

საქართველოს სტანდარტი

სსკ: 93.080.30

საგზაო ვერტიკალური ნიშნები - ცვლადი შეტყობინების საგზაო ნიშნები

საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.

საინფორმაციო მონაცემები

1 მიღებულია და დაშვებულია სამოქმედოდ: სსიპ-საქართველოს სტანდარტებისა და მეტროლოგიის ეროვნული სააგენტოს გენერალური დირექტორის 21/12/2022 წლის № 106 განკარგულებით

2 მიღებულია „თავფურცლის“ თარგმნის მეთოდით: სტანდარტიზაციის ევროპული კომიტეტის (ენ) სტანდარტი ენ 12966:2014+A1:2018 „საგზაო ვერტიკალური ნიშნები - ცვლადი შეტყობინების საგზაო ნიშნები“

3 პირველად

4 რეგისტრირებულია: სსიპ-საქართველოს სტანდარტებისა და მეტროლოგიის ეროვნული სააგენტოს რეესტრში: 21/12/2022 წლის №268-1.3-028479

წინამდებარე სტანდარტის ნებისმიერი ფორმით გავრცელება სააგენტოს ნებართვის გარეშე აკრძალულია

EUROPEAN STANDARD

EN 12966:2014+A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2018

ICS 93.080.30

Supersedes EN 12966:2014

English Version

Road vertical signs - Variable message traffic signs

Signaux de signalisation routière verticale - Panneaux à messages variable

Vertikale Verkehrszeichen - Wechselverkehrszeichen

This European Standard was approved by CEN on 18 October 2014 and includes Amendment 1 approved by CEN on 10 October 2018.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.




EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword.....	7
Introduction	9
1 Scope.....	10
2 Normative references.....	10
3 Terms and definitions	11
4 Product characteristics.....	15
4.1 Dimensions and tolerances requirements.....	15
4.2 General design requirement.....	15
4.3 Visual performance requirements of continuous VMS.....	15
4.4 Visual performance requirements of discontinuous VMS.....	16
4.5 Physical performance requirements	25
4.6 Dangerous substances.....	28
5 Testing, assessment and sampling methods	29
5.1 Test sequence	29
5.2 Durability	29
5.3 Test modules.....	29
5.4 Physical performance test methods	31
5.5 Visual performance test methods	37
6 Assessment and verification of constancy of performance (AVCP)	46
6.1 General.....	46
6.2 Type testing.....	46
6.3 Factory production control (FPC)	52
7 Classification and designation.....	59
7.1 General.....	59
7.2 Continuous retro-reflective VMS.....	59
7.3 Continuous, externally illuminated retro-reflective VMS	59
7.4 Discontinuous VMS.....	60
8 Marking, labelling and packaging	61
9 Product information	61
Annex A (normative) Equivalent area	63
A.1 General.....	63
A.2 Calculation of the luminance.....	63
A.3 Calculation of non-matrix equivalent areas.....	66
A.3.1 Equivalent area for a line of elements.....	66
A.3.2 Equivalent area for a symbol fully populated with elements	67
A.3.3 Equivalent area for a symbol partially populated with elements	67
Annex B (normative) VMS performance declaration codes for marking.....	69
B.1 General.....	69
B.2 Code for continuous retro-reflective VMS.....	69
B.3 Code for externally illuminated continuous retro-reflective VMS.....	69
B.4 Code for discontinuous VMS.....	70
Annex L (informative) Terminology used in this European Standard.....	71
Annex M (informative) Guidance on graphics for discontinuous light emitting signs.....	73
M.1 General.....	73
M.2 Apparent luminance of lines and letter strokes	73

საინფორმაციო ნაწილი. სრული ტექსტის სახსრავად შეიძლება სტანდარტი.

