INTERNATIONAL STANDARD

ISO 18868

First edition
2013-07-01

Commercial road vehicles — Coupling equipment between vehicles in multiple vehicle combinations — Strength requirements

Véhicules routiers utilitaires — Équipement de couplage entre véhicules dans des combinaisons de véhicules multiples — Exigences de résistance

Reference number
ISO 18868:2013(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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Foreword

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The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 15, *Interchangeability of components of commercial vehicles and buses*.

Introduction

This International Standard specifies general requirements and definitions to secure the safe operation of mechanical couplings between individual vehicles in a multiple-vehicle combination.

The expanded application of multiple-vehicle combinations brings new perspectives and needs into the area of trailer couplings. This has made evident the need for a consolidated method to handle the dimensioning of mechanical couplings applied in multiple-vehicle combinations. This International Standard is meant to facilitate the interaction between International Standards and relevant regulations.

The drivers for the introduction of this International Standard are

— the development of the European modular system making multiple-vehicle combinations (road trains) more of a global application, and

— the lack of rules for the dimensions of couplings used together with converter dolly. Those applications are already very common on the roads today.

The limited number of types of multiple-vehicle combinations addressed in this International Standard is the result of a voting process among the nations. Other types may be added in later editions as experience is gained.

Commercial road vehicles — Coupling equipment between vehicles in multiple vehicle combinations — Strength requirements

1 Scope

This International Standard defines different multiple-vehicle combinations (vehicle combinations with more than one coupling point) and the formulae to calculate the requirement of performance for the coupling equipment used in those vehicle combinations. Vehicle categories concerned are N2, N3, O3, and O4.

NOTE For these vehicle combinations, the formulae in this International Standard override the formulae in References [6], [7], [8], and [9] that apply to vehicle combinations with one coupling point only. However, the capability of the coupling equipment is still determined through tests as defined in References [6], [7], [8], and [9].

2 Terms and definitions

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

2.1
centre-axle trailer (CAT)
trailer where the axle(s) is(are) positioned close to the centre of gravity of the trailer such that (when uniformly loaded) only a small static vertical load, not exceeding 10 % of the load corresponding to the maximum design total mass of the trailer or 1 000 daN (whichever is less), is transmitted to the towing vehicle

2.2
converter dolly
towed vehicle with one axle group or single axle and a fifth wheel coupling, designed to be combined with a semi-trailer

Note 1 to entry: In cases where the drawbar of the converter dolly is hinged, the combination of a converter dolly and a semi-trailer is equivalent to a full trailer.

Note 2 to entry: The drawbar of a converter dolly may be rigid or hinged. A hinged drawbar is free to pivot around an axle that is perpendicular to the vertical plane.

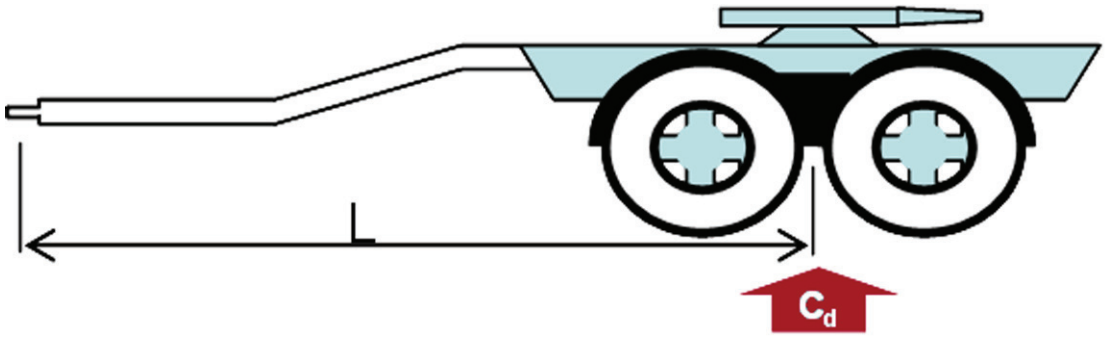

Figure 1 — Converter dolly

2.3
drawbar trailer
trailer having at least two axles, of which at least one is a steered axle, equipped with a towing device (drawbar) which can move vertically (in relation to the trailer) and that transmits less than 100 daN as a static vertical load to the towing vehicle

