SLOVENSKI STANDARD
SIST EN 1317-2:2010

01-december-2010

Nadomešča:
SIST EN 1317-2:1999
SIST EN 1317-2:1999/A1:2006

Oprema cest - 2. del: Razredi uporabnosti, merila sprejemljivosti pri preskusnih trčenjih in preskusne metode za varnostne ograje

Road restraint systems - Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers including vehicle parapets

Rückhaltesysteme an Straßen - Teil 2: Leistungsklassen, Abnahmekriterien für Anprallprüfungen und Prüfverfahren für Schutzeinrichtungen und Fahrzeugbrüstungen

Dispositifs de retenue routiers - Partie 2: Classes de performance, critères d'acceptation des essais de choc et méthodes d'essai pour les barrières de sécurité incluant les barrières de bord d'ouvrage d'art

Ta slovenski standard je istoveten z: **EN 1317-2:2010**

ICS:

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

SIST EN 1317-2:2010 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1317-2

July 2010

ICS 13.200; 93.080.30

Supersedes EN 1317-2:1998

English Version

Road restraint systems - Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers including vehicle parapets

Dispositifs de retenue routiers - Partie 2: Classes de performance, critères d'acceptation des essais de choc et méthodes d'essai pour les barrières de sécurité incluant les barrières de bord d'ouvrage d'art

Rückhaltesysteme an Straßen - Teil 2: Leistungsklassen, Abnahmekriterien für Anprallprüfungen und Prüfverfahren für Schutzeinrichtungen und Fahrzeugbrüstungen

This European Standard was approved by CEN on 29 April 2010.

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 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 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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword

This document (EN 1317-2:2010) 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 January 2011, and conflicting national standards shall be withdrawn at the latest by January 2011.

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

This document supersedes EN 1317-2:1998.

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).

EN 1317 consists of the following parts:

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

— EN 1317-2, *Road restraint systems — Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers including vehicle parapets*;

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

— ENV 1317-4, *Road restraint systems — Part 4: Performance classes, impact test acceptance criteria and test methods for terminals and transitions of safety barriers*;

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

— EN 1317-5, *Road restraint systems — Part 5: Product requirements and evaluation of conformity for vehicle restraint systems*;

— prEN 1317-6, *Road restraint systems — Pedestrian restraint systems — Part 6: Pedestrian Parapet* (under preparation);

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

— prEN 1317-8, *Road restraint systems — Part 8: Motorcycle road restraint systems which reduce the impact severity of motorcyclist collisions with safety barriers* (under preparation).

Annex A is normative and Annex B is informative.

The significant technical changes incorporated in this revision are:

3.2 Containment levels

In Table 2 the new containment classes L1, L2, L3, L4a and L4b have been added, requiring the same tests of the corresponding H classes plus the test TB 32.

3.3 Impact severity

The requirement for the index PHD (Post impact Head Deceleration) has been cancelled. Only ASI and THIV are required.

3.5 Deformation of the restraint system

New requirement on the accuracy of measurement of Dynamic Deflection and Working Width:

The accuracy required for the measurement of the dynamic deflection and for the working width shall be 10 % but not less than 0,1 m.

New definition of vehicle intrusion (VI).

New definitions of Normalised Dynamic Deflection D_N, Normalised Working Width W_N and Normalised Vehicle Intrusion VI_N.

Table 4 – Levels of working width based on the normalised values

Table 5 – Levels of normalised vehicle intrusion (new item)

4 Impact test acceptance criteria

Table 6 – Safety barrier test parameters includes containment levels L

4.2 Safety barrier including parapet behaviour

The first two sentences of the paragraph in the 1998 text:

The safety barrier shall contain and redirect the vehicle without complete breakage of the principal longitudinal elements of the system.

No major part of the safety barrier shall become totally detached or present an undue hazard to other traffic, pedestrians or personnel in a work zone.

are replaced by:

The safety barrier including parapet shall contain the vehicle without complete breakage of any of the principal longitudinal elements of the system.

All totally detached parts of the safety barrier with a mass greater than 2,0 kg shall be identified, located and recorded in the test report with their size.

4.3 Test vehicle behaviour

The first two sentences of the paragraph in the 1998 text:

The centre of gravity of the vehicle shall not cross the centreline of the deformed system.

The vehicle shall remain upright during and after impact, although moderate rolling, pitching and yawing are acceptable.

are replaced by:

During and after the impact, no more than one of the wheels of the vehicle shall completely pass over or under the safety barrier.

The vehicle shall not roll over (including rollover of the vehicle onto its side) during or after impact.

For tests with HGVs and buses, not more than 5 % of the mass of the ballast shall become detached or be spilt during the test up to the time when the wheel tracks of the vehicle leaves the exit box.

4.4 Severity Index

The requirement for the index PHD (Post impact Head Deceleration) has been cancelled. Only ASI and THIV are required.

4.7 Tests for system type tested safety barriers (Families of barriers)

New specifications for families of barriers.