M.2.1	General	73
M.2.2	Further technical explanation of Apparent luminance.....	74
M.3	VMS with colour inversion	75
M.4	VMS without colour inversion.....	81
Annex N	(informative) Guidance on dimensions , luminance, beam width, legibility and efficiency for discontinuous VMS.....	83
N.1	General	83
N.2	Dimensions	83
N.2.1	General	83
N.2.2	Text.....	84
N.2.3	Circles.....	84
N.2.4	Triangles.....	85
N.3	Luminance and beam width classes.....	85
N.4	Beam width and distances of legibility.....	90
N.4.1	Group of VMS, centred above the road.....	90
N.4.2	Group of VMS, not centred above the road	91
N.4.3	Curved road sections.....	92
N.4.4	Limits of legibility due to vertical beam.....	93
N.4.5	Calculation of recognition time	95
N.4.5.1	General	95
N.4.5.2	Distances in metres per second at various speeds.....	95
N.4.5.3	Example of calculation of the recognition time	95
N.4.5.3.1	General.....	95
N.4.5.3.2	Using beam width class B2.....	96
N.4.5.3.3	Using beam width class B4.....	97
N.4.5.3.4	Using beam width class B6.....	97
N.4.5.4	Conclusions after calculation of recognition time	98
N.4.6	Luminance and luminance ratio	98
N.4.7	Beam width	99
N.5	Energy efficiency.....	99
Annex O	(informative) Specific design issues.....	100
O.1	Finish.....	100
O.2	Front panels.....	100
O.3	Front screens.....	100
O.4	Appearance	100
O.5	Electrolytic compatibility	100
O.6	Protection against thermal overload	100
O.7	Physical security against unauthorized access.....	100
O.8	Interfaces between VMS, control, and higher order equipment.....	100
O.9	Diagnostic.....	101
Annex P	(informative) Guidance for design of VMS messages.....	102
P.1	Design of VMS messages.....	102
P.2	Specifying text dimensions	103
Annex Q	(informative) Technical documentation.....	106
Q.1	Sign enclosure.....	106
Q.2	Electrical equipment	106
Q.3	Mounting devices (if applicable).....	106
Q.4	Retro-reflective and non retro-reflective components	106
Annex R	(informative) Example of recommended summary of class combinations.....	108

Annex ZA (informative)  Relationship of this European Standard with Regulation (EU) No.305/2011 116

ZA.1 Scope and relevant characteristics..... 116

ZA.2 System of Assessment and Verification of Constancy of Performance (AVCP) 119

ZA.3 Assignment of AVCP tasks 119

ZA.4 The following clauses are not related to Regulation (EU) No 305/2011: 120

Bibliography 121

Figures	Page
Figure 1 — Chromaticity areas for the colour classes C1 and C2 plotted in the CIE 1931 chromaticity diagram	18
Figure 2 — Examples of passed and failed luminance distributions.....	23
Figure 3 — Examples of variable message traffic sign test modules in front view - a) and c) - and side view b)	31
Figure 4 — Side elevation of the set-up for the measurement of luminance and luminance ratio	38
Figure 5 — Layout examples for a test module and the positioning of the measuring area (circle) of the luminance meter	43
Figure A.1 — Merging of elements	63
Figure A.2 — Character with a regular orthogonal matrix of (5 × 8) elements	64
Figure A.3 — Open line	66
Figure A.4 — Closed line	66
Figure A.5 — Example of symbol with an area fully populated with elements.....	67
Figure A.6 — Example of symbol with an area partially populated with elements	68
Figure B.1 — Code of performance classes of continuous retro-reflective VMS.....	69
Figure B.2 — Code of performance classes of externally illuminated continuous retro-reflective VMS.....	70
Figure B.3 — Code of performance classes of discontinuous VMS	70
Figure L.1 — Parts of a VMS	71
Figure L.2 — Test configuration.....	72
Figure M.1 — A legend seen at short (left), longer (centre), and very long distance (right)	74
Figure M.2 — Example for calculation of dimensions of circular mandatory VMS	78
Figure M.3 — Example for calculation of dimensions of circular mandatory VMS	79
Figure M.4 — Example for calculation of dimensions of a triangular warning VMS.....	80
Figure M.5 — Example of VMS using (64 × 64) elements with colour inversion.....	81
Figure M.6 — Example of VMS using (48 × 48) elements with colour inversion.....	81
Figure M.7 — Example of VMS using (32 × 32) elements with colour inversion.....	81
Figure M.8 — Example of VMS using (64 × 64) elements, no colour inversion.....	82
Figure M.9 — Example of VMS using (48 × 48) elements, no colour inversion.....	82
Figure M.10 — Example of VMS using (32 × 32) elements, no colour inversion	82
Figure N.1 — Relation between classes.....	86
Figure N.2 — Example of coverage by beam width class B1	87
Figure N.3 — Example of coverage by beam width class B3	88
Figure N.4 — Example of coverage by beam width class B6	89
Figure N.5 — Legibility of group of VMS, centred on gantry above the road	90
Figure N.6 — Legibility of group of VMS, mounted on cantilever aside the road.....	91
Figure N.7 — Legibility of group of VMS, mounted on cantilever aside the road.....	93
Figure N.8 — Legibility of group of VMS, mounted on cantilever aside the road.....	94
Figure P.1 — Example of the design of the letter E in a regular orthogonal matrix.....	102
Figure P.2 — Equivalent text dimensions using uppercase characters.....	103

საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.

