BRITISH STANDARD

BS EN
1757-3:2002

Safety of industrial trucks — Pedestrian controlled manual and semi-manual trucks —

Part 3: Platform trucks

The European Standard EN 1757-3:2002 has the status of a British Standard

ICS 53.060

National foreword

This British Standard is the official English language version of EN 1757-3:2002.

The UK participation in its preparation was entrusted to Technical Committee MHE/7, Industrial trucks — Safety, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

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EUROPEAN STANDARD

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Safety of industrial trucks - Pedestrian controlled manual and semi-manual trucks - Part 3: Platform trucks

Sécurité des chariots de manutention - Chariots à conducteur à pied manuels et semi-manuels - Partie 3: Chariots à plateau fixe

Sicherheit von Flurförderzeugen - Handbetriebene und teilweise handbetriebene Flurförderzeuge - Teil 3: Plattformwagen

This European Standard was approved by CEN on 2 September 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This document EN 1757-3:2002 has been prepared by Technical Committee CEN/TC 150 "Industrial trucks - Safety", the secretariat of which is held by BSI.

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 2003, and conflicting national standards shall be withdrawn at the latest by May 2003.

This European Standard is one of a series of European Standards for the safety of Industrial trucks. This series of standards includes:

EN 1175 *Safety of Industrial trucks - Electrical requirements for trucks*

Part 1: General requirement for battery powered trucks
Part 2: General requirements for internal combustion engine powered trucks
Part 3: Specific requirements for the electrical power transmission systems of internal combustion engine powered trucks

EN 1459 *Safety of industrial trucks - Self propelled variable reach trucks*

EN 1525 *Safety of industrial trucks - Driverless trucks and their systems*

EN 1526 *Safety of industrial trucks - Additional requirements for automated functions on trucks*

EN 1551 *Safety of industrial trucks - Self propelled trucks over 10 000 kg capacity*

EN 1726 *Safety of industrial trucks - Self propelled trucks up to and including 10 000 kg capacity and tractors with a drawbar pull up to and including 20 000 N*

Part 1: General requirements
Part 2: Additional requirements for trucks with elevating operator position and trucks specifically designed to travel with elevated loads

EN 1755 *Safety of industrial trucks - Operation in potentially hazardous atmospheres – Use in inflammable gas, vapour, mist and dust*

EN 1757 *Safety of industrial trucks - Pedestrian propelled trucks*

Part 1: Stacker trucks
Part 2: Pallet trucks
Part 3: Platform trucks
Part 4: Scissor lift pallet trucks

EN 12053 *Safety of industrial trucks - Test methods for measuring noise emissions*

EN 12895 *Safety of industrial trucks - Electromagnetic compatibility*

EN 13059 *Safety of industrial trucks - Test methods for measuring vibration*

prEN ISO 13564 *Safety of industrial trucks - Test methods for measuring visibility from self-propelled trucks (ISO/DIS 13564:1996)*

Annexes A and B are normative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

0 Introduction

This European Standard is a type C standard as stated in EN 1070.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

With the aim of clarifying the intention of the standard and avoiding doubts when reading it, the following assumptions were made when producing it:

- only competent persons operate the machine;

- components without specific requirements are designed in accordance with usual engineering practice and calculation code, including all failure modes.

1 Scope

1.1 This European Standard applies to pedestrian propelled industrial platform trucks as defined in clause 3.1 with a rated capacity up to and including 1 000 kg, hereinafter referred to as "trucks" and designed for general purposes.

1.2 This standard does not apply to:

- shopping trolleys referred to in EN 1929 Parts 1 to 6 (CEN/TC 291);

- roll containers referred to in EN 12674 Parts 1 to 4 (CEN/TC 261);

- trucks that are intended to be towed by powered vehicles.

1.3 This standard deals with the technical requirements to minimise the hazards listed in clause 4 which can arise during commissioning, operation and maintenance of trucks when carried out in accordance with the specifications as intended by the manufacturer.

