



**SLOVENSKI STANDARD**  
**SIST EN 15566:2009+A1:2010**  
**01-december-2010**

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**Železniške naprave - Železniška vozila - Vlečna naprava in vijačna spenjača**

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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**ICS:**

45.060.10      Vlečna vozila                      Tractive stock

**SIST EN 15566:2009+A1:2010**                      **en,fr,de**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 15566:2009+A1**

November 2010

ICS 45.060.01

Supersedes EN 15566:2009

English Version

## 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

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## Foreword

This document (EN 15566:2009+A1:2010) 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of an identical text or by endorsement, at the latest by May 2011, and conflicting national standards shall be withdrawn at the latest by May 2011.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 includes Amendment 1, approved by CEN on 2010-09-28.

This document supersedes EN 15566:2009.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

A1 This document has been prepared under a mandate given to CEN/CENELEC/ETSI 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. A1

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 United Kingdom.

## Introduction

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

## 1 Scope

This standard specifies the requirement of the draw gear and screw coupling for the end rolling stock which have to couple with other interoperable rolling stock (freight wagons, locomotives, passenger vehicles ...).

This standard covers the functionality construction, interfaces, 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).

## 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 287-1, *Qualification test of welders — Fusion welding — Part 1: Steels*

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EN 10002-1, *Metallic materials — Tensile testing — Part 1: Method of test at ambient temperature*

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EN 10021, *General technical delivery conditions for steel products*

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

EN 10045-1, *Metallic materials — Charpy impact test — Part 1: Test method*

EN 10079, *Definition of steel products*

EN 10083-1, *Steels for quenching and tempering — Part 1: General technical delivery conditions*

EN 10083-2, *Steels for quenching and tempering — Part 2: Technical delivery conditions for non alloy steels*

EN 10083-3, *Steels for quenching and tempering — Part 3: Technical delivery conditions for alloy steels*

EN 10204:2004, *Metallic products — Types of inspection documents*

EN 10228-3, *Non-destructive testing of steel forgings — Part 3: Ultrasonic testing of ferritic or martensitic steel forgings*

EN ISO 377, *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing (ISO 377:1997)*

EN ISO 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003)*

EN ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1:2005)*



EN ISO 7438, *Metallic materials — Bend test (ISO 7438:2005)*

EN ISO 9001:2000, *Quality management systems — Requirements (ISO 9001:2000)*

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

### 3 Terms and definitions

For the purposes of this European Standard, 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

#### 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 A representative drawing is given in Figure 3.

#### 3.3

##### **draft gear**

system consisting of an assembly of mechanical parts and absorber fixed on the railway vehicle which is able to work in compression and traction (push-pull)

NOTE 1 It is not a part of this standard.

NOTE 2 Freight wagons with draft gear are considered as freight wagons with draw gear, if they fulfil the specified characteristic conditions in this standard including interface to draw-hook.

#### 3.4

##### **draw hook**

mechanical part to transfer forces between draw gear and screw coupling

NOTE Definition in EN 15020 "Rescue coupler": part of a conventional and mechanical manual coupling, also known as UIC draw hook.