5 Test methods

The specifications of 5.1 "Test Site" and 5.2 "Test Vehicles" are moved to Part 1.

5.3.2 Installation

This subclause has been entirely revised with detailed requirements on the test length, end anchorages, pretensioned systems and infilling of vehicle pedestrian parapets.

5.3.3 Position of the impact point

New requirement:

If the test house chooses an impact point other than that at a point about one third of the installation length, in order to ensure worst-case conditions, then this choice shall be justified in the test report.

5.5 Vehicle instrumentation

The specifications of 5.5 are moved to Part 1.

5.6 Photographic coverage

New requirement:

Normal speed cameras shall be operated at a minimum of 24 frames per second.

Annex A – Detailed Test Report Template

New normative item.

Annex B – Criteria for sufficient test length evaluation

New informative item on a possible criterion to evaluate the adequacy of the length of the test installation.

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

Introduction

This European Standard is a revision of EN 1317-2:1998. This standard includes improved impact test procedures and allows for the introduction of Families of Products and a report template.

In order to improve safety the design of roads may require the installation of safety barriers including vehicle parapets which are intended to contain errant vehicles safely for the benefit of the occupants and other road users on sections of road and at particular locations defined by the national or local authorities.

In this standard, several levels of performance are given for the three main criteria relating to the restraint of a road vehicle:

— The containment level;

— The impact severity levels;

— The deformation as expressed by the working width and vehicle intrusion (including normalised values).

The different performance levels of safety barriers including vehicle parapets will enable national and local authorities to specify the performance class of the system to be deployed.

The description of a safety barrier including vehicle parapet system conforming to this standard incorporates the relevant classes and performance levels of the product.

To ensure satisfactory product design it is highly recommended to consider the requirements of this standard and the references in Clause 2, together with the requirements of EN 1317-1. The evaluation of conformity and the durability should meet the requirements of EN 1317-5.

1 Scope

This European Standard specifies requirements on impact performance of safety barriers, including vehicle parapets, classes of containment, working width, vehicle intrusion and impact severity levels.

NOTE This European Standard should be read in conjunction with EN 1317-1. Both these standards support EN 1317-5.

The modifications included in standard are not a change of test criteria, in the sense of the EN 1317-5:2007+A1:2008, ZA.3.

2 Normative references

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

prEN 1317-6, *Road restraint systems — Pedestrian restraint systems — Part 6: Pedestrian Parapet*

3 Performance classes

3.1 General

Safety barriers including vehicle parapets shall conform to the requirements of 3.2, 3.3 and 3.5 when tested in accordance with impact test criteria defined in Table 1.

Vehicle specifications and deviations shall conform to EN 1317-1.

Table 1 — Vehicle impact test descriptions

Test	Impact speed km/h	Impact angle °	Total mass kg	Type of vehicle
TB 11	100	20	900	Car
TB 21	80	8	1 300	Car
TB 22	80	15	1 300	Car
TB 31	80	20	1 500	Car
TB 32	110	20	1 500	Car
TB 41	70	8	10 000	Rigid HGV
TB 42	70	15	10 000	Rigid HGV
TB 51	70	20	13 000	Bus
TB 61	80	20	16 000	Rigid HGV
TB 71	65	20	30 000	Rigid HGV
TB 81	65	20	38 000	Articulated HGV

3.2 Containment levels

The containment levels of safety barriers including vehicle parapets shall conform to the requirements of Table 2 when tested in accordance with the vehicle impact test criteria defined in Table 1.

Table 2 — Containment levels

Containment levels		Acceptance test
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
Higher containment	H1	TB 42 and TB 11
	L1	TB 42 and TB32 and TB 11
	H2	TB 51 and TB 11
	L2	TB 51 and TB32 and TB 11
	H3	TB 61 and TB 11
	L3	TB 61 and TB32 and TB 11
Very high containment	H4a H4b	TB 71 and TB 11 TB 81 and TB 11
	L4a L4b	TB 71 and TB32 and TB 11 TB 81 and TB32 and TB 11

NOTE 1 Low angle containment levels are intended to be used only for temporary safety barriers. Temporary safety barriers can also be tested for higher levels of containment.

NOTE 2 A successfully tested barrier at a given containment level should be considered as having met the containment requirements of any lower level, except that N1 and N2 do not include T3, H-Levels do not include L-Levels and that H1, ..., H4b do not include N2.

NOTE 3 Because testing and development for very high containment safety barriers in different countries has taken place using significantly different types of heavy vehicles, both tests TB 71 and TB 81 are included in the standard at present. The two containment levels H4a and H4b should not be regarded as equivalent and no hierarchy is given between them. The same holds for the two containment levels L4a and L4b.

NOTE 4 The performance of Containment Classes L is enhanced in respect to the corresponding H classes by the addition of Test TB 32.