1.4 This standard does not establish the additional requirements for:

- operation in severe conditions (e.g. extreme environmental conditions such as: freezer applications, high temperatures, corrosive environment);

- operation subject to special rules (e.g. potentially explosive atmospheres);

- handling of loads the nature of which could lead to dangerous situations (e.g. molten metal, acids/alcalies, radiating materials, specially brittle loads);

- hazards occurring during construction, transportation, decommissioning and disposal;

- direct contact with foodstuffs;

- operation on gradients or on surfaces other than smooth, level, hard surfaces;
- trucks designed for special applications : trucks used in hospitals, dinner, trolley;
- trucks fitted with hinged or sliding doors.

1.5 Other possible limitations of the scope of other standards referred to that also apply to this standard.

1.6 Hazards relevant to noise, vibration, visibility and static electricity are not dealt with in this standard.

1.7 This standard applies to trucks manufactured after the date of issue.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1050:1996, *Safety of machinery - Principles for risk assessment*.

EN 1726-1:1998, *Safety of industrial trucks - Self-propelled trucks up to and including 10 000 kg capacity and industrial tractors with a drawbar pull up to and including 20 000 N - Part 1: General requirements.*

EN 12532, *Castors and wheels - Castors and wheels for applications up to 1,1 m/s (4 km/h).*

3 Terms and definitions

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

3.1
pedestrian propelled industrial platform truck
industrial truck with at least 3 wheels and fitted with a non-lifting load-carrying platform and possibly with one or several shelves. The truck is designed to be manually, pushed, pulled and steered by a pedestrian operator by means of a bar or tiller handle to move loads from one place to another one on a smooth, level, hard surface. Loading and unloading may be manual or by external mechanical means

3.2
rated capacity
load in kilograms given by the manufacturer, the truck can transport under intended operation. The rated capacity is defined for a load uniformly and equally distributed over the load carrying platform and the shelves if any. The centre of gravity of the load on each level shall be on the centre line of the truck and 200 mm above the geometrical centre of the platform or the shelf

3.3
intended operating position
position in which the operator may control all operational functions as intended by the manufacturer

3.4
intended operation
the use for which the truck is designed according to the manufacturer’s instructions

3.5
operator
designated person, suitably trained (see EN ISO 9001:2000 clause 4.18) qualified by knowledge and practical experience, and provided with the necessary instructions to enable the required (operation, test and/or examination) to be carried out safely

4 List of hazards

The following hazards from annex A of EN 1050:1996 are applicable in the situations described and could involve risks to persons if not reduced or eliminated. The corresponding requirements are designed to limit the risk or reduce these hazards in each situation.

Hazards		Corresponding requirements	
4.1	**MECHANICAL HAZARDS**		
4.1.1	Crushing	5.2	Propelling, steering
		5.3.2	Wheel guards
		5.4	Parking brake
		5.5	Stability
		5.6	Protection against crushing and shearing points
		6.2.2	Structural test
4.1.2	Shearing	5.6	Protection against crushing and shearing points
		5.7	Edges and angles
4.1.3	Impact	5.2	Propelling, steering
		5.7	Edges and angles
4.1.4	Friction or abrasion	5.2	Propelling, steering
4.1.5	Loss of stability	5.5	Stability
4.2	**HAZARDS GENERATED BY NEGLECTING ERGONOMIC PRINCIPLES**		
4.2.1	Unhealthy postures or excessive efforts	5.1	Design and construction forces for truck
		5.2	Propelling, steering
		7	Information for use

4.2.2	Inadequate consideration of hand-arm or foot-leg anatomy	5.2	Propelling, steering
4.2.3	Neglected use of personal protection equipment	7	Information for use
4.3	**HAZARDS DUE TO FAILURES**	5.3	Wheels and castors
		6.2.2	Structural test
4.4	**ADDITIONAL HAZARDS DUE TO MOBILITY**		
4.4.1	Insufficient ability of machinery to remain immobilised	5.4	Parking brake
			Information for use
4.4.2	Contact with the wheels	5.2.2	Tiller
		5.3.2	Wheel guards
4.4.3	Impact	5.7	Edges and angles
		7	Information for use
4.5	**FALLING OF LOADS HAZARD**	7	Information for use
4.6	**HAZARD COMBINATIONS**	Covering each individual hazard is sufficient for covering combinations of hazards	

5 Requirements

5.1 Design and construction forces for truck

The design and construction of the truck shall be such that the maximum forces required for truck function (propelling, steering) shall not exceed the values given in Table 1 below (see 6.2.3).

