



SLOVENSKI STANDARD

SIST EN 13422:2005

01-januar-2005

Vertical road signs - Portable deformable warning devices and delineators - Portable road traffic signs - Cones and cylinders

Straßenverkehrszeichen (vertikal) - Transportable Straßenverkehrszeichen - Leitkegel und Leitzylinder

Signalisation routière verticale - Signaux temporaires - Dispositifs coniques et balises de signalisation

Ta slovenski standard je istoveten z: EN 13422:2004

ICS:

93.080.30	Cestna oprema in pomožne naprave	Road equipment and installations
-----------	----------------------------------	----------------------------------

SIST EN 13422:2005

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 13422:2005

<https://standards.iteh.ai/catalog/standards/sist/0a80ee19-ae92-4d65-9a80-286d480d0a8c/sist-en-13422-2005>

ICS 93.080.30

English version

Vertical road signs - Portable deformable warning devices and delineators - Portable road traffic signs - Cones and cylinders

Signalisation routière verticale - Signaux temporaires -
Dispositifs coniques et balises de signalisation

Straßenverkehrszeichen (vertikal) - Transportable
Straßenverkehrszeichen - Leitkegel und Leitzylinder

This European Standard was approved by CEN on 24 June 2004.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

[SIST EN 13422:2005](https://standards.iteh.ai/catalog/standards/sist/0a80ee19-ae92-4d65-9a80-286d480d0a8c/sist-en-13422-2005)

<https://standards.iteh.ai/catalog/standards/sist/0a80ee19-ae92-4d65-9a80-286d480d0a8c/sist-en-13422-2005>



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

	page
Foreword.....	4
1 Scope.....	6
2 Normative references	6
3 Terms, definitions, symbols and abbreviations	6
4 Design, dimensions and tolerances.....	9
4.1 Traffic cones.....	9
4.1.1 Design of traffic cones	9
4.1.2 Dimensions of traffic cones	9
4.2 Traffic cylinders	10
4.2.1 Design of traffic cylinders	10
4.2.2 Design of traffic cylinders	10
4.3 Tolerances	10
5 Materials.....	11
6 Performance requirements	11
6.1 Visual performance	11
6.1.1 Classification	11
6.1.2 Colour; luminance factor and retroreflective requirements	11
6.2 Physical performance.....	14
6.2.1 Stability of traffic cones	14
6.2.2 Drop resistance of traffic cones	15
6.2.3 Adhesion of retroreflective surfaces	15
6.2.4 Continuity of retroreflective surfaces	15
6.2.5 Resistance to damage at low temperatures	15
6.2.6 Resistance to bending - traffic cylinders.....	15
6.2.7 Resistance to fatigue of traffic cylinders.....	15
7 Methods of tests.....	16
7.1 General requirements and records	16
7.2 Determination of chromaticity and luminance factor β in dry conditions	16
7.3 Photometric tests.....	16
7.3.1 Determination of minimum initial coefficient of retroreflection R'	16
7.3.2 Determination of coefficient of retroreflective performance R' for retroreflective traffic cones or traffic cylinders	16
7.3.3 Determination of relative distribution of retroreflective performance	17
7.4 Test for determination of stability of traffic cones	20
7.5 Low temperature impact resistance test	20
7.6 Drop test for traffic cones	21
7.7 Measurement of coefficient of retroreflection of wet retroreflective surfaces	22
7.7.1 Principle	22
7.7.2 Apparatus	22
7.7.3 Method.....	23
7.7.4 Report.....	23
7.8 Test for adhesion of retroreflective surface(s) of traffic cones and traffic cylinders	23
7.9 Bending test for traffic cylinders.....	23
7.9.1 Apparatus	23
7.9.2 Test method.....	23
7.10 Fatigue test for traffic cylinders	24
7.10.1 Apparatus	24

