SLOVENSKI STANDARD
SIST HD 638 S1:2002

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Road traffic signal systems

Road traffic signal systems

Straßenverkehrs-Signalanlagen

Systèmes de signaux de circulation routière

Ta slovenski standard je istoveten z: **HD 638 S1:2001**

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93.080.30	Cestna oprema in pomožne naprave	Road equipment and installations

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HARMONIZATION DOCUMENT **HD 638 S1**

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English version

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This Harmonization Document was approved by CENELEC on 2000-04-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

Up-to-date lists and bibliographical references concerning such national implementation may be obtained on application to the Central Secretariat or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, 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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

This Harmonization Document was prepared by the CENELEC Task Force BTTF 69-3 (TC 214 WG1), Road traffic signal systems.

The text of the draft was submitted to the formal vote and was approved by CENELEC as HD 638 S1 on 2000-04-01.

The following dates were fixed:

– latest date by which the existence of the HD has to be announced at national level	(doa)	2000-10-01
– latest date by which the HD has to be implemented at national level by publication of a harmonized national standard or by endorsement	(dop)	2001-08-01
– latest date by which the national standards conflicting with the HD have to be withdrawn	(dow)	2003-04-01

Contents

Introduction

To satisfy the legal and regulatory requirements and specific provisions of each CENELEC country, certain characteristics in this standard contain a range which is defined by a number of discrete classes. The class to be used in the country will be selected by the Standards Authority of the CENELEC member of that country from the range specified.

Thus this document contains the essential electrotechnical requirements of all CENELEC countries and permits through the class selection procedure, countries to incorporate their own requirements.

It is believed that this first step will allow, over a period of time, a gradual alignment of Road Traffic Signal Systems in Europe.

1 Scope

This standard specifies requirements for Road Traffic Signal Systems, including their development, design, testing, installation and maintenance.

In particular, it forms the electrotechnical part of the following two standards issued by CEN:

EN 12368 Traffic control equipment – Signal heads
EN 12675 Traffic Signal Controllers – Functional safety requirements

Each of these standards above shall be used with this standard either singly or together to define an operational equipment or system. This shall be achieved by using the electrotechnical methods and testing defined in this standard.

Where Road Traffic Signal Systems are to be used with other systems e.g. public lighting or railway signalling and communication, this standard shall comply with the other respective standard to ensure that overall safety is not compromised.

Only permanently or temporarily installed Road Traffic Signal Systems are included in this standard. Central office and portable signalling systems are not covered.

2 Normative references

This European Standard 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 Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 12368		Traffic control equipment - Signal Heads
EN 12675		Traffic signal controllers – Functional safety requirements
EN 50102	1995	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK Code)
EN 50110-1		Operation of electrical installations
ENV 50129		Railway applications - Safety related electronic systems for signalling
EN 50293		Electromagnetic compatibility - Road traffic signal systems - Product standard
EN 60529 + corr. May	1991 1993	Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)
EN 60598-1		Luminaires Part 1: General requirements and tests (IEC 60598-1, mod)
EN 61008	series	Electrical accessories Residual current-operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) (IEC 61008 series, mod)
EN ISO 9001		Quality systems - Model for quality assurance in design/development, production, installation and servicing
HD 384.2		International Electrotechnical Vocabulary Chapter 826: Electrical installations of buildings (IEC 60050-826)
HD 384.4	series	Electrical installations of buildings Part 4: Protection for safety (IEC 60364-4 series, mod)

HD 384.5.54	1988	Electrical installations of buildings Part 5: Selection and erection of electrical equipment Chapter 54: Earthing arrangements and protective conductors (IEC 364-5-54:1980, mod).
EN 60068-2-1		Environmental testing - Part 2: Tests; Test A: Cold (IEC 60068-2-1)
EN 60068-2-2		Basic environmental testing procedures; Part 2: Tests; Test B: Dry heat (IEC 60068-2-2 + IEC 60068-2-2A)
EN 60068-2-5		Environmental testing - Part 2: Tests; Test Sa: Simulated solar radiation at ground level (IEC 60068-2-5)
EN 60068-2-14		Environmental testing - Part 2: Tests; Test N: Change of temperature (IEC 60068-2-14)
EN 60068-2-30		Environmental testing - Part 2: Tests; Tests Db and guidance: Damp heat, cyclic (12 + 12-hour cycle) (IEC 60068-2-30)
EN 60068-2-64		Environmental testing - Part 2: Test methods - Test Fh: Vibration, broad band random (digital control) and guidance (IEC 60068-2-64)
EN 60417	series	Graphical symbols for use on equipment (IEC 60417 series)
IEC 60050-191		International Electrotechnical Vocabulary Chapter 191: Dependability and quality of service
IEC 60536	1992	Classification of electrical and electronic equipment with regard to protection against electric shock