Figure P.3 — Equivalent text dimensions using upper- and lower-case characters	104
Figure P.4 — Equivalent text dimensions of full matrix display using proportional character spacing.....	105
Figure R.1— Example of summary of the characteristics of products.....	109
Figure R.2 — Example 1 for visual performance class combination.....	111
Figure R.3 — Example 2 for visual performance class combination.....	112
Figure R.4 — Example 3 for visual performance class combination.....	114
Figure R.5 — Example 4 for visual performance class combination.....	115

Tables	Page
Table 1 — Class designation of the visual performance parameters of VMS	16
Table 2 — Corner points (CIE 1931 chromaticity co-ordinates x, y) of the chromaticity areas for the colours of class C1	17
Table 3 — Corner points (CIE 1931 chromaticity co-ordinates x, y) of the chromaticity areas for the colours of class C2	17
Table 4 — L_e and L_a luminance limits for white on reference axis.....	19
Table 5 — L_e and L_a luminance limits for yellow on reference axis.....	20
Table 6 — L_e and L_a luminance limits for orange on reference axis	20
Table 7 — L_e and L_a luminance limits for green on reference axis.....	20
Table 8 — L_e and L_a luminance limits for red on reference axis	21
Table 9 — L_e and L_a luminance limits for blue on reference axis	21
Table 10 — Minimum luminance ratio values (LR) for various colours and classes R1, R2 and R3, at test angles on the reference axis and off the reference axis	22
Table 11 — Beam width classes.....	24
Table 12 — Class designation.....	25
Table 13 — Temperature range classes	25
Table 14 — Ingress protection level classes	26
Table 15 — Effect of voltage interruption.....	28
Table 16 — Operating voltage range, power-up activation and temporary overvoltage tests	32
Table 17 — Frequency and voltage tests.....	32
Table 18 — Impact test.....	33
Table 19 — Vibration test.....	33
Table 20 — Corrosion test	34
Table 21 — Water ingress test - Severity	34
Table 22 — Dust ingress test - Severity	34
Table 23 — Temperature test	35
Table 24 — Test angles (in degrees, with respect to the reference axis), used for the measurement of luminance under external illumination and luminance ratio	39
Table 25 — Test angles (in degrees, with respect to the reference axis), used for the measurement of luminance without external illumination.....	39
Table 26 — Test angles (in degrees, with respect to the reference axis), used for the measurement of beam width, and for uniformity of luminous intensity and colour of monochromatic elements	40
Table 27 — Test angles (in degrees, with respect to the reference axis), used for the measurement of uniformity of luminous intensity and colour of elements formed by mixing colours.....	41
Table 28 — Characteristics of continuous VMS.....	47
Table 29 — Characteristics of discontinuous VMS.....	49
Table 30 — Identification label	52
Table 31 — Minimum frequency of testing continuous VMS for product testing and evaluation as part of FPC.....	55

Table 32 — Minimum frequency of testing discontinuous VMS for product testing and evaluation as part of FPC	56
Table M.1 — Parameters for mandatory signs using a red circle	76
Table M.2 — Parameters for mandatory signs using a red triangle	77
Table N.1 — Minimum dimensions of text (mm)	84
Table N.2 — Minimum dimensions of circles (mm).....	85
Table N.3 — Minimum dimensions of triangles (mm).....	85
Table N.4 — Examples for applications of beam width classes	86
Table N.5 — Examples for recognition time depending on character height, speed and vertical beam width.....	94
Table N.6 — Conversion from speed unit km/h to m/s.....	95
Table ZA.1 — Relevant clauses for continuous VMS.....	116
Table ZA.2 — Relevant clauses for discontinuous VMS.....	118
Table ZA.3 — Assignment of AVCP tasks for VMS under system 1	120

საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.

European foreword

This document (EN 12966:2014+A1:2018) has been prepared by Technical Committee CEN/TC 226 “Road equipment”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2019 and conflicting national standards shall be withdrawn at the latest by September 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document includes Amendment 1 approved by CEN on 7 November 2018.

This document will supersede A1 EN 12966:2014 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with Regulation (EU) No. 305/2011 [1], see informative Annex ZA, which is an integral part of this document.

EN 12966, *Road vertical sign – Variable message traffic signs*, covers the product standard, assessment and verification of constancy of performance (AVCP) including type testing and factory production control.

It derives from performance requirements and test methods published in CEN, CENELEC, CIE, IEC and ISO documents.

