Blank λ/f -diagram	9
Figure 4 — Symbol for infra-red	10
Figure 5 — Symbol to indicate equipment using infra-red	10
Figure C.1 — Residential	12
Figure C.2 — Office	13
Figure C.3 — Industrial	14
Figure C.4 — Medical	15
Figure C.5 — Conference	16
Figure C.6 — Traffic	17
Table 1 — Classification criteria	5
Table 2 — Product groups of IR systems	7
Table B.1 — Possible priority of product groups within user areas	11

1 Scope

Increasing parallel application of different infra-red (IR) systems can cause mutual interferences. To identify and make transparent these problems, a classification of IR devices into groups and classes is proposed.

The purpose of this European prestandard is to avoid or at least to minimize mutual interferences and to enable coexistence of different IR products. It is intended to mark each IR product with its characteristic parameters according to the classification criteria.

It is not the object of this prestandard to describe the consequences of interferences between IR systems as well as radiation safety aspects of optical radiation.

Due to the physical character of optical emission the possibility of local limitation is a special feature of IR radiation.

In this prestandard the wavelength range from 700 nm to 1 600 nm will be considered. Included are all systems based on free air application (see 5.2, Product groups), which send intentionally or unintentionally IR radiation in this range. Excluded is each kind of fibre optics.

In this context “free air” means freely radiated IR in indoor or outdoor applications.

If the IR systems are used for information transmission, this prestandard is only to be seen in connection with the Physical Layer of the ISO-OSI Reference Model (EN 27498).

2 Normative references

This European Prestandard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Prestandard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 27498, *Information processing; Open system interconnection; basic reference model*; identical with ISO 7498:1984 + A1:1987

IEC 50(60), *International Electrotechnical Vocabulary: Radio Communications*.

IEC 50(845), *International Lighting Vocabulary*.

3 Definitions

For the purposes of this prestandard the following definitions apply.

3.1

bandwidth

of a receiver, amplifier or network. The extent of a continuous range of frequencies over which the gain does not differ from its maximum value by more than a specified amount (electrical and optical)

NOTE Extended definition of [IEC 50(60):60-12-025].

3.2

fluorescent lamp

a discharge lamp of the low pressure mercury type in which most of the light is emitted by one or several layers of phosphor excited by the ultraviolet radiation from the discharge [IEC 50(845): 845-07-26]

3.3

harmonic

integral multiple of a basic frequency

3.4

interference

disturbance experienced in the reception of a wanted signal, caused by an unwanted signal or noise [IEC 50(60): 60-08-025]

3.5

infra-red radiation

optical radiation for which the wavelengths are longer than those for visible radiation

NOTE For infra-red radiation, the range between 780 nm and 1 mm is commonly subdivided into:

IR-A 780 nm to 1 400 nm

IR-B 1,4 μm to 3 μm

IR-C 3 μm to 1 mm

[IEC 50(845): 845-01-04]

3.6

infra-red system

system which uses IR radiation in free air application consisting of an IR emitter and an IR receiver

3.7

modulation frequency

electrical signal frequency which modulates the IR radiation

3.8

peak intensity

maximum intensity I_p [$\text{mW}/(\text{sr} \times \text{nm})$] of the optical radiation in the direction of maximum emission around the rated wavelength λ_p

3.9 radiant intensity

quotient of the radiant flux $d\Phi_e$ leaving the source and propagated in the element of solid angle $d\Omega$ containing the given direction, by the element of solid angle [IEC 50(845): 845-01-30]

I_0 (mW/sr) radiant intensity averaged in time of the optical radiation in the direction of maximum emission

3.10 radiation characteristic

defined by two angles a_1 and a_2 for describing the focusing of IR emission. References are the points of half optical radiant intensity, a_1 is the angle of maximum divergence, a_2 is the angle rectangular to the plane expanded by a_1 , where $a_1 > a_2$

3.11 steradian

SI unit of solid angle: Solid angle that, having its vertex at the centre of a sphere, cuts off an area of the surface of the sphere equal to that of a square with sides of length equal to the radius of the sphere [IEC 50(845): 845-01-20]

3.12 subharmonic

integral divisor of a basic frequency

3.13 wavelength

distance in the direction of propagation of a periodic wave between two successive points at which the phase is the same [IEC 50(845): 845-01-14]

4 Symbols

B_f, B_λ	bandwidth
f	modulation frequency in kHz
f_p	frequency at the electrical peak radiant intensity I_{pf} in kHz
f_l	lower band limiting frequency in kHz
f_u	upper band limiting frequency in kHz
I_0	time averaged total optical radiant intensity in mW/sr
I_p	total optical peak intensity in mW/sr
$I_{p\lambda}$	spectral optical peak intensity in mW/(sr nm)
$I_{e\lambda}$	spectral optical radiant intensity in mW/(sr nm)
I_{ef}	spectral electrical radiant intensity mW/(sr Hz)
I_{pf}	spectral electrical peak intensity mW/(sr Hz)

sr	steradian
λ	wavelength in nm
λ_p	wavelength at the optical peak intensity I_p in nm
λ_l	lower band limiting wavelength in nm
λ_u	upper band limiting wavelength in nm

5 Classification

The classification considers three main aspects for system description:

- physical parameters;
- product groups;
- user areas.

In a first approach the IR emitters are defined by the physical parameters. In the future the same IR system definitions should include selective IR receivers.

5.1 Parameters

There are 5 criteria for which the physical operating parameters are based on nominal operating conditions given by the manufacturer (see Table 1).

5.1.1 Ranges of wavelength (criterion 1)

The lower (λ_l) and the upper (λ_u) optical wavelengths describe the optical range of function of an IR radiator.

Both the lower and the upper optical wavelengths of an IR radiator are defined by the reduction of the peak intensity I_p by 3 dB, taking into account the effects of temperature and component deviations (see Figure 1).

5.1.2 Ranges of frequency (criterion 2)

The lower (f_l) and upper (f_u) frequencies describe the electrical range of function of an IR radiator.

The modulating frequencies of the optical radiation are defined by – 10 dB of the maximum intensity I_{pf} . Harmonics are to be considered with respect to temperature factors and component deviations, too. For the classification criterion 2 it is only important to know the upper and lower band limiting frequency; the possible influence of modulation hasn't been regarded in this definition.

The upper and lower band limiting frequency is indicated in the following form:

Example: 500 kHz or $5 \times 10^2 \text{ kHz} \geq 5E2 \text{ kHz}$