7.10.2	Test method	24
8	Marking	26
8.1	Traffic cones	26
8.1.1	Base plate	26
8.1.2	Cone body	26
8.1.3	Retroreflective surfaces (Traffic cones of all types of construction)	26
8.2	Traffic cylinders	26
8.2.1	Cylinder Body (in any convenient visible position)	26
8.2.2	Retroreflective surfaces	27
8.3	Legibility and durability of markings	27
8.3.1	Size of lettering (height)	27
8.3.2	Durability of marking	27
8.4	Examples of marking scheme	27
8.4.1	Traffic cones	27
8.4.2	Traffic cylinders	27
8.5	Anti-theft markings	28
9	Evaluation of conformity	28
9.1	Initial type testing	28
9.2	Factory production control	34
9.3	Common requirements	36
9.3.1	General	36
Annex A (normative) Technical documentation for ITT		37
Annex B (informative) Examples of test forms to register the results of a conformity review		38
Annex C (informative) Environmental considerations		45
Bibliography		46

SIST EN 13422:2005

<https://standards.iteh.ai/catalog/standards/sist/0a80ee19-ae92-4d65-9a80-286d480d0a8c/sist-en-13422-2005>

Foreword

This document (EN 13422:2004) has been prepared by the Technical Committee CEN/TC 226 "Road Equipment" the Secretariat of which is held by AFNOR.

No existing document is superseded.

It derives from performance requirements and test methods published in CEN, CENELEC, CIE and ISO documents together with standards of the CEN member organisations.

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 April 2005, and conflicting national standards shall be withdrawn at the latest by April 2005.

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

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 13422:2005](https://standards.iteh.ai/catalog/standards/sist/0a80ee19-ae92-4d65-9a80-286d480d0a8c/sist-en-13422-2005)

<https://standards.iteh.ai/catalog/standards/sist/0a80ee19-ae92-4d65-9a80-286d480d0a8c/sist-en-13422-2005>

Introduction

This document may be used to implement type approval and certification testing.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 13422:2005](https://standards.iteh.ai/catalog/standards/sist/0a80ee19-ae92-4d65-9a80-286d480d0a8c/sist-en-13422-2005)

<https://standards.iteh.ai/catalog/standards/sist/0a80ee19-ae92-4d65-9a80-286d480d0a8c/sist-en-13422-2005>

1 Scope

This document specifies requirements for new traffic cones and new traffic cylinders with retroreflective properties.

This document specifies minimum essential visual and physical performance characteristics; test methods for determination of product performance and the means by which this performance may be communicated to the user and the public including safety enforcement agencies.

The document provides a series of categories or classes by which a traffic cone or traffic cylinder may be specified for use in different applications in accordance with best practice.

In the case of physical properties, performance levels and indicative tests are provided for cold weather, stability, and impact resistance when dropped. Requirements for visual recognition properties, colour, retroreflectivity and luminance are provided.

All of the tests contained in this document already exist in one or more national technical standard(s) of Member State(s), or in legislative requirement(s) or code(s) of practice of Member State(s).

Provision for identification and marking to declared levels of performance is provided.

There are other product shapes which perform similar functions. This document does not cover devices made in other shapes, or which do not meet the design requirements of this document.

2 Normative references (standards.iteh.ai)

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.

EN 12767, *Passive safety of support structures for road equipment - Requirements and test methods*

EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:1999)*.

ISO 4:1997, *Information and documentation — Rules for the abbreviation of title words and titles of publications*.

CIE 15.2:1986, *Colorimetry*.

CIE 17.4:1987, *International lighting vocabulary*.

CIE 54.2:2001, *Retroreflection — Definition and measurement*.

3 Terms, definitions, symbols and abbreviations

For the purposes of this document, the following terms and definitions together with the symbols and abbreviations given in ISO 4:1997 apply. The photometric definitions given in CIE 17.4:1997 together with the following apply.

3.1

traffic cone

three dimensional device of conical shape comprising one or more parts including a base plate, cone body and a retroreflective surface or surfaces

3.2**base plate**

lowest part of the traffic cone which supports the cone body, having an upper visible surface, and a lower surface in contact with the support surface

3.3**cone body**

part of the traffic cone which is conical in shape, but excludes the base plate and the retroreflective surface(s)

3.4**category A cone**

traffic cone which is totally retroreflective, except for the base plate

3.5**category B cone**

traffic cone in which only a part or parts of the cone body are retroreflective

3.6**traffic cylinder**

three dimensional device of substantially cylindrical shape comprising one or more parts including a cylinder body, and a retroreflective surface or surfaces