The evaluation of a vehicle restraint system within the range of containment levels T3, N2, H1, H2, H3, H4a, H4b, L1, L2, L3, L4a and L4b shall require the carrying out of different tests:

a) A test according to the maximum level of containment for that particular system; and

b) Test(s) using cars in order to verify that satisfactory containment of the maximum level is also compatible with safety for a range of cars.

3.3 Impact severity

The evaluation of vehicle occupant impact severity assessment indices ASI and THIV shall be carried out for cars. For cars ASI and THIV shall conform to the requirements of Table 3.

These indices are defined in EN 1317-1:2010.

As a function of the value of the ASI and THIV indices, three impact severity classes A, B and C are defined in Table 3.

Impact severity level A affords a greater level of safety for the occupant of an errant car than level B, and level B greater than level C.

Test measures, appropriately adjusted in accordance with EN 1317-1:2010, 6.3, shall be directly compared to the values in Table 3.

Table 3 — Impact severity levels

Impact severity level	Index values		
A	ASI ≤ 1,0	and	THIV ≤ 33 km/h
B	ASI ≤ 1,4		
C	ASI ≤ 1,9		

3.4 Location of the ATD

The ATD, when required by EN 1317-1, shall be located in the front seat of the car on the impact side and secured by means of the vehicle seat belt.

3.5 Deformation of the restraint system

The deformation of safety barriers during impact tests is characterised by the dynamic deflection, working width and vehicle intrusion (see Figure 1).

The accuracy required for the measurement of the dynamic deflection and for the working width shall be 10 % but not less than 0,1 m.

The measurement shall be recorded in metres (m) to at least two decimal places and reported to one decimal place by mathematical rounding, i.e. 0,64 = 0,6; 0,65 = 0,7.

The rounded value of the working width shall not be allowed to become smaller than the real width of the safety barrier. In this case the value shall to be rounded up; e.g. System width = 0,63 m, $W_{normalized}$ = 0,64 m, then $W_{rounded}$ = 0,7 m.

The dynamic deflection (D_m) shall be the maximum lateral dynamic displacement of any point of the traffic face of the restraint system.

The working width (W_m) is the maximum lateral distance between any part of the barrier on the undeformed traffic side and the maximum dynamic position of any part of the barrier. If the vehicle body deforms around the road vehicle restraint system so that the latter cannot be used for the purpose of measuring the working width, the maximum lateral position of any part of the vehicle shall be taken as an alternative (see Figure 1, d)).

The vehicle intrusion (VI_m) of the Heavy Goods Vehicle (HGV) is its maximum dynamic lateral position from the undeformed traffic side of the barrier; it shall be evaluated from high speed photographic or video recordings, in consideration of a notional load having the width and length of the vehicle platform and a total height of 4 m. The VI_m shall be evaluated by measuring the position and angle of the vehicle platform and assuming the notional load stays undeformed and rectangular to the vehicle platform or by using test vehicles with the notional load.

The vehicle intrusion (VI_m) of a bus is its maximum dynamic lateral position; it shall be evaluated from high speed photographic or video recordings.

The deformation of the restraint system shall be classified in accordance with Tables 4 and 5.

The actual and normalised values of dynamic deflection, working width and vehicle intrusion shall be measured and recorded in the test report.

Normalised Dynamic Deflection (D_N) in metres (m) = $D_m \times \sqrt{\frac{M_t \times (V_t \times \sin\alpha_t)^2}{M_m \times (V_m \times \sin\alpha_m)^2}}$

Normalised Working Width (W_N) in metres (m) = $W_U + \left[(W_m - W_U) \times \sqrt{\frac{M_t \times (V_t \times \sin\alpha_t)^2}{M_m \times (V_m \times \sin\alpha_m)^2}} \right]$

Normalised Vehicle Intrusion (VI_N) in metres (m) = $VI_m \times \sqrt{\frac{M_t \times (V_t \times \sin\alpha_t)^2}{M_m \times (V_m \times \sin\alpha_m)^2}}$

where

Measured maximum Dynamic Deflection in metres (m) = D_m;
Measured Working Width in metres (m) = W_m;
Undeformed width of the system = W_u;
Measure Vehicle Intrusion in metres (m) = VI_m;

Specified Total Mass in kilograms (kg) = M_t;
Specified Velocity in metres per second (m/s) = V_t;
Specified Angle in degrees (°) = α_t;
} See Table 1.

Measured Total Mass in kilograms (kg) = M_m;
Measured Velocity in metres per second (m/s) = V_m;
Measured Angle in degrees (°) = α_m.

With the above procedure, the Normalised Dynamic Deflection and Normalised Working Width shall be computed from measured data, or from other test data recorded during tests performed before the publication of the present standard, provided the data collection methods conform to the requirements of this standard.

Likewise, Vehicle Intrusion shall be evaluated, from high speed photographic or video recordings, and then normalised using measured data.

The accuracy required for the evaluation of Vehicle Intrusion shall be ± 0,2 m.