SLOVENSKI STANDARD
SIST HD 516 S1:1998

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Guide to use low voltage harmonized cables

Guide to use of low-voltage harmonised cables

Anwendungsrichtlinie für harmonisierte Niederspannungsleitungen

Guide d'emploi des câbles harmonisés basse tension

Ta slovenski standard je istoveten z: **HD 516 S1:1990**

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GUIDE TO USE OF LOW VOLTAGE HARMONIZED CABLES

Guide d'emploi des cables harmonisés basse tension

Anwendungsrichtlinie für harmonisierte Niederspannungsleitungen

BODY OF THE HD

The Harmonization Document consists of:

- Text prepared by CENELEC TC 20

This Harmonization Document was approved by CENELEC on 1989-09-11.

All texts prepared by CENELEC exist in three official versions (English, French and German).

According to the CENELEC Internal Regulations the CENELEC member National Committees are bound:

to announce the existence of this Harmonization Document at national level

by or before 1989-12-01

to publish their new harmonized national standard

by or before 1990-06-01

to withdraw all conflicting national standards

by or before 1991-03-01

Harmonized national standards are listed on the HD information sheet, which is available from the CENELEC National Committees from the CENELEC Central Secretariat.

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

Foreword

This Harmonization Document was agreed by CENELEC Technical Committee No. 20, Electric Cables, at its meeting in Brussels, November 1988.

The purpose of the document is to give guidance to equipment manufacturers, installers and end-users on the properties of harmonized low voltage electric cables, and the limitations considered necesssary in order to safeguard life, buildings and goods.

The information is given as limiting values and illustrated by examples, which cannot be exhaustive but nevertheless indicate ways by which safety can be obtained. The Guide could be especially useful in cases where no specific reference to cable types is made in other HDs or ENs.

In specific cases where guidance is not given, nor is deducible from the general information given, it is recommended that the specific advice of TC 20 be sought.

Reference is made, in this Harmonization Document, to other HDs as follows:

HD 21: PVC Insulated Cables of rated voltage up to and including 450/750 V.

HD 22: Rubber Insulated Cables of rated voltage up to and including 450/750 V.

HD 384.2: International Electrotechnical Vocabulary: Chapter 826 - Electrical Insulation of Buildings.

HD 384.3: International Installation of Buildings: Part 3 - Assessment of General Characteristics.

HD 384.4.43: Electrical Installation of Buildings: Part 4 - Protection for Safety: Chapter 43 - Protection against overcurrent.

HD 384.5.523: Electrical Installation of Buildings: Part 5 - Selection and Erection of Electrical Equipment: Section 523 - Current-Carrying Capacities.

C O N T E N T S

INTRODUCTION

The aims in publishing this Harmonised Document are to inform users of the properties and limiting conditions of electric cables and therefore to avoid misuse of the cables.

1. SCOPE

This HD provides a guide to the proposed safe use of harmonised electric cables as presently covered in the various parts of:

HD 21 - PVC Insulated Cables of rated voltage up to and including 450/750V.

HD 22 - Rubber Insulated Cables of rated voltage up to and including 450/750V.

Cables should only be used within the limits given and in the manner described in this HD and in HD 21 and HD 22. This HD should be read in conjunction with other HD's or EN's relating to particular types of equipment or installation conditions.

Legal or statutory requirements do take precedence over the guidance given in this document.

Note: Guidance given in HD 21 and HD 22, is still relevant and will be incorporated in this HD at the next revision.

2. DEFINITIONS

The meaning and sense of the terms used in this HD are as defined in HD 384.2; relevant product specifications, or Appendix 1 of this HD unless otherwise stated.

3. REQUIREMENTS FOR SAFETY

3.1 Fundamental Requirements

3.1.1 Safety is defined as the avoidance of danger to life and property whilst equipment is in use or in storage. This involves the identification of stresses, hazards and possible failure points and their elimination or control to a level of acceptable risk.

3.1.2 Unless otherwise stated, cables should not be used for any other purpose than the transmission and distribution of electricity.

3.1.3 The test methods, test parameters and requirements descri in HD 21 and HD 22 are only for the pruposes of check design with respect to safety and quality assurance. Th should not be regarded as providing guidance that the cables are suitable for service under conditions equivalent to the test conditions.

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3.2 General Requirements

3.2.1 All conductors and cables should be selected so as to be suitable for the voltages and currents likely to occur under all conditions which are or should have been anticipated in the equipment or installation or that part thereof in which they are used.

3.2.2 Cables should be so constructed, installed, protected, used and maintained as to prevent danger so far as it is reasonably practical.

3.2.3 The limiting conditions under which the cables can reasonably be expected to operate safely under normal circumstances are given in Tables to this HD.

These conditions are those considered capable of ensuring a length of life in service which has been accepted as reasonable by experience of the particular type of cable and in particular conditions of use. The duration of acceptable performance of a particular type of cable depends upon the type of use, installation or electrical apparatus and on the particular combination of influences relating thereto. For example, the duration of acceptable performance considered as reasonable for a cable used in a fixed installation for the distribution of electricity in a building is more than that for a flexible cord.

3.2.4 Cables should be selected so that they are suitable for the operating conditions.

Examples of operating conditions are:

- voltage
- overcurrent
- protective measures
- grouping of cables
- method of installation
- accessibility

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3.2.5 Cables should be selected so that they are suitable for any external influences which may exist.

Examples of external influences are:

- ambient temperature.
- presence of rain, steam or accumulation of water.
- presence of corrosive, chemical or polluting substances.
- mechanical stresses (such as through holes or sharp edges in metal work)
- fauna (such as rodents)
- flora (such as mould)
- radiation (such as sunlight) - Note: in this respect it should be noted that colour is important, black giving a higher degree of protection.

