INTERNATIONAL STANDARD

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Commercial road vehicles — Fifth wheel couplings — Strength tests

Véhicules routiers utilitaires — Sellette d'attelage — Essais de résistance

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

International Standard ISO 8717 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 15, *Interchangeability of components of commercial vehicles and buses*.

This second edition cancels and replaces the first edition (ISO 8717:1988), which has been technically revised.

Annex A forms a normative part of this International Standard.

Commercial road vehicles — Fifth wheel couplings — Strength tests

1 Scope

This International Standard specifies the test conditions and strength requirements to be met by 50 and 90 fifth wheel couplings (see ISO 3842).

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 1176, *Road vehicles — Masses — Vocabulary and codes*.

ISO 3842, *Road vehicles — Fifth wheels — Interchangeability*.

3 General test requirements

3.1 The strength tests described in clause 5 are static and dynamic tests which shall be performed on a test bed. Special requirements for fifth wheels intended for forced semi-trailer axle steering (through a steering wedge) are specified in annex A.

3.2 The fixing arrangements for the fifth wheel on the test bed shall be those intended for its attachment to the towing vehicle in accordance with the coupling manufacturer's fitting instructions.

3.3 At the discretion of the manufacturer, any flexible components may be neutralized.

4 Determination of D-value

The D-value is a comparative value determined by calculation for the longitudinal forces occurring between the towing vehicle and the semi-trailer. D, expressed in kilonewtons, shall be calculated from the equation:

$$D = g \times \frac{0{,}6 \times T \times R}{T + R - U}$$

where

T is the maximum design total mass, including U, of the towing vehicle which is to tow the semi-trailer, in tonnes;

R is the maximum design total mass of the semi-trailer which is to be drawn with the fifth wheel, in tonnes;

U is the mass imposed vertically on the fifth wheel coupling by the semi-trailer loaded to its maximum design total mass, in tonnes;

g is the acceleration due to gravity $(= 9{,}81 \text{m/s}^2)$.

Terminology for the different masses shall be taken with the meanings given in the corresponding definitions in ISO 1176.

5 Test conditions

5.1 General

For the purpose of the tests, the fifth wheel coupling shall be equipped with all the fixings needed to attach it to the vehicle (see ISO 3842). The method of mounting shall be identical to that employed subsequently on the vehicle itself.

5.2 Static lifting test

A static lifting test shall be performed on all fifth wheel couplings. Up to a lifting force of $F_A = g \times U$, there shall be no major permanent bending of the coupling plate over more than 0,2 % of its width.

In the case of 50 mm fifth wheel couplings and comparable couplings for the same kingpin diameter, there shall be no separation of the kingpin from the coupling with a lifting force of

$$F_A = g \times 2{,}5 \times U$$

In the case of 90 mm fifth wheel couplings, there shall be no separation of the kingpin from the coupling with a lifting force of

$$F_A = g \times 1{,}6 \times U \text{ (but minimum 500 kN)}$$

The force shall be applied by means of a lever acting on the coupling plate at one end and raised at the other end at a distance of 1,0 m to 1,5 m from the centre of the kingpin (see Figure 1).

Dimensions in metres

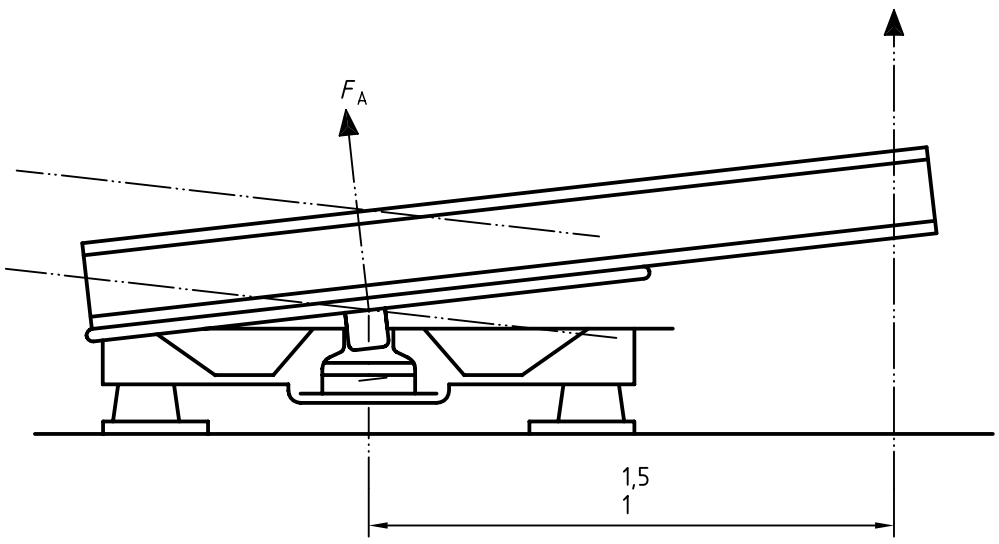


Figure 1 — Lifting test on fifth wheel couplings

The lever arm shall be at 90° to the direction of entry of the kingpin into the coupling. If the worst case is obvious, the side corresponding to this worst case shall be tested; otherwise the technical service shall decide which side to test. No second test shall be required.

5.3 Dynamic test

5.3.1 General

The following test loads, simulating practical loads under driving conditions, shall be applied:

— $F_{v,t}$ = vertical test load;

— $F_{h,t}$ = horizontal test load.