Table 1 - Maximum allowed forces

TEST LOAD	PROPELLING		STEERING
	STARTING	ROLLING	
kg	N	N	N
250	150	75	150
500	200	100	200
750	250	150	250
1 000	300	200	300

NOTE The values in Table 1 are pure design values for the truck and should not be confused with actual operating forces in the work place (see 7.1.3).

5.2 Propelling, steering

5.2.1 Push/pull handle(s) either vertical or horizontal and/or a tiller shall be provided to allow an operator to push, pull and steer the truck.

5.2.2 Tiller

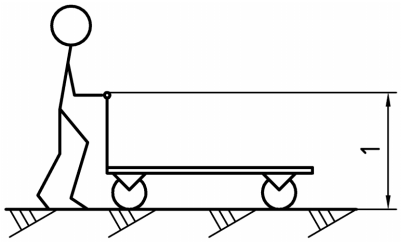
The tiller shall be provided with a handle of the closed loop type or otherwise designed to ensure lateral protection of the operator's hands.

The hand grips shall be of a cross section enclosed within the space between two concentric circles of 25 mm inside diameter and 35 mm outside diameter and provide a minimum span of 100 mm for each hand.

The upper part of the tiller handle shall conform to the dimensions shown in Figure 1 and Figure 2.

When pulling the horizontal distance between the end of the tiller and the front of the wheel (Figure 2) shall be more than 500 mm, the handle axis being positioned within 700 mm to 1 000 mm height.

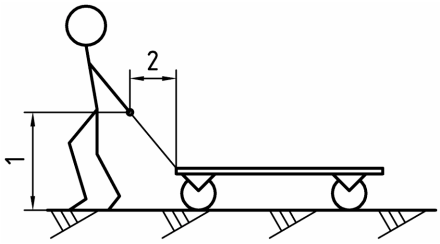
The tiller shall automatically and gently return to the upper rest position when released.



Key

1 – 1 100 mm to 1 300 mm

Figure 1 - Tiller (Pushing)



Key

1 – 700 mm to 1 000 mm

2 – 500 mm minimum

Figure 2 - Tiller (Pulling)

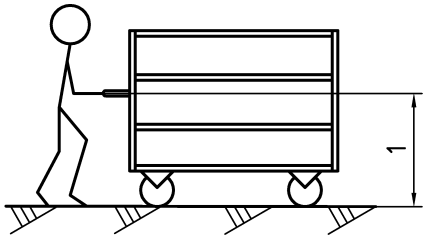
5.2.3 Push/pull bars

The height from ground to centre of push/pull bar shall be 1 100 mm to 1 300 mm, see Figure 3 and Figure 4.

Vertical bars shall have a vertical length of at least 300 mm.

A minimum distance of 50 mm shall be provided between the outside of the push/pull bars and the lateral extremities of the truck.

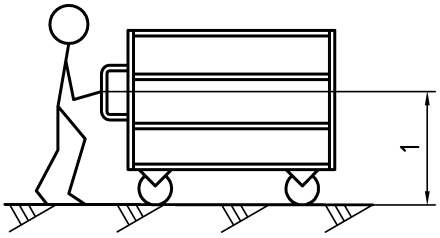
The hand grips shall be of a cross section enclosed within the space between two concentric circles of 25 mm inside diameter and 35 mm outside diameter.



Key

1 – 1 100 mm to 1 300 mm

Figure 3 - Horizontal push/pull handle



Key

1 – 1 100 mm to 1 300 mm

Figure 4 - Vertical push/pull handle

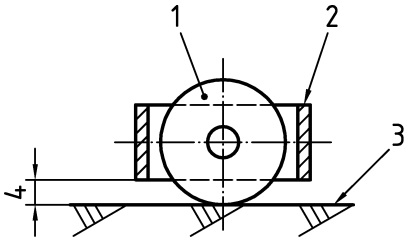
5.3 Wheels and castors

5.3.1 Specifications

Wheels and castors of the truck shall comply with EN 12532.