#### 3.5

##### **screw coupling**

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

## EN 15566:2009+A1:2010 (E)

### 3.6 stored energy

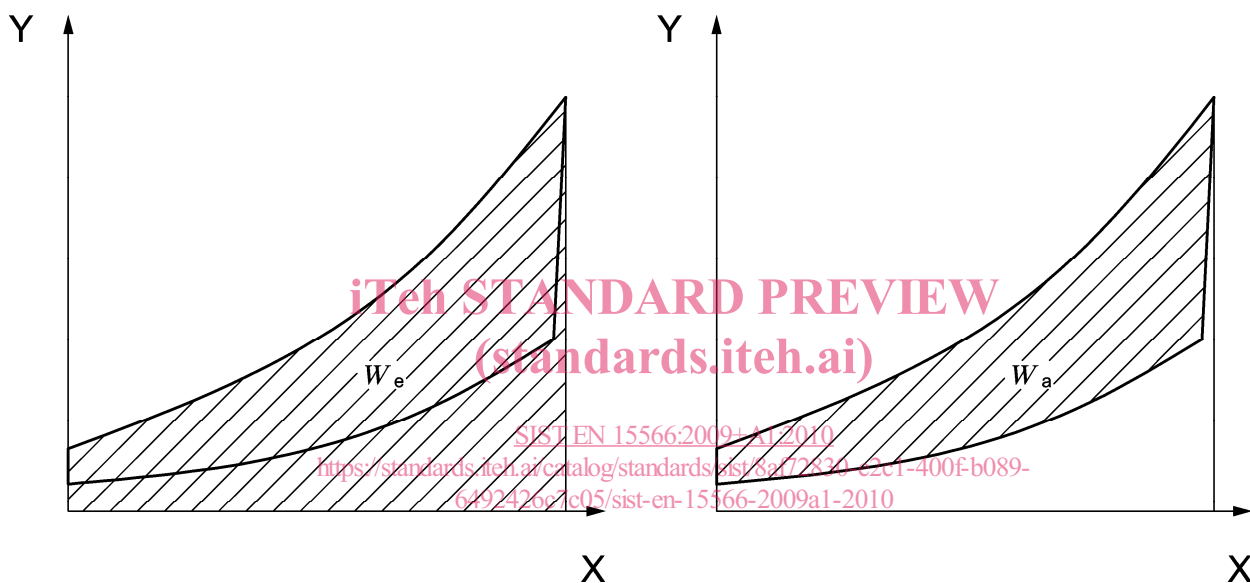
$W_e$   
energy ( $W_e$ ) stored by the draw gear for a given elasticity stroke

NOTE It is represented, on the force-stroke diagram, by the 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)

### 3.7 absorbed energy

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

NOTE It is represented, on the force-stroke diagram, by the area lying between the compressive curve and the return curve (see Figure 1)



#### Key:

Y force in kN

X stroke in mm

$W_e$  stored energy in kJ

$W_a$  absorbed energy in kJ

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

### 3.8 working capacity

stored energy under test conditions

### 3.9 damping

$A$   
ratio of absorbed energy divided by stored energy

NOTE It is calculated using the following equation:

$$A = \frac{W_a}{W_e} \times 100$$

where:

$A$  is the damping;

$W_a$  is the absorbed energy;

$W_e$  is the stored energy.

### 3.10

#### minimum breaking load

minimum load which may lead to mechanical failure

## 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 minimal breaking load

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

The coupling links shall be designed to break first in case of overloading.

For shunting operations, the draw gear shall allow a 0,05 MN compressive load on the draw hook.

For rescue operations, the draw gear of locomotives shall allow a 0,3 MN compressive load on the draw hook.

### 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.

NOTE Refer to prEN 15839 for details.