Cables should not be installed under any of these conditions unless they are a type specifically designed to withstand such conditions.

3.3 Requirements for Fixed Cables

3.3.1 Cables should not be installed in contact with or close to hot surfaces unless the cables are intended for such conditions.

3.3.2 Cables shall not be buried directly in the ground.

3.3.3 Cables should be supported adequately. Recommended maximum spacing of supports is given in Table 5 of this HD. In deciding the actual spacing, the weight of the cable between the supports should be taken into account so that the limiting value of tension is not exceeded.

The cable should not be damaged by any mechanical restraint used for its support.

3.3.4 Cables which have been in use may be damaged if they are disturbed. This can arise from the effect of natural ageing on the physical properties of the materials used for cable insulation and sheathing which ultimately results in hardening of these materials.

3.4 Requirements for Flexible Cables or Cords

3.4.1 Flexible cables or cords should be used for connections to all mobile equipment.

Such cables should be of such a length to ensure that the circuit protective device is capable of operation. They should also be of minimum practical length to reduce the risk of mechanical damage.

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3.4.2 Flexible cables or cords (except for those heavy duty types used as fixed installations in temporary buildings) should not be used as fixed wiring unless contained in an enclosure affording mechanical protection, except when used as the final connection to fixed equipment. In which case they should be of, at least, the 'ordinary' type (see Appendix 2 for definitions of duty.)

Exposed lengths of flexible cable or flexible cord used as final connections to fixed equipment should be as short as practically possible and should be directly connected to the fixed wiring in an appropriate manner.

3.4.3 Flexible cables or cords should not be subjected to excessive tension, (see Cl. 4.4.1) crushing, abrasion, torsion and kinking particularly at the inlet of the appliance and at the point of connection to the fixed wiring. They should not be damaged by any strain relief or clamping device.

3.4.4 Flexible cables or cords should not be placed under carpets or other floor coverings, where there is

a) any risk of thermal insulating effects, leading to excessive temperature rise (See Sub Clause 4.3.1 a)).

b) any risk of damage due to furniture or equipment resting on them or traffic passing over them.

3.4.5 Flexible cables or cords should be prevented from being in contact with or close to hot surfaces, unless the cables are intended for such conditions.

Because of their nature, particular attention should be paid to PVC insulated and/or sheathed cables or cords.

3.4.6 PVC flexible cables or cords are unsuitable for permanent use out of doors. Neither should they be used temporarily outdoors in adverse conditions, e.g. at temperatures below those given in Tables 3 and 4.

When cables are required for intermittent, temporary or permanent use outdoors, reference should be made to Table 2 of this HD.

4. LIMITING CONDITIONS

The influence of all factors as outlined in this section shall be considered in combination, not separately.

4.1 Voltage

The rated voltage of a cable is the reference voltage for which the cable is designed and which serves to define the electrical tests.

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The rated voltage is expressed by the combination of two values Uo/U, expressed in volts:

Uo being the r.m.s. value between any insulated conductor and 'earth' (metal covering of the cable or the surrounding medium);

U being the r.m.s. value between any two phase conductors of a multicore cable or of a system of single core cables.

In an alternating current system, the rated voltage of a cable shall be at least equal to the values Uo and U.

In a direct current system, the nominal voltage of the system shall be not higher than 1.5 times the rated voltage of the cable.

Note The operating voltage of a system may permanently exceed the nominal voltage of such a system by 10%.

4.2 Current Carrying Capacity

4.2.1 The cross sectional area of every conductor size should be such that its current carrying capacity is not less than the maximum sustained current which will normally flow through it.

For the purposes of this HD, the limiting temperature to which the current carrying capacity is related should not exceed that appropriate to the type of cable insulation or sheath concerned.

4.2.2 The current carrying capacities of cables for fixed wiring are given in HD 384.5.523 and for flexible cables and cords in HD 21 or HD 22.

The values given have been determined such that the limiting temperatures given in column 8, Tables 3 and 4 of this HD are not exceeded under paritcular defined conditions where the cables are continuously loaded (100% load factor) with current having an alternating frequency of 50 Hz.

4.2.3 In the case of soft soldered joints or terminations the limiting temperature for the conductor under short circuit conditions is reduced to 160° C. Account of this limitation should be taken in selecting and operating cables.

4.2.4 Defined conditions include the method of installation of the cable used. Account should be taken of these conditions in determining the current capacity of a cable.

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Correction factors for quoted current carrying capacities may be available for particular conditions such as:

ambient temperature (See HD 384).
cable grouping (See HD 384.5.523)
type of overcurrent protection (See HD 384.4.43)
presence of thermal insulation
reeled/drummed cables
frequency of supply (if different from 50 Hz etc)

4.2.5 If cables are operated for any prolonged periods at temperatures above those given in Tables 3 and 4, then they may be seriously damaged leading to premature failure, or their properties significantly reduced.

4.2.6 The selection of the cross sectional area of any conductor should not be based on current carrying capacity alone, account should be taken of the influence of the requirements for protection against:

electric shock
thermal effects
overload and short circuit current
voltage drop
mechanical strength

Examples of particular influence of which account should be taken are:

- limiting temperatures for terminals of equipment, busbars or bare conductors.

- the carrying of current by the neutral conductor as, for example, resulting from the presence of significant harmonic current in a three phase circuit.

- electromagnetic effects.

- inhibition of heat dissipation.

- requirements determining the size of the circuit protective conductor.

- solar or infra red radiation.

4.3 Thermal Effects

4.3.1 The limiting temperatures of the individual types of cables are given in Tables 3 and 4 of this HD. The values given should not be exceeded by any combination of the heating effect of current in the conductors and the ambient conditions.

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