5.3.2 Wheel guards

Trucks fitted with push-pull handles shall have a chassis profile which conforms to Figure 37 of EN 1726-1:1998 or shall be provided with devices to protect the operator's feet when he is in his intended operating position (see Figure 5).



Key

1 – Wheel
2 – Deflector
3 – Ground (floor)
4 – 35 mm maxi

Figure 5 – Example of wheel guard

5.4 Parking brake

The truck shall be provided with a parking brake which shall be controlled by e.g.: a lever located on the tiller or by a foot pedal, and be able to maintain the truck at a standstill on a level ground.

5.5 Stability

The truck shall be designed and constructed in order to restrict hazards of forward, backward and lateral overturning during intended operation.

5.6 Protection against crushing and shearing points

Relative moving parts on the truck within reach of operator in his intended operating position shall be adequately guarded or shall comply with the following minimum distance requirements:

- places where the operator's fingers can be trapped: 25 mm
- places where the operator's hands or feet can be trapped: 50 mm
- places where the operator's arms or legs can be trapped: 100 mm

5.7 Edges and angles

External parts of the truck which may impact parts of the body shall be free of sharp edges and sharp angles.

6 Verifications of safety requirements and/or measures

6.1 General

The manufacturer shall verify and record that the requirements of section 5 are complied with.

The verification of safety requirements shall be carried out by design verification on truck type plus manufacturing arrangements (not described here) plus functional routine verification on each truck to verify its fitness for purpose.

The verifications may be as follows:

- by design e.g. for verification of drawings and documents;
- by measures e.g. of propelling and steering forces as shown in Table 1 and annex A and tests described in 6.2.2 and 6.3.

Tests shall either be performed by operating the truck in the manner prescribed below or, where practicable, be simulated by any method giving an equivalent effect and producing substantially the same results.

The test load, where applicable, shall be applied according to clause 3.2 except if specified differently hereunder.

6.2 Design verification on truck type

6.2.1 General

These tests shall be performed on a sample which is representative of series production or on individual truck in case of unit production.

6.2.2 Structural test

A test load equal to 1,33 times the rated capacity shall be applied to the truck for a period of 15 min.

The truck shall be on substantially firm and level ground and may be anchored to prevent overturning.

The test shall not result in any visual permanent deformation or damage.

6.2.3 Verification of design and construction forces

The design and construction forces for truck shall be measured in accordance with annex A.

The test is successful if measured values do not exceed those laid down in Table 1.

6.2.4 Verification of the parking brake

The parking brake shall maintain the truck at a standstill with its rated capacity on a 5 % gradient with a hard smooth surface.

6.2.5 Verification of the stability

The type truck shall undergo the platform tests described in annex B without overturning.

6.3 Functional routine verification

6.3.1 General

The functional verification shall be carried out on each truck to verify that it is able to safely perform the tasks for which it is designed.

6.3.2 Inspection

The information plate for the truck shall be inspected to verify that it contains the information listed in 7.2.

The truck shall be examined visually to ensure that there are no defects.

6.3.3 Dynamic tests

The tests shall be carried out with the truck unladen:

a) operate wheels and castors by hand to verify freely movement;
b) apply and release parking brake to verify functioning.

In case of incorrect operation, the truck shall be adapted until the test is successful.

7 Information for use

An instruction label or handbook drawn up in the language or languages of the country in which the truck is to be used shall be provided with each truck.

7.1 Instruction label or handbook

The handbook shall include at least the following.

7.1.1 General obligation

The truck shall be used, serviced and repaired according to the instructions of the manufacturer and shall not be modified or have attachments fitted without ensuring that the truck is still safe.

7.1.2 Intended uses

- Instructions to operate, load and unload the truck;
- instructions for parking the truck;
- information on stability: e.g. to avoid impairing the truck stability, the truck loaded or unloaded shall be moved slowly and smoothly.

