SLOVENSKI STANDARD
oSIST prEN 1317-5:2014

01-februar-2014

Oprema cest - 5. del: Zahteve za proizvode, preskusi in metode ocenjevanja ter merila sprejemljivosti za sisteme za zadrževanje vozil

Road restraint systems - Part 5: Product requirements, test and assessment methods and acceptance criteria

Rückhaltesysteme an Straßen - Teil 5: Anforderungen an die Produkte, Konformitätsverfahren und -bescheinigung für Fahrzeugrückhaltesysteme

Ta slovenski standard je istoveten z: **prEN 1317-5**

ICS:

13.200	Preprečevanje nesreč in katastrof	Accident and disaster control
93.080.30	Cestna oprema in pomožne naprave	Road equipment and installations

oSIST prEN 1317-5:2014 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 1317-5

December 2013

ICS 13.200; 93.080.30

Will supersede EN 1317-5:2007+A2:2012

English Version

Road restraint systems - Part 5: Product requirements, test and assessment methods and acceptance criteria

Rückhaltesysteme an Straßen - Teil 5: Anforderungen an die Produkte, Konformitätsverfahren und -bescheinigung für Fahrzeugrückhaltesysteme

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 226.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. prEN 1317-5:2013: E

Contents

Page

Foreword

This document (prEN 1317-5:2013) has been prepared by Technical Committee CEN/TC 226 “Road equipment”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

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.

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

This document will supersede EN 1317-5:2007+A2:2012.

At the moment of writing, the cast-in-place barriers are considered to be on-site works, not products, however their performance evaluation can be made against this standard.

This European Standard consists of the following Parts under the general title:

Road restraint systems —

— Part 1: *Terminology and general criteria for test methods*;

— Part 2: *Performance classes, impact test acceptance criteria and test methods for safety barriers*;

— Part 3: *Performance classes, impact test acceptance criteria and test methods for crash cushions*;

— Part 4: *Performance classes, impact test acceptance criteria and test methods for transitions* (under preparation: this document will supersede ENV 1317-4:2001 for the clauses concerning transitions);

— Part 5 (this part), *Product requirements, test and assessment methods and acceptance criteria*;

— Part 6: *Pedestrian restraint system - Pedestrian parapets (CEN/TR);*

— Part 7: *Performance classes, impact test acceptance criteria and test methods for terminals* (under preparation: this document will supersede ENV 1317-4:2001 for the clauses concerning terminals);

— Part 8: *Motorcycle road restraint systems which reduce the impact severity of motorcyclist collisions with safety barriers (CEN/TS)*.

Annexes A, C, D, E, G are normative and Annexes B, F, H, I are informative.

The significant technical changes incorporated in this revision are:

— The assessment procedures for modified products and product ranges;

— The addition of provisions to assess the characteristics of the ground (with a means of soil, plinth, anchorages, etc.) where the barrier has been tested;

— The addition of provision to limit the volatility of performance derived by the material used for the product through limited material’s characteristics;

— Adaptation of the standard to the CEN rules and templates for harmonized standard and to the new template for annex ZA;

— Adaptation of the standard to the CPR;

— The addition of an annex dealing with the simplified assessment through virtual testing (computational mechanics);

— The addition to the annex ZA of terminals and transitions;

— The addition of a list of minimal information that a manufacturer should provide when placing the product on the market;

— The addition of minimal provisions the manufacturer should include in his installation manual.

Introduction

In order to improve and maintain road safety, the design of safer roads requires, on certain sections of road and at particular locations, the installation of road restraint systems. These road systems are designated to redirect and/or contain errant vehicles safely or to reduce the severity of vehicle impact with a more resistive object, for the benefit of the occupants and other road users, including pedestrians. This will happen on sections of road and at particular locations open to vehicle traffic, defined by the National or Local Authorities with a specified performance level or category, chosen among those defined in this standard.

Additionally, the performances of road restraint systems and other information indicated in the standard and in the Annexes can be useful for the installation by road safety designer or National or Local Authority.