3.7**cylinder body**

part of the traffic cylinder which is substantially cylindrical in shape and supports the retroreflective surface or surfaces

3.8**category A cylinder**

traffic cylinder which is totally retroreflective

3.9**category B cylinder**

traffic cylinder in which only part or parts of the cylinder body are retroreflective

3.10**retroreflective surface(s)**

part (or those parts) of a traffic cone or traffic cylinder fixed to the cone body or cylinder body which are retroreflective according to the requirements of this document

ITeH STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 13422:2005

<https://standards.iteh.ai/catalog/standards/sist/0a80ee19-ae92-4d65-9a80-286d480d0a8c/sist-en-13422-2005>

3.11

height (H)

traffic Cone - the vertical distance between the support surface and the top of the traffic cone

traffic Cylinder - the vertical distance between the top of the cylinder body and the lowest extremity of the cylinder body

3.12

batch

amount of product manufactured as one complete operation as defined by the manufacturer in its FPC system manual and accepted by the notified body

3.13

production identification code

code that will be defined by the manufacturer of the retroreflective sheeting in order to achieve traceability

3.14

test product

product in original size and design, or part of it, prepared by the manufacturer and submitted to the ITT procedure

3.15

sample

construction representing parts of the product or its constituents in original materials prepared by the manufacturer and submitted to the ITT procedure

3.16

reference sample

sample as defined in 3.3 to be retained in order to be able to repeat the ITT procedure in case of disagreements

3.17

manufacturer

responsible body in the framework of this document

3.18

supplier

producer of components for use in the product

3.19

product families

products that are related in such a way that testing of one of the products covers all of the products from a product family

3.20

notified body

body responsible for the third party execution of ITT in the framework of this document

4 Design, dimensions and tolerances

4.1 Traffic cones

4.1.1 Design of traffic cones

4.1.1.1 Shape of traffic cones

There shall be 2 shape classes for traffic cones (S1 and S2).

Class S1 - The angle between the sides of the cone body and the cone's vertical axis shall be $(10 \pm 2,5)^\circ$ for at least the uppermost 75 % H of the traffic cone. The lower 25 % H of the traffic cone above the base plate may have an increased angle between the sides of the body and the traffic cone's vertical axis of between $7,5^\circ$ and $14,5^\circ$.

Class S2 - The angle between the sides of the cone body and the cone's vertical axis shall be $(10 \pm 2,5)^\circ$ for at least the uppermost 75 % H of the traffic cone. The lower 25 % H of the traffic cone above the base plate may have an increased angle between the sides of the body and the traffic cone's vertical axis of between $7,5^\circ$ and 45° .

4.1.1.2 Shape of base plate for traffic cones

The base plate shall have a minimum of 4 and not more than 8 sides.

4.1.2 Dimensions of traffic cones

[SIST EN 13422:2005](https://standards.iteh.ai/catalog/standards/sist/0a80ee19-ae92-4d65-9a80-286d480d0a8c/sist-en-13422-2005)

4.1.2.1 General <https://standards.iteh.ai/catalog/standards/sist/0a80ee19-ae92-4d65-9a80-286d480d0a8c/sist-en-13422-2005>

Traffic cones shall conform to Table 1 and 6.3.1 (as appropriate) and shall be assigned according to weight class (W) of Table 1 achieved. (The nominal height of the traffic cone and the weight class required are to be specified by the purchaser).

Table 1 — Height of traffic cones and minimum weight – (W)

Height (H) in mm	Minimum weight (W) In kg		
	Class W1	Class W2	Class W3
$> 900 \leq 1\ 000$	4,80	6,00	7,50
$> 750 \leq 900$	3,20	4,00	5,00
$> 500 \leq 750$	1,30	1,90	2,50
$> 450 \leq 500$	1,10	1,80	1,90
$\geq 300 \leq 450$	0,80	0,80	0,80

4.1.2.2 Stacked height of traffic cones

The overall height of two identical traffic cones, when stacked one upon the other, shall not exceed 1,2 H of each individual traffic cone. Traffic cones shall be designed to ensure that, when stacked, they do not bind together, nor damage the retroreflective surface(s).

