
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

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

Dispositifs de retenue routiers - Partie 2: Classes de performance, criteres d'acceptation des essais de choc et méthodes d'essai pour les barrieres de sécurité

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This European Standard was approved by CEN on 5 March 1998.

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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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 226 "Road equipment", the secretariat of which is held by AFNOR.

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 : Crash cushions - Performance classes, impact test acceptance criteria and test methods for crash cushions ;

The following Parts are not yet available but in course of preparation :

- Part 4 : Impact tests acceptance criteria and test methods for terminals and transitions of safety barriers ;
- Part 5 : Durability criteria and evaluation of conformity ;
- Part 6 : Pedestrian road restraint system.

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of an identical text or by endorsement, at the latest by October 1998, and conflicting national standards shall be withdrawn at the latest by October 1998.

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

Introduction

In order to improve safety the design of roads may require the installation of safety barriers which are intended to contain and redirect errant vehicles safely for the benefit of the occupants and other road users on certain sections of road and at particular locations.

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 i.e. T1, T2, etc. ;
- the impact severity levels i.e. A and B ;
- the deformation as expressed by the working width i.e. W1, W2, etc.

The different performance levels of safety barriers will enable national and Local Authorities to specify the performance class of a safety barrier to be deployed. Factors to be taken into consideration include the class or type road, its location, geometrical layout, the existence of a vulnerable structure, potentially hazardous area or object adjacent to the road.

The description of a safety barrier system conforming into this Standard incorporates the relevant classes and performance levels of the product.

To ensure satisfactory product design it is imperative to consider the requirements of this standard and the references in clause 2, together with the requirement of EN 1317-1. Quality of manufacture, installation and durability all contribute to this fulfilment of the important safety criteria that have to be considered in the application of these systems.

This standard provides a common basis for vehicle impact test data collection and the collation of relevant European studies and research with a view to improving future specifications and reviewing of the measurement of impact severity.

1 Scope

This European Standard specifies requirements for the impact performance of safety barriers including vehicle parapets. It defines performance classes for different containment levels, acceptance criteria for impact tests and test methods.

The provisions of this standard apply to systems of which the containment function is the unique purpose of the system. These provisions apply also to systems of which the containment function is an additional purpose of such systems, for example noise barriers and signalling equipment.

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 1317-1 Road restraint systems - Part 1 : Terminology and general criteria for test methods
- ISO 6487 Road vehicles - Measurement techniques in impact tests - Instrumentation
- ISO 10 392 Road vehicles with two axles - Determination of centre of gravity

3 Performance classes

3.1 General

Safety barriers shall conform to the requirements of 3.2, 3.3 and 3.4 when tested in accordance with impact test criteria defined in table 1.

NOTE : These requirements include several levels of performance that permit selection of a containment system adapted to suit the traffic conditions and the geometrical characteristics of the road under consideration.

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

Table 1 : Vehicle impact test criteria

Test	Impact speed km/h	Impact angle degrees	Total vehicle 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 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
H2	TB 51 and TB 11
H3	TB 61 and TB 11
Very high containment	
H4a	TB 71 and TB 11
H4b	TB 81 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 installation at a given containment level shall be considered as having met the test condition of a lower level, except that N1 and N2 do not include T3.

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 evaluation of a vehicle restraint system within the range of containment levels T3, N2, H1, H2, H3, H4a and H4b, will require the carrying out of two different tests :

- a test according to the maximum level of containment for that particular system ; and
- a test using a light vehicle (900 kg), in order to verify that satisfactory attainment of the maximum level is also compatible with safety for a light vehicle.

3.3 Impact severity

The vehicle occupant impact severity assessment indices ASI, THIV and PHD, shall conform to the requirements of table 3.

These indices are defined in EN 1317-1.

As a function of the value of the ASI and THIV (PHD) indices, two severity levels are determined in table 3.

Table 3 : Impact severity levels

Impact severity level	Index values		
A	ASI ≤ 1,0	and	THIV ≤ 33 km/h PHD ≤ 20 g
B	ASI ≤ 1,4		
<p>NOTE 1 : Impact severity level A affords a greater level of safety for the occupants of an errant vehicle than level B and is preferred when other considerations are the same.</p> <p>NOTE 2 : At specific hazardous locations where the containment of an errant vehicle (such as a heavy goods vehicle) is the prime consideration, a vehicle restraint system with no specific impact severity level may need to be adopted and installed. The index values recorded in the test of the restraint system shall however be quoted in the test report.</p>			

3.4 Deformation of the restraint system

The deformation of safety barriers during impact tests is characterised by the dynamic deflection and by the working width (see figure 1). It is important that the deformation should be compatible with the available space or distance behind the system.

The working width (W) is the distance between the side facing the traffic before the impact of the road restraint system and the maximum dynamic lateral position of any major part of the system.

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.

During impact tests using buses and HGV, the extreme lateral position of the system and the extreme lateral position of the test vehicle shall be recorded separately in the test report.

The dynamic deflection (D) is the maximum lateral dynamic displacement of the side facing the traffic of the restraint system. For narrow restraint systems, the dynamic deflection can be difficult to measure and if such is the case, the dynamic deflection may be taken as the working width.

The deformation of the restraint system shall conform to the requirements of table 4.