1 Scope

This European Standard specifies requirements, test/assessment methods, acceptance criteria and methods for verification of constancy of performance of the following vehicle restraint systems to be used as temporary[1)] or permanent on the roads and in vehicle circulation areas:

a) safety barriers (including vehicle parapets),

b) crash cushions,

c) terminals,

d) transitions (including Removable Barrier Sections),

e) safety barriers (including vehicle parapets) combined with motorcyclists protection (only for the vehicle restraint function),

f) vehicle parapets combined with pedestrian parapets (only for the vehicle restraint function).

Pedestrian parapets requirements are not included in this European Standard.

2 Normative references

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

EN 206-1:2000/A2:2005, *Concrete - Part 1: Specification, performance, production and conformity*

EN 335-1, *Durability of wood and wood-based products - Definition of use classes - Part 1: General*

EN 335-2, *Durability of wood and wood-based products - Definition of use classes - Part 2: Application to solid wood*

EN 338, *Structural timber - Strength classes*

EN 485-2, *Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties*

EN 573, *Aluminium and aluminium alloys - Chemical composition and form of wrought products*

EN 933-1, *Tests for geometrical properties of aggregates - Part 1: Determination of particle size distribution - Sieving method*

EN 933-2, *Tests for geometrical properties of aggregates - Part 2: Determination of particle size distribution — Test sieves, nominal size of apertures*

EN 1194, *Timber structures - Glued laminated timber - Strength classes and determination of characteristic values*

EN 1317-1:2010, *Road restraint systems - Part 1: Terminology and general criteria for test methods*

EN 1317-2:2010, *Road restraint systems - Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers*

1) Temporary barriers are regulated by National or local Authorities, however, their performance evaluation can be made against this standard.

EN 1317-3:2010, *Road restraint systems - Part 3: Performance classes, impact test acceptance criteria and test methods for crash cushions*

prEN1317-4:_[2] *Road restraint systems - Part 4 7: Performance classes, impact test acceptance criteria and test methods for transitions*

prEN1317-7:_[3] *Road restraint systems – Part 7 4: Performance classes, impact test acceptance criteria and test methods for terminals*

EN 1992-1-1, *Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings*

EN 10025, *Hot-rolled products of non alloy structural steels: technical delivery conditions*

EN 10051, *Continuously hot-rolled strip and plate/sheet cut from wide strip of non-alloy and alloy steels. Tolerances on dimensions and shape*

EN 10080, *Steel for the reinforcement of concrete - Weldable reinforcing steel*

EN 10088, *Stainless steels*

EN 10204, *Metallic products - Types of inspection documents*

EN 10346, *Continuously hot-dip coated steel flat products*

EN 12385, *Steel wire ropes – Safety*

EN 12390-3, *Testing hardened concrete - Part 3: Compressive strength of test specimens*

EN 12390-6, *Testing hardened concrete - Part 6: Tensile splitting strength of test specimens*

EN 13036-4, *Road and airfield surface characteristics - Test methods - Part 4: Method for measurement of slip/skid resistance of a surface: The pendulum test*

EN 13183-1, *Moisture content of a piece of sawn timber - Part 1: Determination by oven dry method*

EN ISO 75, *Plastics - Determination of temperature of deflection under load*

EN ISO 179, *Plastics - Determination of Charpy impact properties*

EN ISO 180, *Plastics - Determination of Izod impact strength*

EN ISO 527, *Plastics - Determination of tensile properties*

EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods (ISO 1461:1999)*

EN ISO 6892, *Metallic materials - Tensile testing*

EN ISO 10684, *Fasteners - Hot dip galvanized coatings*

EN ISO 12994-5:2007, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 5: Protective paint systems*

---

2) To be published

3) To be published

CEN/TS 1317-8:2012*, Road restraint systems - Part 8: Motorcycle road restraint systems which reduce the impact severity of motorcyclist collisions with safety barriers*

ISO 8349:2002*, Road vehicles. Measurement of road surface friction*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1317-1:2010, EN 1317-2:2010, EN 1317-3:2010, CEN/TS1317-8:2012 and the following apply.