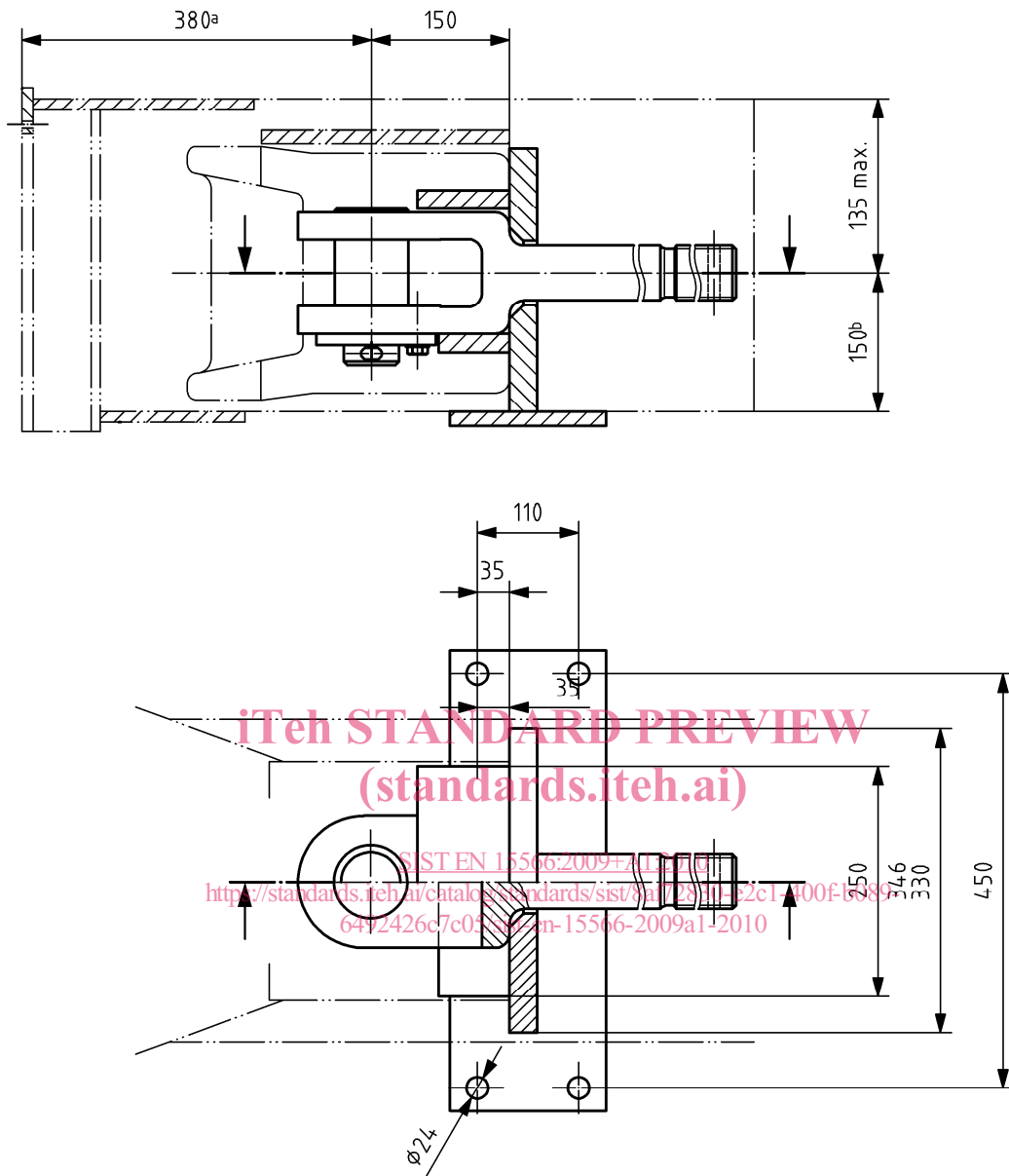
### 4.3 Interface dimension for freight wagons

Support plate interface dimensions for fixing of draw gear on freight wagons are defined in Figure 2.

NOTE For other railway vehicles, the arrangement could be different.

Draw gear assemblies shall be interchangeable. The interchangeability only applies to complete draw gear assemblies, not to single draw gear parts.

Dimensions in millimetres

**Key**

- a distance to the buffer fixing plate
- b 140 mm for mounting the draw gear from the front of the headstock

**Figure 2 — Support plate - Interface dimension for freight wagons**

NOTE The centreline of the draw gear (screw coupling) is also the centreline of the automatic coupler.

**4.4 Life time**

Draw gears (excluded elastic device), draw hooks, and screw coupling shall be designed for a life time of 30 years. 20 years could be agreed on customer request.

The table shows range of forces and number of cycles to be applied for the dynamic type test.

Table 3 — Condition of dynamic tests

Operational requirements			Range of forces to be applied		
Lifecycle in years	Survival probability %	Safety factor $f_N$	Designation	Step 1	Step 2
			1MN	$\Delta F1=200$ kN	$\Delta F2=675$ kN
			1,2 MN	$\Delta F1=240$ kN	$\Delta F2=810$ kN
			1,5 MN	$\Delta F1=300$ kN	$\Delta F2=1015$ kN
				N1 in cycles	N2 in cycles
20	97,5	1,7	All	$10^6$	$1,45 \times 10^3$
30	97,5	1,7	All	$1,5 \times 10^6$	$2,15 \times 10^3$

The dynamic tests have to be carried out on 3 draw gears without elastic device. The 3 samples all have to endure the tests without showing any damage. They shall not show any cracks and the tensile strength shall not drop below 1 000 kN.

NOTE ERRI Report B51/RP 27 describes one possible way testing all force transferring components of a draw gear including the assembled draw gear, draw hook and screw coupler.

## 5 Draw gear

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### 5.1 Draw gear components (standards.iteh.ai)

Draw gear assembly see Figure 3.