4.1.2.3 Top of body of traffic cones

The external diameter of the top of the cone body shall be (60 ± 15) mm. The top of the cone body shall have a circular hole provided in its upper surface. The hole shall have a diameter of (40 ± 5) mm.

The area of the cone body immediately below the top of the traffic cone may have a configuration to provide a hand grip. This area need not be retroreflective and shall not exceed the greater height of either $0,1 H$ or 60 mm measured from the top.

4.1.2.4 Base plate of traffic cones

When the thickness of the outer edge of the base plate exceeds 15 mm, its plan area shall be contained within a circle whose diameter is $0,75 H$ of the traffic cone.

When the thickness of the outer edge of the base plate is 15 mm or less, the plan area of the base plate shall be contained within a circle whose diameter is $0,9 H$ of the traffic cone.

4.2 Traffic cylinders

4.2.1 Design of traffic cylinders

4.2.1.1 Shape of traffic cylinder

Traffic cylinders shall have substantially parallel sides. The lowest 100 mm portion of the cylinder body may be of a different diameter to the portion above 100 mm from the support surface and need not be substantially parallel. A means for drainage of any water entering the traffic cylinder shall be provided.

4.2.1.2 Fixing method for traffic cylinder

The design of such a fixing may be of any type which enables the traffic cylinder to be temporarily installed in or on the road surface while allowing the other requirements of this document to be satisfied.

4.2.2 Design of traffic cylinders

4.2.2.1 Height

Traffic cylinders shall be not less than 450 mm in height nor greater than 1 250 mm in height. (The nominal height of traffic cylinders is to be specified by the purchaser).

4.2.2.2 Top of traffic cylinders

The top of the cylinder body shall not be less than 95 mm or exceed 120 mm in diameter. A circular hole of (30 ± 5) mm diameter shall be provided in the upper 100 mm of each traffic cylinder except where the inclusion of any internal mechanism makes it impracticable to provide such a hole. In this case, the traffic cylinder shall be constructed such that in the event of it being run over, air will exhaust without the traffic cylinder bursting.

4.3 Tolerances

Tolerances for traffic cones and traffic cylinders shall be $\pm 5 \%$ except where stated elsewhere in this document.

5 Materials

5.1 Materials shall enable conformance to the relevant requirements of this document.

5.2 Environmental considerations are set out in Annex C, and provision for marking to aid recycling is set out in Clause 8 of this document.

6 Performance requirements

6.1 Visual performance

6.1.1 Classification

Traffic cones and traffic cylinders shall be assigned to a Category A or B in accordance with 3.4 and 3.5, or 3.8 and 3.9.

6.1.2 Colour; luminance factor and retroreflective requirements

6.1.2.1 Daylight appearance of retroreflective surfaces

When tested in accordance with 7.2 the chromaticity and luminance factor β of traffic cones and traffic cylinders shall conform to Table 2.

Table 2 — Chromaticity co-ordinates and luminance factors: Retroreflective surfaces

Colour	1		2		3		4		Luminance factor β			
	x	y	x	y	x	y	x	y	LA	LB	LC	LD
White	0,355	0,355	0,305	0,305	0,285	0,325	0,335	0,375	$\geq 0,35$	$\geq 0,27$	$\geq 0,20$	$\geq 0,10$
Red	0,735	0,265	0,674	0,236	0,569	0,341	0,655	0,345	$\geq 0,03$	$\geq 0,03$	$\geq 0,03$	$\geq 0,03$
Yellow	0,545	0,454	0,487	0,423	0,427	0,483	0,465	0,534	$\geq 0,16$	$\geq 0,16$	$\geq 0,16$	$\geq 0,16$
Blue	0,078	0,171	0,150	0,220	0,210	0,160	0,137	0,038	$\geq 0,01$	$\geq 0,01$	$\geq 0,01$	$\geq 0,01$

(Ref. CIE Publication 39.2 surface colours for visual signalling)

6.1.2.2 Daylight appearance of non-retroreflective surfaces

When tested in accordance with 7.2 the chromaticity and luminance factor β of the exterior surfaces of the cone body of Category A and B traffic cones and the exterior surface of Category A and B traffic cylinders shall conform to Table 3.A.

The interior surface of the cone body of Category A and B traffic cones shall conform to Table 3.B.