3.1.1
vehicle restraint system
kit usually composed by a fixed number of components (rail or post or spacer, etc.) working together as a set

3.1.2
kit
set of elements as a whole

3.1.3
bi-directional terminal BDT
terminal designed and tested to perform at the approach and departure of a barrier

3.1.4
combined vehicle/pedestrian parapet
vehicle parapet with additional safety provisions for pedestrians and/or other road users

3.1.5
containment height (Hc)
height to the uppermost longitudinal element which affects the containment capacity

3.1.6
containment height for barrier used on plinth (Hcfp)
height from the plinth to the uppermost longitudinal element which affects the containment capacity

3.1.7
handrail height (Hhand)
height to the uppermost longitudinal element if the uppermost longitudinal element does not affect vehicle containment capacity of the barrier in the containment level vehicle impact test (does not share or resist loads)

3.1.8
handrail height for barrier used on plinth (Hhandfp)
height from the plinth to the uppermost longitudinal element if the uppermost longitudinal element does not affect vehicle containment capacity of the barrier in the containment level vehicle impact test (does not share or resist loads)

3.1.9
height of safety barriers
the vertical distance from the road surface beside the barrier to the upper edge of the uppermost longitudinal element of the barrier

3.1.10
non-redirective crash cushion
crash cushions which contains but does not redirect vehicles in the specified tests

3.1.11
product range
group of products produced by one manufacturer for which the test results for one or more characteristics from any one product within the range are valid for all other products within this range

3.1.12
redirective crash cushion
crash cushions which contains and redirects vehicles

3.1.13
safety barrier
continuous vehicle restraint system installed alongside, or on the central reserve, of a road

Note 1 to entry: This can include a vehicle parapet.

3.1.14
uni-directional terminal (UDT)
terminal designed and tested to perform at the departure end of a barrier only

3.2 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply:

AVCP	Assessment and verification of constancy of performance (CPR)
CWFT	Classification without further testing
DoP	Declaration of performance
EAT	Energy absorbing terminal. Complies with 4.3.2
NEAT	Non-energy absorbing terminal. Complies with 4.3.2
VCDI	Vehicle Cockpit Deformation Index
A_m	Minimum percentage elongation after fracture according to EN ISO 6892
F_{tk}	Characteristic tensile splitting strength of concrete according to EN 206-1:2000/A2:2005
F_{ck}	Characteristic compressive strength of concrete according to EN 206-1:2000/A2:2005
R_e	Yield strength according to EN ISO 6892
R_m	Tensile strength according to EN ISO 6892

4 Requirements

4.1 Safety barriers

4.1.1 Performance under vehicle impact

4.1.1.1 General

The verification of the following aspects gives information about the ability of a safety barrier to provide appropriate restraint in case of impact of a vehicle: containment level: the capability to restrain errant vehicles

— impact severity level: the risk for a vehicle occupant consequent to a vehicle impact, applicable to cars only

— deformation of the safety barrier: modification of geometry or displacement of the safety barrier under impact

The barrier shall be tested in a length sufficient to demonstrate performances which will be achieved by any longer installation.

The results may be influenced the ground characteristics where the test item is installed.

EXAMPLE Soil in which the post are driven, pavement surface, anchorages, geometry, etc.

The description of the ground shall be given, according to provisions in 5.1.6.

Concerning anchorages, plinth and foundations, the manufacturer shall provide a detailed description of the test item, including information on the characteristics of the plinth material, the geometry of the plinth, the type of anchorages etc.

The manufacturer shall declare any design features of the vehicle restraint system intended to limit the loading on the supporting structure.

4.1.1.2 Containment level

When tested in accordance with 5.1.1.1, for the containment levels given in Table 1, the results shall comply with EN 1317-2:2010, subclauses 4.2 and 4.3.

