



DRAFT INTERNATIONAL STANDARD ISO/DIS 12357-3.2

ISO/TC 22/SC 15

Secretariat: UNI

Voting begins on
2012-06-22

Voting terminates on
2012-08-22

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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

Part 3: Strength requirements

Véhicules routiers commerciaux — Pivot et anneaux pour barres d'attelage rigides —

Partie 3: Exigences de résistance pour les véhicules multiples

ICS 43.040.70

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO/DIS 12357-3.2](#)

<https://standards.iteh.ai/catalog/standards/sist/b502e220-d0f1-4df7-9bf8-9672cc91c9c4/iso-dis-12357-3-2>

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO/DIS 12357-3.2](https://standards.iteh.ai/catalog/standards/sist/b502e220-d0f1-4df7-9bf8-9672cc91c9c4/iso-dis-12357-3-2)

<https://standards.iteh.ai/catalog/standards/sist/b502e220-d0f1-4df7-9bf8-9672cc91c9c4/iso-dis-12357-3-2>

Copyright notice

This ISO document is a Draft International Standard and is copyright-protected by ISO. Except as permitted under the applicable laws of the user's country, neither this ISO draft nor any extract from it may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission being secured.

Requests for permission to reproduce should be addressed to either ISO at the address below or ISO's member body in the country of the requester.

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

Reproduction may be subject to royalty payments or a licensing agreement.

Violators may be prosecuted.

Contents

Page

Foreword	iv
Introduction.....	v
1 Scope	1
2 Terms and definitions	1
3 Symbols.....	3
4 ISO vehicle combinations definition	5
4.1 ISO vehicle combination 1	5
4.2 ISO vehicle combination 2.....	5
4.3 ISO vehicle combination 3.....	5
4.4 ISO vehicle combination 4.....	5
4.5 ISO vehicle combination 5.....	5
5 General requirements	6
5.1 Vehicle combination handling	6
5.2 Determination of minimum coupling equipment performance capability required for a specific vehicle combination	6
5.2.1 Determination of (calculated) D-value performance requirement.....	6
5.2.2 D- and V-value formula per ISO vehicle combination.....	7
6 Worked numerical examples	11
6.1 ISO-Combination 1: truck + dolly + A-semi (Numerical Example)	11
6.2 ISO-Combination 2: tractor + A-semi + centre axle trailer (Numerical Example)	11
6.3 ISO-Combination 3: tractor + A-semi + dolly + A-semi (Numerical Example).....	12
6.4 ISO-Combination 4 : truck + centre axle trailer+ centre axle trailer (Numerical Example)	13
6.5 ISO-Combination 5: tractor + link-trailer + A-semi (B-train) (Numerical Example).....	13
7 Bibliography.....	14

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 12357-3 was prepared by Technical Committee ISO/TC 22, *Road Vehicles*, Subcommittee SC 15, *Interchangeability of components for commercial vehicles and buses*.

ISO 12357 consists of the following parts, under the general title *Commercial Road Vehicles — Coupling equipment between vehicles in multiple vehicle combinations*:

- *Part 1: Strength tests for general cargo centre-axle trailers*
- *Part 2: Strength tests for special applications*
- *Part 3: Strength requirements*

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 group of standard is meant to facilitate the interaction between international standards and relevant regulations.

The drivers for the introduction of this standard are:

- the development of the European module system making multiple vehicle combinations (road trains) more of a global application;
- the lack of rules for the dimensions of couplings used together with converter dolly. Those applications are very common on the roads already today.

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/DIS 12357-3.2](https://standards.iteh.ai/catalog/standards/sist/b502e220-d0f1-4df7-9bf8-9672cc91c9c4/iso-dis-12357-3-2)

<https://standards.iteh.ai/catalog/standards/sist/b502e220-d0f1-4df7-9bf8-9672cc91c9c4/iso-dis-12357-3-2>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/DIS 12357-3.2](https://standards.iteh.ai/catalog/standards/sist/b502e220-d0f1-4df7-9bf8-9672cc91c9c4/iso-dis-12357-3-2)

<https://standards.iteh.ai/catalog/standards/sist/b502e220-d0f1-4df7-9bf8-9672cc91c9c4/iso-dis-12357-3-2>

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

1 Scope

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

For these vehicle combinations the formulas in this standard override the formulas in the standards [6], [7], [8] and [9] listed in clause 7, which are applying to vehicle combinations with one coupling point only. However the capability of the coupling equipment shall still be determined through tests as defined in the standards [6], [7], [8] and [9] listed in clause 7.

2 Terms and definitions

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

2.1

Centre Axle Trailer (CAT)

A 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 1000 daN (whichever is the lesser), 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. 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.

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).

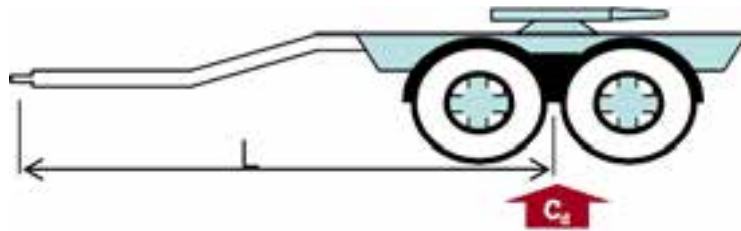


Figure 1 — Converter Dolly

iTeh STANDARD PREVIEW
(standards.iteh.ai)

2.3

Drawbar trailer

a 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.

