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Oprema cest - 4. del: Razredi uporabnosti, merila za preskušanje ob naletu in preskusne metode za prehodne in odstranljive elemente varnostnih ograj

Road restraint systems - Part 4: Performance classes, impact test acceptance criteria and test methods for transitions and removable barrier sections

Rückhaltesysteme an Straßen - Teil 4: Leistungsklassen, Abnahmekriterien und Anprallprüfungen für Übergangskonstruktionen von Schutzeinrichtungen

Dispositifs de retenue routiers - Partie 4 : Classes de performance, critères d'acceptation des essais de choc et méthodes d'essai pour les raccordements et les sections de barrière amovibles

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English Version

Road restraint systems - Part 4: Performance classes, impact test acceptance criteria and test methods for transitions and removable barrier sections

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

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Foreword

This document (prEN 1317-4:2012) 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 will supersede ENV 1317-4:2001 for the clauses concerning transitions.

EN 1317, *Road restraint systems*, consists of the following parts:

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

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

— 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 and removable barriers sections;

— Part 5: Road restraint systems – Product requirements and evaluation of conformity for vehicle restraint systems;

— Part 6: Pedestrian restraint system – Pedestrian restraint systems – Pedestrian parapets (CEN/TR);

— Part 7: Performance classes, impact test acceptance criteria and test methods for terminals of safety barriers;

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

This part of EN 1317 is to be read in conjunction with EN 1317-1 and EN 1317-2.

Introduction

In order to improve safety, the design of roads may require the installation of safety barriers including parapets which are intended to contain and redirect 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. Problems may also arise in the connection between two different safety barriers having consistent difference in design and/or in stiffness. Transitions are required to provide a smooth and safe change from one barrier to the other.

This European Standard specifies the direction of impact, and the methods for determining the critical impact points, for the assessment of transitions.

Manufacturers may wish to modify their products following the ITT and 6.2.1.5 and Annex A of EN 1317-5:2007+A2:2012 set out the procedure to be followed.

1 Scope

This part of EN 1317 is a supporting standard to EN 1317-5 and should also be read in conjunction with EN 1317-1 and EN 1317-2.

This part of EN 1317 completes EN 1317-2 because it specifies performance for transitions, considered as the linkage between safety barriers of different types.

This European Standard specifies the direction of impact and the impact points, for the assessment of transitions and removable barrier sections. It also defines the rules to be followed in the design of transitions that cannot be CE marking.

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 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 including vehicle parapets*

EN 1317-5:2007+A2:2012, 2012, *Road restraint systems – Part 5: Product requirements and evaluation of conformity for vehicle restraint systems*

3 Abbreviations

For the purposes of this document, the following abbreviations apply.

ASI: Acceleration Severity Index

CIP: Critical Impact Point

RBS: Removable Barrier Section

THIV: Theoretical Head Impact Velocity

4 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1317-1:2010 and the following apply.

4.1
transition
connection of two safety barriers of different designs and/or performances

4.2
length of a transition
distance between the start and end points

Note 1 to entry: A transition's start and end points are located where a longitudinal barrier starts to have changes in its standard design pattern that exist over the complete length of the barrier. Such changes could be post distance spacing, additional/other elements such as spacers, different/additional beams, height, width, etc.

4.3
removable barrier section
RBS
section of barrier connected to a barrier at both ends which allows for removal and reinstallation for temporary openings, mainly used for emergency reasons or maintenance, and which, in closed position, offers containment performances

4.4
critical impact point
CIP
impact point identified to reasonably represent the worst case for testing the transition

Note 1 to entry: Critical impact points may be different from test to test.

4.5
containment test
vehicle impact test providing the highest impact momentum among tests specified for the chosen containment level

5 Containment levels

The minimum containment level of a transition shall be equal to the lower containment level of the two connected vehicle restraint systems. If this containment level is an L level, the minimum containment class required for the transition is the corresponding H level. For example, if the lower containment level is L2 the minimum level for the transition shall be H2.

6 Assessment methods

6.1 General

Transitions can be assessed with methods A, B1, B2 and B3. Only transitions assessed with method A can be considered products and can be CE marked.

The connection of two barriers having the same design, the same containment class and the same components and differing only in the post spacing does not need to be assessed, provided the difference of the working width of the two barriers is no more than one Class.

6.2 Impact direction

The direction of the impact shall be chosen to demonstrate the worst-case testing condition for the transition. In general, the direction of the impacts considered in the assessment shall be from the lower containment to the higher containment barrier. If the two barriers have the same containment level, the direction of the impacts shall be from the barrier with the larger dynamic deflection to the one with the lower deflection. If a different impact direction is chosen, this shall be justified in the test report.