5.3.2 Application of test load

5.3.2.1 The vertical test load $F_{v,t}$ and the horizontal test load $F_{h,t}$ shall be applied simultaneously (see subclause 5.3.4).

5.3.2.2 The vertical test load $F_{v,t}$ shall be a pulsating force applied in the direction shown in Figure 2. $F_{v,t}$ shall be applied by means of a rigid counter-plate simulating the semi-trailer skid-plate. To ensure constant friction between these plates, suitable measures shall be taken (for example inserting polyamide foil) to guarantee a maximum coefficient of friction of $\mu = 0{,}15$.

$F_{v,t}$ shall pulsate between $0{,}4 \times U \times g$ and $1{,}2 \times U \times g$.

5.3.2.3 The horizontal test load $F_{h,t}$ shall be an alternating force applied in the direction shown in Figure 2. $F_{h,t}$ shall be applied by means of a fifth wheel kingpin.

$F_{h,t}$ shall alternate between $+0{,}6 \times D$ and $-0{,}6 \times D$.

5.3.3 Loading cycle

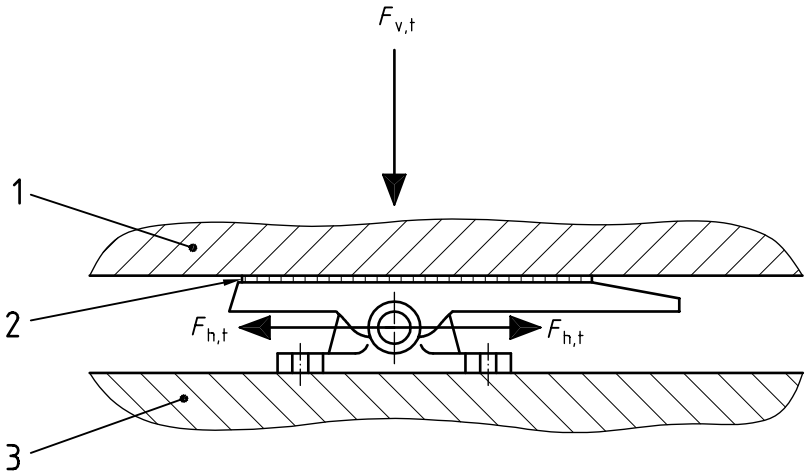
The dynamic test shall be carried out sinusoidally and the number of cycles shall be 2×10^6 for each $F_{v,t}$ and $F_{h,t}$ load.

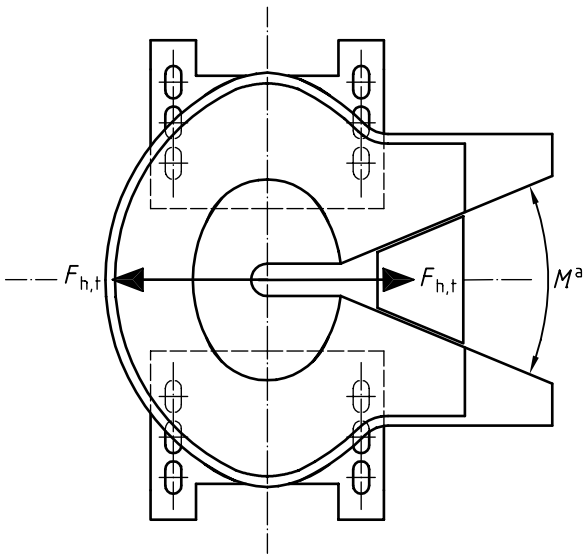
5.3.4 Frequency

The selected frequency shall not exceed 35 Hz and shall not coincide with the natural frequency of the system. Since $F_{v,t}$ and $F_{h,t}$ are applied simultaneously, the cycle rates shall differ by 1 % to 3 %.

5.3.5 Strength criteria

The dynamic test shall not cause permanent deformation, breaks or cracks.





Key

1 Counter-plate

2 Polyamide foil

3 Test bed

[a] Moment M applies only to the additional static test specified in annex A.

Figure 2 — Application of vertical test load $F_{v,t}$ and horizontal test load $F_{h,t}$

Annex A
(normative)

Additional requirements for fifth wheels intended for forced semi-trailer axle steering

A.1 Dynamic test

In the case of fifth wheels intended for forced semi-trailer axle steering, the load $F_{h,t}$ specified in 5.3.2.3 shall alternate between $+0{,}675 \times D$ and $-0{,}675 \times D$.

A.2 Additional static test

A.2.1 Fifth wheels intended to accept a steering wedge or similar device to correct the trajectory of the semi-trailer shall be subjected to the following additional test.

A.2.2 On the fifth wheel, kept in its normal working position, the vertical load $F_{v,t} = U \times g$ shall be applied downward by means of a rigid plate of such dimensions as to cover the fifth wheel completely; the resultant of the pressure applied shall pass through the centre of the horizontal articulation of the fifth wheel.

A.2.3 At the same time, a horizontal transverse force representing the force required to correct the trajectory of the semi-trailer shall be applied at each side, guiding the insertion of the kingpin.

The magnitude of this force and the line along which it acts shall be selected so that a moment $M = 0{,}75 \times D$, in kN·m, is exerted around the centre of the kingpin by means of a force acting on a lever arm 0,5 m $\pm$ 0,1 m long.

Permanent plastic deformation up to 0,5 % of all nominal dimensions is permitted. There shall not be any cracking.

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