[ISO/DIS 12357-3.2](https://standards.iteh.ai/catalog/standards/sist/b502e220-d0f1-4df7-9bf8-9672cc91c9c4/iso-dis-12357-3-2)

<https://standards.iteh.ai/catalog/standards/sist/b502e220-d0f1-4df7-9bf8-9672cc91c9c4/iso-dis-12357-3-2>

2.4

Semi-trailer

a trailer which is designed and constructed to be by means of a king pin 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

A semi-trailer in a multi-vehicle combination that is towed on a converter dolly by means of an "A"-frame.

2.6

Link –trailer (or B-trailer)

A 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 Symbols¹⁾

3.1

S

The 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 (also towing tractors) 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)

The 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 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.

<https://standards.iteh.ai/catalog/standards/sist/b502e220-d0f1-4df7-9bf8-9672cc91c9c4/iso-dis-12357-3-2>

3.6

W_d

The tare mass, in tonnes, of a converter dolly.

3.7

g

Acceleration due to gravity (assumed as 9,81 m/s²).

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:

a) **a₁** = 1,8 m/s² for vehicles with air suspension or equivalent.

b) **a₂** = 2,4 m/s² for vehicles with other suspension.

3.9

X (X_i)

Length, in meters, of the loading area of the centre axle trailer.

1) Symbols defined in this clause are in line with those used in UNECE R55.

3.10

L (L_i)

Theoretical drawbar length, in meters, i.e. the distance between the centre of the drawbar eye and the centre of the axle assembly of the centre axle trailer.

$(\frac{X_i^2}{L_i^2} \geq 1)$ (where the result is a value less than 1,0 the value shall be at least 1).

3.11

t_r
Distance, in meter, from the centre of axles of a centre axle trailer to its rear coupling point.

3.12

R_b
The 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
The mass, in tonnes, transmitted to the ground by the axle(s) of the converter dolly including U_d.

3.14

D (D_c)
The D-value is a comparative value determined by calculation for the longitudinal forces occurring between towing vehicle and trailer. D, expressed in kiloNewtons. For applications where a drawbar coupling is subject to vertical forces the related D-value is designated D_c. Defined through the formulae in §§ 5.3.2.

iTeh STANDARD PREVIEW

Standards.IteH.ai

[ISO/DIS 12357-3.2](https://standards.iteh.ai/catalog/standards/sist/b502e220-d0f1-4df7-9bf8-9672cc91c9c4/iso-dis-12357-3-2)

<https://standards.iteh.ai/catalog/standards/sist/b502e220-d0f1-4df7-9bf8-9672cc91c9c4/iso-dis-12357-3-2>

3.15

V
The V-value is a comparative value determined by calculation for the vertical forces occurring between towing vehicle and a centre axle trailer. Defined through the formulae in §§ 5.3.2.

3.16

A and B
Parameters used in the calculations. "A" is the total mass forward of the coupling point. "B" is the total mass aft of the coupling point. Their detailed definitions as sum of masses are given in the tables of §§ 5.3.2.

4 ISO vehicle combinations definition

4.1 ISO vehicle combination 1

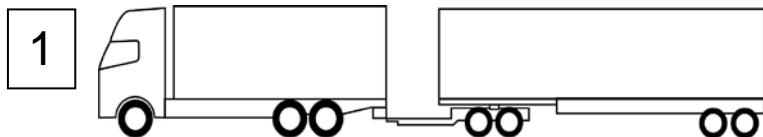


Figure 2 — truck + dolly + A-semi

4.2 ISO vehicle combination 2

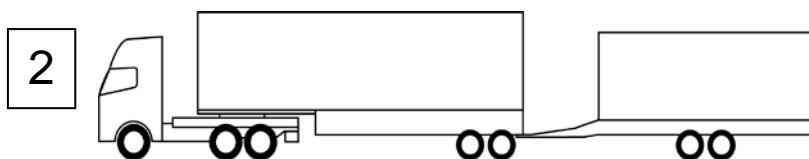


Figure 3 — tractor + A-semi + centre axle trailer

4.3 ISO vehicle combination 3

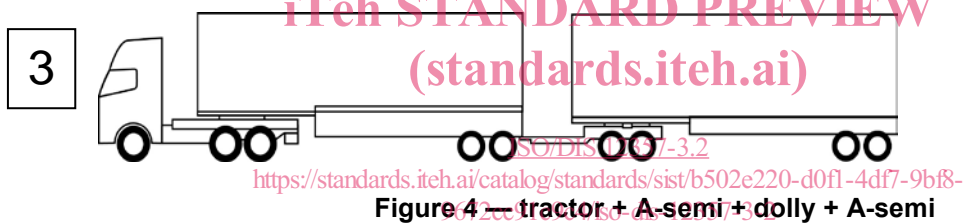


Figure 4 — tractor + A-semi + dolly + A-semi

4.4 ISO vehicle combination 4

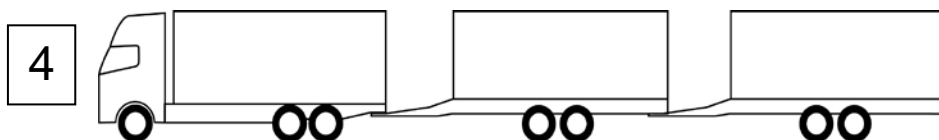


Figure 5 — truck + centre axle trailer+ centre axle trailer

4.5 ISO vehicle combination 5

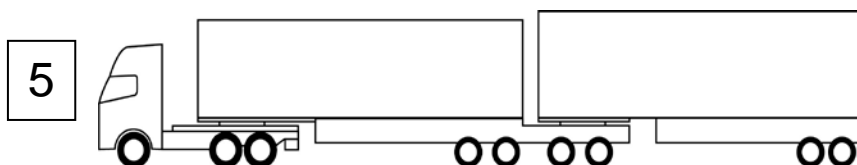


Figure 6 — tractor + link-trailer + A-semi (B-train)