2.4
semi-trailer
trailer which is designed and constructed to be by means of a kingpin coupled to a tractor unit or to a converter dolly and that impose a substantial vertical load on the towing vehicle

2.5
A-trailer
semi-trailer in a multiple-vehicle combination that is towed on a converter dolly

2.6
link–trailer (or B-trailer)
semi-trailer with a fifth wheel mounted at the rear such that a semi-trailer could be towed by the link-trailer

2.7
tractor
motor vehicle built to tow a semi-trailer

2.8
truck
motor vehicle built to tow a full trailer or a centre-axle trailer

3 Symbols[1)]

3.1
S
mass imposed vertically on the coupling under static conditions by the CAT loaded to its maximum design total mass

3.2
T
technically permissible maximum total mass, in tonnes, of the towing vehicle including, as applicable, the vertical static load, S, of a CAT or the vertical static load, U, imposed by a semi-trailer

3.3
R
technically permissible maximum total mass, in tonnes, of the full trailer (with drawbar free to move in the vertical plane) or of the semi-trailer

3.4
C
mass, in tonnes, transmitted to the ground by the axle(s) of the CAT loaded to its maximum total design mass

3.5
U (U_T, U_d, U_b)
mass, in tonnes, imposed vertically on the fifth wheel of a tractor (U_T), a converter dolly (U_d), or a B-trailer (U_b) by the semi-trailer loaded to its maximum total design mass

Note 1 to entry: The total mass of a semi-trailer (R) is divided into two parts for the calculation: the front part (U_x) and the rear part (R_b) giving the bogey mass.

3.6
W_d
tare mass, in tonnes, of a converter dolly

3.7
g
acceleration due to gravity (assumed as 9,81 m/s^2)

1) The symbols defined below are in line with those used in UNECE R55.

3.8
a
equivalent vertical acceleration in the coupling point, dependent on the kind of suspension on the rear axle(s) of the towing vehicle including a constant factor

3.8.1
a_1
1,8 m/s² for vehicles with air suspension or equivalent

3.8.2
a_2
2,4 m/s² for vehicles with other suspension

3.9
***X* (X_i)**
length, in metres, of the loading area of the centre-axle trailer

3.10
***L* (L_i)**
theoretical drawbar length, in metres, i.e. the distance between the centre of the drawbar eye and the centre of the axle assembly of the centre-axle trailer

3.11
t_i
distance, in meter, from the centre of axles of a centre-axle trailer to its rear coupling point

3.12
R_b
mass, in tonnes, transmitted to the ground by the axle(s) of the semi-trailer loaded to its maximum total design mass

3.13
C_d
mass, in tonnes, transmitted to the ground by the axle(s) of the converter dolly including U_d

3.14
***D* (D_c)**
D-value is a comparative value determined by calculating for the longitudinal forces occurring between a towing vehicle and a trailer

Note 1 to entry: *D*, expressed in kilonewtons.

Note 2 to entry: For applications where a drawbar coupling is subject to vertical forces, the related *D*-value is designated D_c. Defined by the formulae given in the tables of 5.2.2.

3.15
V
V-value is a comparative value determined by calculating for the vertical forces occurring between a towing vehicle and a centre-axle trailer

Note 1 to entry: Defined by the formulae given in the tables of 5.2.2.

3.16
A and ***B***
parameters used in the calculations.

Note 1 to entry: "A" is the total mass forward of the coupling point.

Note 2 to entry: "B" is the total mass behind the coupling point.

Note 3 to entry: Their detailed definitions as sum of masses are given in the tables of 5.2.2.