The main changes with respect to the previous edition are listed below:

- The new structure of the standard has been adapted to the structure proposed by CEN BT for harmonized standards
 - Consequently the contents of Clauses 4 to 8 of the previous edition have been moved to Clause 4, Product characteristics, in 4.1 to 4.6;
 - Contents of Clause 9 of the previous edition have been moved to Clause 5, Testing, assessment and sampling methods;
 - Contents of EN 12966-2:2005 and contents of EN 12966-3:2005 have been moved to Clause 6, Assessment and verification of constancy of performance (AVCP), and revised in accordance with requirements of CPR;
 - contents of Clause 10 of the previous edition have been moved to Clause 7, Classification and designation;
 - contents of Clause 11 of the previous edition have been moved to Clause 8, Marking, labelling and packaging;

- contents of Clause 12 of the previous edition are now included in Clause 6, Assessment and verification of constancy of performance (AVCP);
- contents of Clause 13 of the previous edition are now included in 4.6, Dangerous substances;
- informative Annex B of the previous edition has been renamed informative Annex L;
- informative Annex C of the previous edition has been renamed informative Annex M, information and guidance on graphics for discontinuous light emitting signs including figures has been added for better understanding;
- informative Annex D of the previous edition has been renamed informative Annex N, information and guidance on dimensions, luminance, beam width, legibility and efficiency for discontinuous VMS including figures has been added for better understanding;
- informative Annex E of the previous edition has been renamed informative Annex O;
- informative Annex F of the previous edition has been renamed informative Annex P ;
- new normative Annex B has been added to define declaration codes for marking;
- new informative Annex Q has been added to give guidance for technical documentation;
- new informative Annex R has been added showing templates for summary of test results;
- visual performance requirements of continuous VMS (4.3) and discontinuous VMS (4.4), have been updated, test methods have been simplified (5.5);
- physical performance requirements have been updated (4.5), test method have been adjusted accordingly (5.4);
- informative Annex ZA has been revised in accordance with requirements of the CPR.

NOTE The structure of the document follows the requirements requested by the CEN CPR Consultant at the time of drafting the document.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

საინფორმაციო ნაწილი. სრული ტექსტის სახანძრავდ შეიძინეთ სტანდარტი.

Introduction

This European Standard is designed for use by manufacturers, who are placing their variable message traffic signs on the market, as well as by Road Authorities and private developers who wish to use variable message signs. It provides requirements for performance of characteristics of these signs, test and assessment methods and the means of assessment and verification of constancy of performance (AVCP).

This European Standard is a product standard covering the requirements for variable message traffic signs (VMS). A VMS is a sign where the information shown can be changed or switched on or off as required. The information can be text and/or symbols.

VMS fall into the two different types of continuous and discontinuous. Continuous VMS show sign faces of the types of fixed signs defined in EN 12899. Discontinuous VMS use luminous elements to show different messages on a single sign face.

There is diversity of VMS. Some have elements that are placed with a view of displaying a few predetermined messages, while other have elements placed in arrays. Some can show messages where all elements have approximately the same luminous intensity while other can vary the luminous intensity individually. Some can show certain predetermined colours, while other can show a range of colours. Some can show only character legends while other can show a wider range of legends.

This European Standard does not describe the detailed form and configuration of a VMS. Therefore, test modules representing the VMS are used to demonstrate compliance with the requirements of this European Standard because of the impracticality of testing some complete VMS.

Because of the major demands on a sign for good legibility and visibility throughout the required viewing range, the main properties of the sign are described. These properties can vary depending on the situation. For example, it will not be necessary to ask for a minimum temperature requirement of -40 °C in Greece, but this needs to be considered in Lapland. For visual performance there will be a difference between installation on highways - with good distance visibility and a narrow beam width - and installation in cities, where there is only short distance legibility and when a wide beam width may be required.

This European Standard uses requirements for performance of the characteristics, which are not dependent on technology. The visual and environmental performance is demonstrated on a test module representing the VMS. This European Standard contains a number of defined requirements on VMS, some of which have to be demonstrated on the test module, others that are to be verified by the manufacturer. It is the manufacturer's responsibility to ensure that the VMS is fully represented by the test module.

The performances of the main characteristics of discontinuous VMS are given by classes, which are designed to be selected by choosing a combination of classes dependent on the end-user's requirements. National annexes may define class combination applicable to the local needs. This combination covers not only the regulatory requirements of the destination country but also issues of lifetime, quality, maintenance and construction, all of which affect the ability of a sign in its particular application, to meet safety and fitness for purpose. The details in the informative annexes are provided as useful guidance on the additional aspects relating to VMS for those setting up purchasing contracts for signs or signing systems.

Installed discontinuous VMS should be regulated in view of the ambient light and the stroke width of legends to provide the intended apparent luminance and balance of colours. Symbols and fonts for character legends should be designed to provide best possible legibility.

The working environment for VMS can be relatively harsh and equipment that is deemed "fit for purpose" is expected to last in an exposed, corrosive environment for a minimum of 10 years. It is essential that all materials and manufacturing processes take this into account.