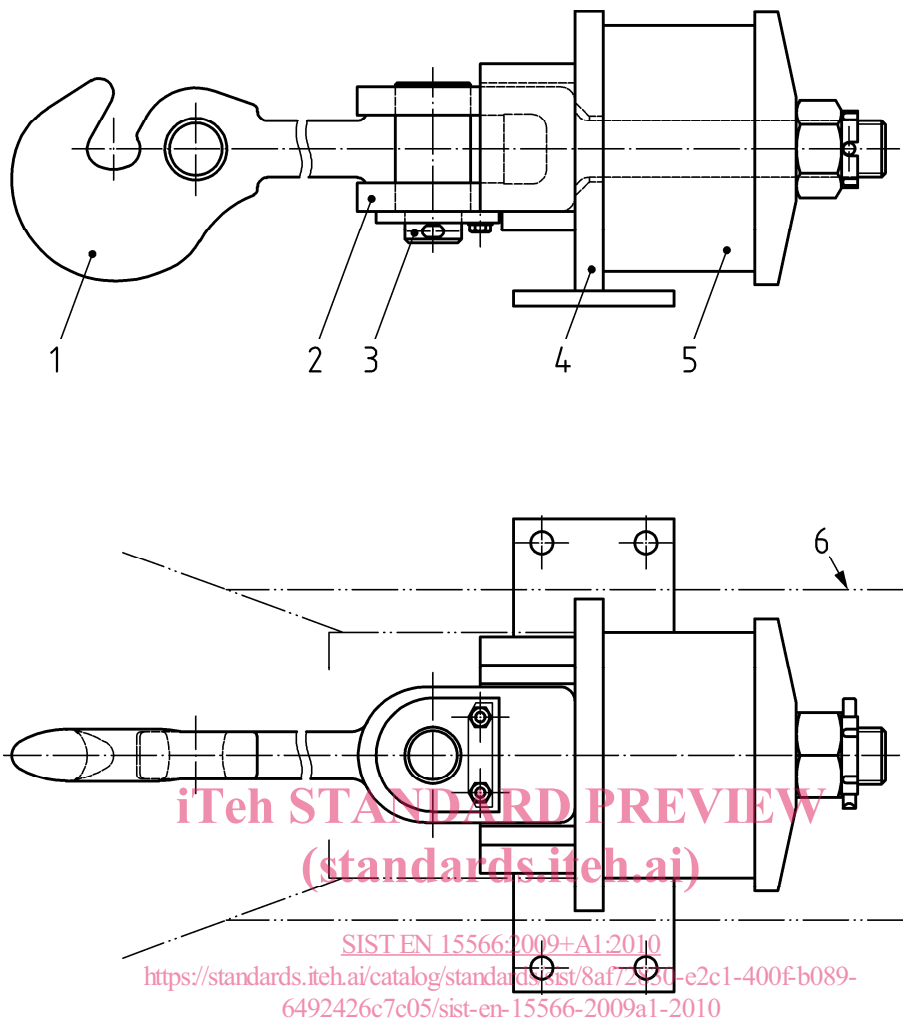
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The interface dimensions of the draw gear are given in Annex A and Annex B.

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Components of a standard draw gear are:

- Draw hook see Figure A.1
- Drawbar interface dimensions see Figure B.1
- Joint pin interface dimensions see Figure B.2
- Elastic device see 7
- Support plate see Figure 2

**Key**

- 1 Draw hook
- 2 Drawbar
- 3 Joint pin
- 4 Support plate
- 5 Elastic device
- 6 Underframe

**Figure 3 —Draw gear - Assembly****5.2 Draw hook and drawbar – Requirements**

Requirements are defined in Annex D.

**6 Screw coupling****6.1 General requirements**

The mass of the screw coupling shall not exceed 36 kg.

The coupling length measured from inside the loop of the coupling link to the joint pin of the coupling screw and draw hook shall comply with the following conditions:

$(986^{+10}_{-5})$  mm for the fully loosened coupling,

$(750 \pm 10)$  mm for the fully tightened coupling.

For the 1 MN coupling, all the component parts of the screw coupling shall be interchangeable.

Coupling with higher minimum breaking load shall have same functional dimensions in order to assure a same interface with the rolling stock.

The screw coupler assembly for standard screw coupling with non-loosening hinged ball handle shall be as shown in Figure 4.

The screw coupler assembly for Standard screw coupling with hinged handle with non-loosening upper rest shall be as shown in Figure 5.

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