3 Definitions

3.1 General

3.1.1
Road Traffic Signal Systems
include systems and devices, provided they are affiliated to them in terms of circuitry.
They may consist of the following elements which is not in itself a complete list:

Controllers

Signal heads, signalling devices and traffic signs,
e.g. signal heads for traffic signals,
acoustic signal generators,
mechanical signal generators,
traffic signs connected to the Road Traffic Signal System

Traffic sensors and detectors,
e.g. request push buttons,
vehicle detectors / Pedestrian Detectors

Monitoring equipment,
e.g. photographic monitoring devices

Equipment Enclosures
Electrical Supply
Cables
Interconnections
Supports

3.1.2
Failure Mode Analysis
a means of examining all failure modes to ensure that signal states endangering the road users and/or risk of electrical hazard cannot occur during normal conditions of operation of a Road Traffic Signal System or if they do occur under failure mode that they can not continue

3.1.3
Signal Safeguarding Facility
facilities intended to prevent states of signals endangering the traffic

3.1.4
monitoring element
device that signals electrical and mechanical states of equipment, preferably for signal circuits, and which convert the obtained information in such a manner that it can be processed in signal safeguarding facilities

3.1.5
hardware
the complete Road Traffic Signal System or a (material) part of it

3.1.6
hardware fault
failures of components and any influence that will cause the equipment to fail

NOTE Systematic hardware faults constitute either design faults or systematic production faults.

3.1.7
software
all or part of the sequence instructions for a Road Traffic Signal System including the affiliated documentation.

NOTE Software is exclusively immaterial, so that it is subject to no wear or failure mechanisms. Once implemented, software cannot be falsified on its own.

3.1.8
software error
deviation between the realised and intended functional contents of the software

NOTE All errors in the software are systematic errors. They are caused by:
– invalid specification (incorrect formulation of intention)
– incorrect programming (incorrect translation of the specification to sequential instructions).

Apparent program falsification in memories is produced by hardware faults or failures or is caused by inadmissible influencing.

3.2 Traffic engineering

3.2.1
controllers (traffic)
an electrical device to control signals

3.2.2
signal group
the sequence of conditions applied to a group of signal heads, which always received identical signal light indications

3.2.3
Operating System
the principle software that allows a computer to operate. This software establishes the basic foundations, protocols and functions that the computer can perform, including communication with internal and external resources

3.2.4
Application Program
software that determines specific tasks that a computer can perform i.e. operate as a traffic controller. Application software rests on and extends the capabilities of the operating system to meet customer needs

3.2.5
Traffic Data
that data which specifies how the application program will perform in the particular circumstances of one traffic system. This may be considered to be in 2 parts

3.2.5.1
Traffic Safety Data
is all Traffic Data stored in non-volatile memory that has a direct impact on the safety of road users

3.2.5.2
Traffic Non Safety Data
all the remainder of the data which will not cause an unacceptable danger to the road user if the data is changed

3.2.6
Design Authority (Design Responsible)
the individual or group (organisation) responsible for the safe design and manufacturing, including the instructions for safe use, installation and maintenance of the equipment or system

3.3 Electrotechnical

3.3.1
live part
See HD 384.2

3.3.2
enclosure (EN 50102)

a part providing protection of equipment against certain external influences and, in any direction protection against contact

NOTE This definition from the existing International Electrotechnical Vocabulary (HD 384.2) needs the following explanations under the scope of this standard.

