October 2020

DIN EN 16303

ICS 13.200; 93.080.30

Supersedes: see below

Road restraint systems – Validation and verification process for the use of virtual testing in crash testing against vehicle restraint system; English version EN 16303:2020, English translation of DIN EN 16303:2020-10

Rückhaltesysteme an Straßen –
Validierungs- und Nachweisverfahren für die Nutzung von Computersimulationen bei Anprallprüfungen an Fahrzeug-Rückhaltesysteme;
Englische Fassung EN 16303:2020,
Englische Übersetzung von DIN EN 16303:2020-10

Dispositifs de retenue routiers –
Processus de vérification et de validation pour l'utilisation d'essais virtuels dans les essais de choc contre un dispositif de retenue pour véhicules;
Version anglaise EN 16303:2020,
Traduction anglaise de DIN EN 16303:2020-10

Supersedes DIN CEN/TR 16303-1 (DIN SPEC 91103-1):2012-04, DIN CEN/TR 16303-2 (DIN SPEC 91103-2):2012-04, DIN CEN/TR 16303-3 (DIN SPEC 91103-3):2012-04 and DIN CEN/TR 16303-4 (DIN SPEC 91103-4):2012-04

Document comprises 87 pages

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original shall be considered authoritative.

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A comma is used as the decimal marker.

National foreword

This document (EN 16303:2020) has been prepared by Technical Committee CEN/TC 226 “Road equipment” (Secretariat: AFNOR, France).

The responsible German body involved in its preparation was *DIN-Normenausschuss Bauwesen* (DIN Standards Committee Building and Civil Engineering), Working Committee NA 005-10-21 AA “Road restraint systems (national mirror committee for CEN/TC 226/WG 1 and WG 10), Joint working group with FGSV”.

For current information on this document, please go to DIN’s website (www.din.de) and search for the document number in question.

Amendments

This standard differs from DIN CEN/TR 16303-1 (DIN SPEC 91103-1):2012-04, DIN CEN/TR 16303-2 (DIN SPEC 91103-2):2012-04, DIN CEN/TR 16303-3 (DIN SPEC 91103-3):2012-04 and DIN CEN/TR 16303-4 (DIN SPEC 91103-4):2012-04 as follows:

a) some symbols and abbreviations have been modified;

b) the roadmap for the validation of the numerical vehicle model has been updated and acceptance conditions have been provided;

c) the validation requirements for virtual testing against vehicle restraint systems have been updated;

d) the verification evaluation criteria for finite element model have been updated;

e) the template of the report has been updated.

Previous editions

DIN CEN/TR 16303-1 (DIN SPEC 91103-1): 2012-04
DIN CEN/TR 16303-2 (DIN SPEC 91103-2): 2012-04
DIN CEN/TR 16303-3 (DIN SPEC 91103-3): 2012-04
DIN CEN/TR 16303-4 (DIN SPEC 91103-4): 2012-04

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16303

August 2020

ICS 13.200; 93.080.30

Supersedes CEN/TR 16303-1:2012, CEN/TR 16303-2:2012, CEN/TR 16303-3:2012, CEN/TR 16303-4:2012

English Version

Road restraint systems - Validation and verification process for the use of virtual testing in crash testing against vehicle restraint system

Dispositifs de retenue routiers - Processus de vérification et de validation pour l'utilisation d'essais virtuels dans les essais de choc contre un dispositif de retenue pour véhicules

Rückhaltesysteme an Straßen - Validierungs- und Nachweisverfahren für die Nutzung von Computersimulationen bei Anprallprüfungen an Fahrzeug-Rückhaltesysteme

This European Standard was approved by CEN on 24 May 2020.

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

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

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Ref. No. EN 16303:2020 E

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European foreword

This document (EN 16303:2020) 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 February 2021, and conflicting national standards shall be withdrawn at the latest by February 2021.

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

This document supersedes CEN/TR 16303-1:2012, CEN/TR 16303-2:2012, CEN/TR 16303-3:2012 and CEN/TR 16303-4:2012 (which have been merged).

In comparison to the previous Technical Reports, this document contains the following changes:

— some symbols and abbreviations have been modified;

— the roadmap for the validation of the numerical vehicle model has been updated and acceptance conditions have been provided;

— the validation requirements for virtual testing against vehicle restraint systems have been updated;

— the verification evaluation criteria for finite element model have been updated;

— the template of the report has been updated.

Annexes A, B and C are normative and Annexes D to J are informative.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document provides a common basis for the use of virtual testing to reproduce vehicle impacts against vehicle restraint systems including safety barriers, crash cushions, terminals and passive safety devices in accordance with the EN 1317 (all parts) and the EN 12767:2019.

This document provides requirements to establish the degree to which the numerical models of vehicle restraint system and of vehicle are an accurate representation of the real world from the perspective of the intended uses of the model.

In this document a methodology is defined to validate the results obtained with computational mechanics work and to verify the reliability of the virtual test. It also includes a report template and incorporates specific content for general requirements for the competence of entities performing virtual testing.

General recommendations based on experiences for developing numerical models of vehicle restraint systems and vehicles for virtual tests are also given.

Two main modelling approaches have been considered:

— finite element (FE) method;

— multi-body (MB) approach.

1 Scope[1]

This document defines the accuracy, credibility and confidence in the results of virtual crash test to vehicle restraint systems through the definition of procedures for verification, validation and development of numerical models for roadside safety application. Finally it defines a list of indications to ensure the competences of an expert/organization in the domain of virtual testing.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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*

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

ENV 1317-4:2001, *Road restraint systems – Part 4: Performance classes, impact test acceptance criteria and test methods for terminals and transitions of safety barriers*

EN 12767:2019, *Passive safety of support structures for road equipment - Requirements and test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp/ui

3.1
independent expert
third-party qualified expert in virtual testing with experience on vehicle restraint systems and/or passive safety devices, independent from the organisation or the construction product he assesses (see Annex B)

3.2
numerical model
complete mathematical 3-D model of vehicle restraint systems, passive safety devices and vehicles

Note 1 to entry: It refers to a numerical model which might be analytical or discrete and aims to reproduce the basic physical phenomena of a subject.

3.3
passive safety device
support structures for road equipment tested according to EN 12767:2019

[1] The scope of this document is also applicable to passive safety devices.