It may occasionally be necessary to negotiate small slopes for the purposes of moving the truck between buildings etc. In such cases the gradient shall be no more than 2 % and the truck shall be unladen.

7.1.3 Residual risks

The manufacturer shall give warnings on residual risks during the use of the truck for example:

- risks when handling heavy loads (see note);
- risk of load falling.

NOTE The forces to operate the truck are varying with the value of the load, the ground conditions and the truck conditions. The frequency of the load handling cycle should also be taken into account.

7.1.4 Prohibited uses

The manufacturer shall give warnings on prohibited uses, for example:

- a truck shall not be used on gradients due to possible excessive efforts and loss of control except when unladen according to last paragraph of 7.1.2;
- the tiller shall not be turned at right angles to stop truck;
- a truck shall not be used to transport persons;
- a truck shall not be used in applications where a risk of exceeding the rated capacity exists;
- a truck shall not be towed by a powered vehicle.

7.1.5 Instructions for service and maintenance of the truck

- Frequency of inspections and maintenance operations, instructions for replacement of wear parts;
- drawings and diagrams if required;
- instructions for verification of marking and warnings;

- use of approved spare parts.

7.1.6 Instructions for transportation

Mass and overall dimensions of truck.

7.2 Minimum marking

7.2.1 Information plates

Trucks shall be marked legibly and indelibly (e.g. weather proof) with the following minimum details:

- name and address of the manufacturer or the authorised representative;
- designation of series or type;
- serial number and year of manufacture;
- unladen mass of the truck in working order. The mass may vary from the figure shown by up to ± 10 %;
- rated capacity;
- inflation pressures for pneumatic tyres.

The rated capacity shall be easily readable by the operator.

7.2.2 Warnings

Warnings shall be affixed to the truck in close proximity to the hazards concerned.

7.2.3 Languages

If any of the information in 7.2.1 and 7.2.2 is in writing, it shall be in the language or languages of the country where the truck is to be used.

Annex A
(normative)

Method for measurement of forces (F)

A.0 Conditions for test

The tests shall be carried out with a new truck, chosen according to 6.2.1, on a smooth, dry, level, troweled finish concrete floor in good condition. The tests shall be conducted in an ambient temperature of between 15 °C and 28 °C.

The measuring instrument used shall indicate maximum values with ± 3 % accuracy.

The efforts shall be measured in accordance with the methods described below for all the values of load indicated in Table 1 which are less or equal to the rated capacity and located according to 6.1.

A.1 Measurement of starting force and rolling force

With the truck in starting position and stationary, the wheels shall be positioned in the direction that they naturally take when moving the truck in the test direction.

The force shall be applied horizontally along the truck's axis on the tiller handle or bar. The tiller shall be maintained in vertical position along the truck's axis.

Two tests in both the forward and reverse directions shall be carried out and the average result recorded.

A.1.1 Starting force: the maximum value necessary to start the truck shall be recorded.

A.1.2 Rolling force: the maximum value necessary to maintain the truck at a stabilized speed of 0,5 m/s (± 20 %) shall be recorded.

The maximum starting force ED_{max} or the maximum rolling force ER_{max} is the average of the maximum values recorded in each direction of travel, forward AV and reverse AR, during two successive tests.

$$ED_{max} = \frac{ED_{max}\,AV1 + ED_{max}\,AV2 + ED_{max}\,AR1 + ED_{max}\,AR2}{4}$$

$$ER_{max} = \frac{ER_{max}\,AV1 + ER_{max}\,AV2 + ER_{max}\,AR1 + ER_{max}\,AR2}{4}$$

A.2 Measurement of the steering force

A.2.1 Steering by means of a tiller:

With the truck stationary, measurement consists of recording the maximum force applied tangentially in the middle of the handle throughout the steering lock in one direction from the tiller's axial position (Figure A.1 a).

During measurement the lower surface of the tiller handle shall be maintained at a height of 950 mm above the ground.

Two measurements are recorded in each direction of tiller steering.