Table 1 — Containment levels

Containment Level		Tests
Low angle containment	T1	TB 21
	T2	TB 22
	T3	TB 41 and TB 21
Normal containment	N1	TB 31
	N2	TB 32 and TB 11
High containment	H1	TB 42 and TB 11
	L1	TB 42 and TB 32 and TB 11
	H2	TB 51 and TB 11
	L2	TB 51 and TB 32 and TB 11
	H3	TB 61 and TB 11
	L3	TB 61 and TB 32 and TB 11
Very high containment	H4a	TB 71 and TB 11
	L4a	TB 71 and TB 32 and TB 11
	H4b	TB 81 and TB 11
	L4b	TB 81 and TB 32 and TB 11
NOTE T containment level barriers might be used in a temporary manner or on roads with very low traffic speed. However, is recommended that permanent safety barriers should have at least an N containment level.		

When there is compliance with a containment level, other containments can be considered to be included, according to Table 2.

Table 2 — Containment levels including other containment levels

Included containment level	Containment level														
	T1	T2	T3	N1	N2	H1	L1	H2	L2	H3	L3	H4a	L4a	H4b	L4b
T1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
T2	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X
T3	-	-	X	-	-	X	X	X	X	X	X	X	X	X	X
N1	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X
N2	-	-	-	-	X	-	X	-	X	-	X	-	X	-	X
H1	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X
L1	-	-	-	-	-	-	X	-	X	-	X	-	X	-	X
H2	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X
L2	-	-	-	-	-	-	-	-	X	-	X	-	X	-	X
H3	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X
L3	-	-	-	-	-	-	-	-	-	-	X	-	X	-	X
H4a	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-
L4a	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-
H4b	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X
L4b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X

NOTE Class N2 is not contained in classes H, but it is in classes L which require same high level car impact test.

"X" Containment level included

"-" Containment level not included

4.1.1.3 Impact severity level

Impact severity indexes are defined in EN 1317-1:2010, subclause 8.1

When tested in accordance with 5.1.1.3, the results shall comply with Table 3 and both levels and real measured values shall be given.

Table 3 — Impact severity levels

Impact severity level		Acceptance criteria: Index values		
A	Low severity	ASI ≤ 1,0	And	0 ≤ THIV ≤ 33 km/h
B	Medium severity	ASI ≤ 1,4		
C	High severity	ASI ≤ 1,9		

The impact severity assessment indices ASI and THIV, as defined in EN 1317-1:2010, apply to cars only, as defined in EN 1317-1:2010, Table 1.

The impact severity level assigned on the basis of a series of tests shall be the most severe level obtained from that series of tests.

4.1.1.4 Deformation of the safety barrier

The deformation of safety barriers during impact tests is characterised by:

— normalized dynamic deflection for containment test,

— normalized working widths,

— normalized vehicle intrusion for containment test.

When tested in accordance with 5.1.1.4, the results shall comply with Tables 4 and 5 and 6. If a TB 11 test is carried on results shall comply with Table 5. The normalized values shall be given together with the class.

Table 4 — Levels of normalized working width for containment test

Levels of normalized working width (containment test)	Values of normalized working width (m)
W1	$W_N \leq 0,6$
W2	$W_N \leq 0,8$
W3	$W_N \leq 1,0$
W4	$W_N \leq 1,3$
W5	$W_N \leq 1,7$
W6	$W_N \leq 2,1$
W7	$W_N \leq 2,5$
W8	$W_N \leq 3,5$

Table 5 — Levels of normalized working width for TB 11 Impact

Levels of normalized working width for TB 11 impact	Values of normalized working width (m)
WP1	$WP_N \leq 0,6$
WP2	$WP_N \leq 0,8$
WP3	$WP_N \leq 1,0$
WP4	$WP_N \leq 1,3$
WP5	$WP_N \leq 1,7$
WP6	$WP_N \leq 2,1$
WP7	$WP_N \leq 2,5$
WP8	$WP_N \leq 3,5$