1) Enclosures provide protection of equipment against harmful effects of mechanical impacts and protection of persons and livestock against access to hazardous parts.
2) Barriers, shapes of openings or any other means - whether attached to the enclosure or formed by the enclosed equipment - suitable to prevent or limit the penetration of the specified test probes are considered as part of the enclosure, except when they can be removed without the use of a tool.

3.3.3
complete protection
protection that achieves the following:

a) effective and durable prevention of contact with live parts by the attachment of obstacles at least conforming to type of protection IP2x as defined in EN 60529;

or

b) complete enclosure of live parts by insulating material that can be removed only by destruction (protection by insulating envelopment)

3.3.4
partial protection
protection that prevents the possibility of accidental contact by persons or by objects usually handled by them in one of the following ways:

a) by placing live parts at a distance that the possibility of accidental contact by persons or objects usually handled by them is excluded (protection against accidental contact by a safety clearance);

or

b) by attaching obstacles conforming at least to type of protection IP1x as defined in EN 60529 (protection against accidental contact by the attachment of obstacles)

3.3.5
reinforced insulation
See EN 60529

3.3.6
nominal voltages
See HD 384.2

3.3.7
earthed systems
See HD 384.2

3.3.8
Class 0 equipment
See IEC 60536

3.3.9
Class I equipment
See IEC 60536

3.3.10
Class II equipment
See IEC 60536

3.3.11
Class III equipment
See IEC 60536

3.3.12
safety extra-low voltage (SELV)
See IEC 60536

3.3.13
protective conductor (symbol PE)
See HD 384.2

3.3.14
earthing conductor
See HD 384.2

3.3.15
RCD
See EN 61008 and EN 61009

3.3.16
voltage dip
See IEC 60050-161

4 Electrical supply and limits

4.1 Nominal voltages

The standard nominal voltage for connection to the public supply shall be taken to be 230 V $AC_{r.m.s.}$ Other nominal voltages shall be permitted.

4.2 Operating voltage range

The system shall be classified according to its mains voltage range within which the Road Traffic Signal System shall work as defined by EN 12675, as follows:

Class A1: nominal voltage -13%...+10%;

Class A2: 220 volts -20%...+15%.

The system shall not display signals which contravene EN 12675 when the supply voltage is outside the above voltage ranges.

4.3 Low voltage

4.3.1 Switch off response voltage (V_{off})

The system shall be classified as follows according to whether or not it automatically switches off when the supply voltage falls below a specified value.

Class B0: no automatic switch off is required;

Class B1: automatic switch off is required at nominal voltage -20%;

Class B2: automatic switch off is required at nominal voltage -25%.

4.3.2 Auxiliary state switch response voltage (V_{aux})

The auxiliary state is a state specified by the customer which will occur when normal operation is not satisfactory due to low supply voltage or other specified conditions. This state shall be specified by EN 12675 as:

Signals off
or
Flashing Yellow
etc.

The system shall be classified as follows according to whether or not the system automatically switches to an auxiliary state when the supply voltage falls below a specified value ($V_{aux.}$).

Class C0: no auxiliary state is required;

Class C1: the system switches to the auxiliary state when the supply voltage has any value between the minimum operating voltage as specified in 4.2 and V_{off}.

4.3.3 Power up activation voltage

The system shall become active when the supply voltage reaches a value within its operating voltage range. The restart procedure shall normally be automatic or in exceptional circumstances it may be by manual or remote control. No signalling state dangerous to traffic shall be possible and the signalling state shall conform to EN 12675.

4.4 Overvoltage

The system shall be classified as follows according to whether or not a protective device is incorporated which cuts off the supply voltage to prevent damage. Where incorporated, the protective device shall operate when the supply voltage is greater than the operating voltage range.

Class D0: no protective device is required;

Class D1: a protective device is required to provide protection up to 1500 $V_{r.m.s.}$

4.5 Voltage dip

The system shall be classified according to the duration of dips in supply which affect the operation. In order to avoid undesirable reactions by the signal safeguarding facilities, the system shall operate as shown in Table 1 according to the duration of the voltage dip below V_{off} or $V_{aux.}$. Where B0 and C0 are specified, V_{off} or V_{aux} shall be taken as zero.

Period t_1 is a timeperiod of a voltage dip in the supply which will not affect the normal operation of the system.