6.3 Impact points

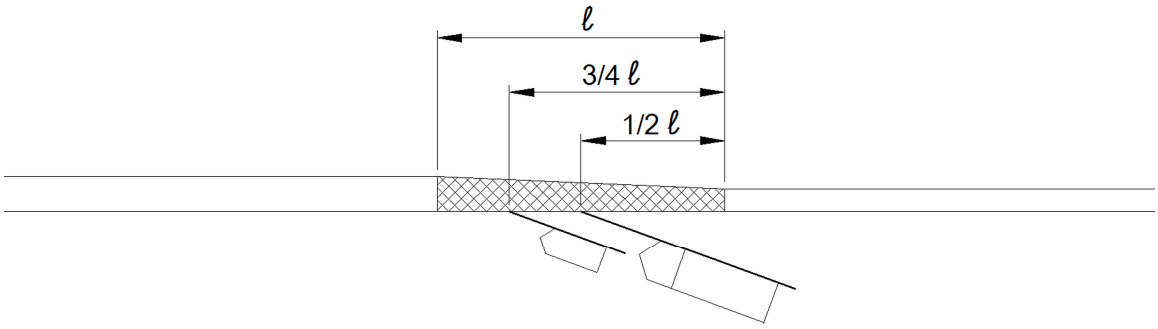
The impact points shall be chosen by the test house and shall demonstrate the worst-case testing conditions of the transition, and shall include any sensitive feature of the design. The reasons for the choice of the impact points shall be included in the test report.

6.4 Assessment method A

The transition shall be evaluated with two full-scale tests, one TB11 test and one containment test.

The direction of impact as well as the impact point shall be chosen as the most critical for each test.

As a first approach, the impact point for the light vehicle shall be at a distance of 3/4 of the length of the transition downstream the start point of the transition. The impact for the heavy vehicle shall be the midpoint of the transition.



Key

ℓ length of the transition

Figure 1 – Impact points

It is up to the test laboratory to choose different critical impact points and record its choices with justification in the test report.

6.5 Assessment method B1

The transition shall be evaluated with two simulated vehicle impact tests. Tests approaches are the same as in Assessment Method A.

The simulation model shall be validated against the full-scale test of the two barrier types connected with the transition with is under evaluation. The simulation model and the validation process shall be in accordance with EN 1317-5:2007+A2:2012, Annex L.

6.6 Assessment method B2

Assessment method B2 is applicable only if the difference between the two barriers to be connected is no more than one containment class. In this case, the design of the transition shall follow the rules specified in Annex A.

6.7 Assessment method B3

Assessment method B3 is applicable only if the difference between the two barriers to be connected is no more than two containment classes. In this case, the design of the transition shall follow the rules specified in Annex A.

7 Performances of transitions

7.1 General

The performances of transitions shall be assessed by the impacts specified in EN 1317-2 for the safety barrier, in the containment level defined in Clause 5.

7.2 Test methods

The vehicle impact tests specified in Clause 6 shall be performed in accordance with EN 1317-2. Assessment Method B1 simulations shall be validated in accordance with EN 1317-5:2007+A2:2012, Annex L.

The working width and vehicle intrusion of the transition is given by the highest measured values in all tests or simulations. The values for ASI and THIV are given by the highest values for these indices derived in all tests or simulations.

7.3 Test acceptance criteria

The test acceptance criteria for Assessment Methods A and B1 are specified in EN 1317-2.

For level A and B1, the normalized dynamic deflection shall not be larger than the larger normalized dynamic deflection of the two connected barriers. If the dynamic deflections are measured at different types of containment tests the normalized dynamic deflection shall be transferred to the containment class of the transition according to the procedure given in Annex A and the conversion factors given in Table A.1.

7.4 Length of test installation

The test installation shall include a length of the upstream barrier, the transition and a length of the downstream barrier. The length of the two barriers shall be sufficient to show the performance of longer installations. The adequacy of the installed length shall be evaluated from the result of the tests with a suitable procedure, i.e. with the procedure in EN 1317-2:2010, Annex B.

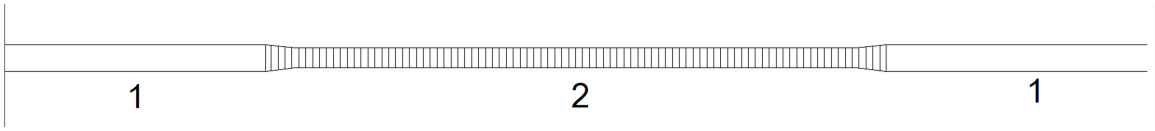
8 Removable barrier sections

8.1 General

The RBS shall be connected to the adjoining barriers and the connection shall be compliant with Annex A. Otherwise, the connection needs to be a transition and it shall comply with Clause 6.

The RBS shall be tested as specified in EN 1317-2 in the relevant containment class, connected to permanent barriers on both ends.

Figure 2 shows schematically the location of a RBS between two barriers.



Key

1 barrier

2 RBS

Figure 2 – Removable barrier sections