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GUIDE

Electrotechnical equipment – Temperatures of touchable hot surfaces

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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INTERNATIONAL
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FOREWORD

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This first edition of IEC Guide 117 has been prepared in accordance with ISO/IEC Directives, Part 1, Annex A, by the IEC Advisory Committee on Safety (ACOS). This is a non-mandatory guide in accordance with SMB Decision 136/8.

This Guide is based on CENELEC Guide 29.

The text of this IEC Guide is based on the following documents:

Four months' vote	Report on voting
C/1619/DV	C/1636/RV

Full information on the voting for the approval of this Guide can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

INTRODUCTION

This Guide was initially prepared by CENELEC BTTF 120-1, Surface temperatures, and was approved by the CENELEC Technical Board as CENELEC Guide 29.

The CENELEC guide has been modified to take into account IEC document preparation procedures and those comments received from National Committees and Technical Committees.

ELECTROTECHNICAL EQUIPMENT – TEMPERATURES OF TOUCHABLE HOT SURFACES

1 Scope

This IEC Guide provides guidance for assessing the risk, to any person, of a burn from contact with hot touchable surfaces of electrotechnical equipment. This Guide establishes surface temperature limits, where such limits are required, and describes the maximum contact periods with a hot surface that any person may be subjected to without being exposed to a risk of burn. Curves of maximum temperatures versus contact times are described for different types of material with different types of surfaces.

These temperature limit values shall be taken into consideration by technical committees in determining surface temperature limits in product standards. In making this determination, consideration should be given to:

– the likelihood of contact with the heated part;

– the size and thermal capacity of the heated part;

– the expertise of the persons and their knowledge and experience relative to the temperatures likely to be encountered in operating or servicing the product;

– the provision of adequate cautions or warnings; and

– other similar factors taking into account the task analysis specified in 4.3.

It is ultimately the responsibility of the technical committee to establish the acceptable temperature limits (which may be higher) that may apply to touchable surfaces of products under their scope. Manufacturers may also use these temperature limit values to assist in their risk assessment if no relevant product standard exists.

It is not within the scope of this Guide to set temperature limits for the following zones or surfaces:

– hot functional surfaces;

– adjacent surfaces;

– handles or control knobs, including keypads, keyboards and the like, that a user needs to touch to operate or adjust the equipment;

– surfaces not likely to be touched.

It is outside of the scope of this Guide to specify protective measures. It is the task of manufacturers and also of standardisation groups to decide upon protective measures appropriate to the intended use of a product. Protective means, if needed, should be provided together with the equipment.

NOTE Although not specified in this Guide, examples of protective measures that may be taken are given in Clause 5 and Annex D. One example of several possible protective measures is the limitation of the surface temperature below the burn threshold. To achieve this, surface temperature limit values may be established at or below the burn threshold in the product standard. It is then the task of the manufacturer of the product to apply technical solutions in order to comply with the established limit values.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13732-1:2006, *Ergonomics of the thermal environment – Methods for the assessment of human responses to contact with surfaces – Part 1: Hot surfaces*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
adjacent surface
surface adjacent to a hot functional surface

NOTE The adjacent surface and the hot functional surface normally consist of the same piece of material, or are in direct thermal contact, and have similar thermal properties. The adjacent surface is not heated intentionally during use of the product. However, as it is adjacent to the hot functional surface and may become hot through conduction, its temperature will be in the range between the hot functional surface and a touchable surface.

3.2
arm's reach
either the distance measured from the floor to the fingertips of a person fully extended in the vertical direction or, for any other direction, one-third of that distance

3.3
burn threshold
surface temperature defining the boundary between no burn and a superficial partial thickness burn caused by contact of the skin with a hot surface for a specified contact period

3.4
contact period
duration of contact with the surface

3.5
hot functional surface
surface that is intentionally heated by an internal heat source and that has to be hot to carry out the function for which the equipment is intended to be used

NOTE 1 For example, curling tongs or the soleplate of an iron or the heater of a copy machine.

NOTE 2 Some equipment has hot surfaces as a consequence of how they generate their output, (for example, lamps within a luminaire or the heater of a copy machine), and these surfaces are considered, in terms of their treatment, as equivalent to a hot functional surface.

3.6
skin temperature
temperature at a depth of 80 μm below the surface of the skin, measured in degrees Celsius

3.7
surface temperature
temperature of a surface, measured in degrees Celsius, at an ambient temperature of 25^{-5}_{+0} °C.

3.8
thermal inertia
product of the density, thermal conductivity and specific thermal capacity of material

3.9
touchable surfaces (in some standards, accessible surfaces or accessible parts)

surfaces defined as touchable (or accessible) in the end-product standard, taking into account the intended installation of the equipment and surfaces within arm's reach, other than: