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Railway applications - Railway rolling stock - Draw gear and screw coupling

Bahnanwendungen - Schienenfahrzeuge - Zugeinrichtung und Schraubenkupplung

Applications ferroviaires - Matériel roulant ferroviaire - Organes de traction et tendeur d'attelage

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Railway applications - Railway rolling stock - Draw gear and screw coupling

Applications ferroviaires - Matériel roulant ferroviaire
- Organes de traction et tendeur d'attelage

Bahnanwendungen - Schienenfahrzeuge -
Zugeinrichtung und Schraubenkupplung

This European Standard was approved by CEN on 8 July 2016.

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European foreword

This document (EN 15566:2016) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by March 2017, and conflicting national standards shall be withdrawn at the latest by March 2017.

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 EN 15566:2009+A1:2010.

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 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

Modifications

Compared with EN 15566:2009+A1:2010 the following main changes have been done:

- a) checking and revision of Clause 2 – Normative references;
- b) modification in Clause 3 – working capacity (3.8) was deleted and intermediate coupling system for permanent coupled wagons now defined as permanent coupling system;
- c) in Clause 4, requirements for compressive loads for draw hook and draw gear rationalised and explained;
- d) in Clause 7, the required value changed into mandatory and given in SI-Unit;
- e) changes in Annex A with respect to the implementation of the dynamic test;
 - new specification of the test load for the residual strength;
 - the macrographic and micrographic tests were added;
 - acceptance criteria were added;
 - modification in Table A.2 and A.3 (rows of survival probability and safety factor were deleted);
- f) revision of Annex E and Annex F to get a similar structure and the requirements of the raw material are defined in the new tables Table E.1 and Table F.1. The marking in Annex E and Annex F were moved into the new Annex H – Marking;
- g) revision of Annex G;
 - specification of the maximum deviation of type test to serial test;
 - revision of Table G.2;

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- h) new Annex H – Marking with the marking system for draw hook, draw gear, draw bar and screw coupling as well the new Table H.1 – Marking as summary;
- i) modification of the following figures:
- Figure 2 – Support plate;
 - Figure 3 – Draw gear;
 - Figure A.1 – Example of load cycles Step 1 and Step 2;
 - Figure E.2 – Marking of the draw hook for the tensile test;
 - Figure E.3 – Location of the test samples (item numbers);
 - Figure F.7 – Coupling link – test samples location (item numbers);
 - Figure F.8 and F.9 – Trunnion nut (item numbers);
 - shifted Figures from Annex E and Annex F to Annex H;
- j) editorial modifications.

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, 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 the United Kingdom.

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Introduction

This European Standard is based on UIC 520, UIC 825, UIC 826, UIC 827-1 and UIC 827-2.

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EN 15566:2016 (E)**1 Scope**

This standard specifies the requirements for the draw gear and screw coupling for the end of rolling stock that has to couple with other rolling stock (freight wagons, locomotives, passenger vehicles ...).

This standard covers the functionality, construction, interfaces and testing including pass/fail criteria for draw gear and screw coupling.

The standard describes three categories of classification of draw gear and screw coupling, (1 MN, 1,2 MN and 1,5 MN).

Coupling systems between permanent coupled vehicle units are not in the scope of this 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 10021, *General technical delivery conditions for steel products*

EN 10025 (all parts), *Hot rolled products of structural steels*

EN 10079, *Definition of steel products*

EN 10083 (all parts), *Steels for quenching and tempering*

EN 10168, *Steel products - Inspection documents - List of information and description*

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

EN 10228-1, *Non-destructive testing of steel forgings - Part 1: Magnetic particle inspection*

EN 10228-2, *Non-destructive testing of steel forgings - Part 2: Penetrant testing*

EN 10243 (all parts), *Steel die forgings — Tolerances on dimensions*

EN 10247, *Micrographic examination of the non-metallic inclusion content of steels using standard pictures*

EN 10308, *Non destructive testing - Ultrasonic testing of steel bars*

EN ISO 148 (all parts), *Metallic materials — Charpy pendulum impact test*

EN ISO 377, *Steel and steel products - Location and preparation of samples and test pieces for mechanical testing (ISO 377)*

EN ISO 643, *Steels - Micrographic determination of the apparent grain size (ISO 643)*

EN ISO 6506-1, *Metallic materials - Brinell hardness test - Part 1: Test method (ISO 6506-1)*

EN ISO 6892-1, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1)*

EN ISO 6892-2, *Metallic materials - Tensile testing - Part 2: Method of test at elevated temperature (ISO 6892-2)*

EN ISO 9606-1, *Qualification testing of welders - Fusion welding - Part 1: Steels (ISO 9606-1 including Cor 1)*

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 813, *Rubber, vulcanized or thermoplastic — Determination of adhesion to a rigid substrate — 90 degree peel method*

ISO 815-1, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 1: At ambient or elevated temperatures*

ISO 815-2, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 2: At low temperatures*

ISO 4967, *Steel — Determination of content of non-metallic inclusions — Micrographic method using standard diagrams*

ISO 4968, *Steel — Macrographic examination by sulfur print (Baumann method)*

ISO 7619-1, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1: Durometer method (Shore hardness)*

3 Terms and definitions

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

3.1

screw coupling system

system to connect two railway vehicles consisting of draw gear, draw hook and screw coupling

Note 1 to entry: The screw coupling system defined in this document is also designated UIC coupling.

3.2

draw gear

system consisting of an assembly of mechanical parts and absorber fixed on the railway vehicle which is able to work in traction

Note 1 to entry: A representative drawing is given in Figure 3.

3.3

draw hook

mechanical part to transfer forces between draw gear and screw coupling

Note 1 to entry: Definition in EN 15020 “Rescue coupler”: part of a conventional and mechanical manual coupling, also known as UIC draw hook.

3.4

screw coupling

mechanical system to connect to the draw hook of the adjacent railway vehicle including length adjustment

3.5

Standard screw coupling

1 MN screw coupling defined on ERRI standard drawings 100M 3220 0001 and 100M 3220 0002 [16].

3.6

stored energy

W_e

energy (W_e) stored by the draw gear for a given elasticity stroke

Note 1 to entry: It is represented, on the force-stroke diagram, by the hatched area lying between the compressive curve, the axis of the abscissa and the straight line, perpendicular to the axis, corresponding to the stroke under consideration (see Figure 1 a).

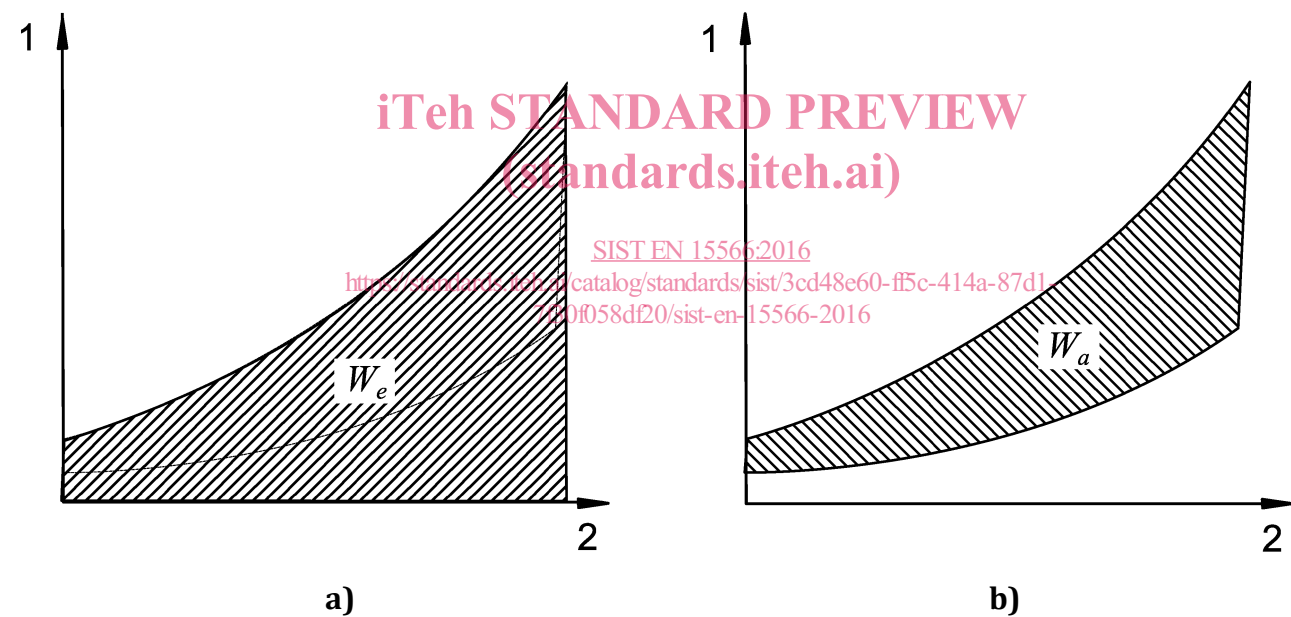
3.7

absorbed energy

W_a

energy (W_a) absorbed by the draw gear for a given elasticity stroke

Note 1 to entry: It is represented, on the force-stroke diagram, by the hatched area lying between the compressive curve and the return curve (see Figure 1 b)).

**Key**

1	force in kN
2	stroke in mm
	stored energy W_e in kJ
	absorbed energy W_a in kJ

Figure 1 — Force-stroke diagram for stored and absorbed energy

3.8

damping

d

ratio of absorbed energy divided by stored energy

Note 1 to entry: It is calculated using the following equation:

$$d_{\%} = \frac{W_a}{W_e} \cdot 100 \%$$

where:

$d_{\%}$ is the damping, in %;

W_a is the absorbed energy, in kJ;

W_e is the stored energy, in kJ.

3.9

minimum breaking load

minimum traction force which may lead to mechanical breaking

3.10

technical specification

document describing specific parameters and/or product requirements as an addition to the requirements of this standard

4 Requirements for all types of draw gear and screw coupling

4.1 Classification and designation

Coupling systems are classified according to their minimum breaking load as specified in Table 1.

Table 1 — Classification of coupling by designation of the minimum breaking load

Coupling system designation	Minimum breaking load of the screw coupling MN	Maximum breaking load of the screw coupling MN	Minimum breaking load in traction of the draw gear and draw hook MN
1 MN	0,85	0,98	1,0
1,2 MN	1,02	1,18	1,2
1,5 MN	1,35	1,48	1,5

In case of longitudinal overloading the breaking point of the screw coupling system shall be either the screw or the link of the screw coupling.

NOTE 1 The combination of a screw coupling with draw hooks and/or draw gear with higher breaking loads is possible. The screw coupling system designation is defined by the screw coupling.

Any draw gear and any draw hook shall sustain a 0,05 MN compressive load. Draw gear and draw hook for locomotives shall sustain a 0,3 MN compressive load.

NOTE 2 These compressive loads are needed for shunting operation and rescue operations.

4.2 Interaction coupling/buffer

To ensure that the train is able to negotiate curves at 150 m radius safely, the static characteristics of draw gears and buffers should be coordinated.

In order to meet this requirement for vehicles, a guideline value of 250 kN should not be exceeded for the compression force of a pair of buffers in contact in a curve of 150 m.