The maximum steering force EB_{max} is the average of the recorded measurements on the left hand side G and on the right hand side D.

$$EB_{max} = \frac{EB_{max}\ G1 + EB_{max}\ G2 + EB_{max}\ D1 + EB_{max}\ D2}{4}$$

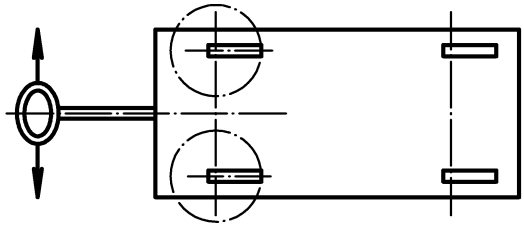
A.2.2 Steering by means of horizontal or vertical bars:

With the truck travelling at 1 km/h, measurement consists of recording the maximum force applied tangentially in the middle of the horizontal bar or between the vertical bars during 90° steering in one direction (Figure A.1 b - c - d - e).

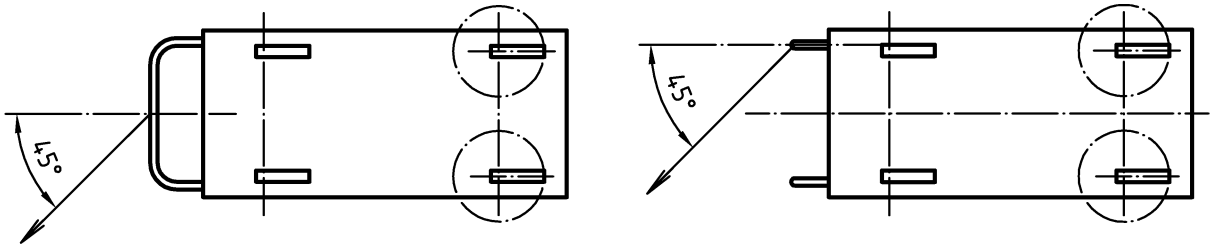
During measurement the force continues to be applied tangentially, the wheels swivel freely and are turned crosswise at the end of the measurement.

Two measurements are recorded in each direction of bar steering.

The maximum steering force EB_{max} is the average of the recorded measurements on the left hand side G and on the right hand side D.

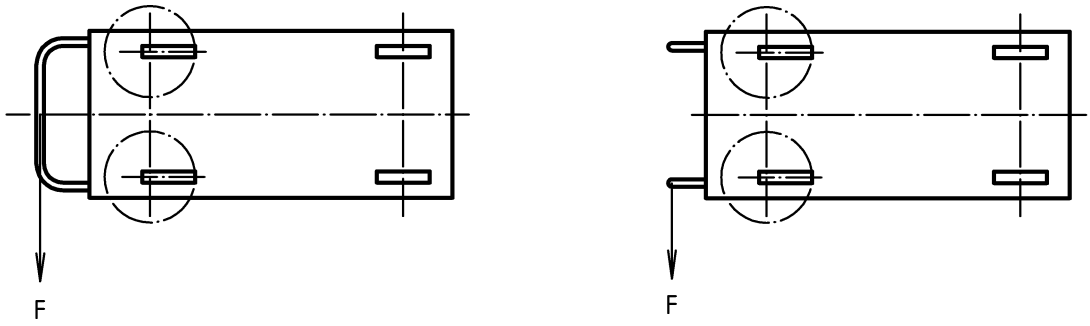


a) Truck with a tiller



b) c)

Swivelling wheels placed on the opposite side of the bar or bow



d) e)

Swivelling wheels placed on the side of the bar or bow

Figure A.1 - Position of the wheels and direction of the force at the beginning of measurement

Annex B
(normative)

Stability tests for pedestrian propelled industrial platform trucks

B.1 Conditions of validity

The following stability tests in these requirements ensure that the truck of the specified type has satisfactory stability when used under intended operating conditions, namely: travelling on hard, substantially smooth, level and prepared surfaces, with the load centre of gravity on the longitudinal centre line of the truck.

The test shall be carried out with a new truck chosen according to 6.2.1 ready for use and with the test load where applicable.

B.2 Acceptance conditions

A truck is considered stable if it passes the dynamic longitudinal test and the specified static tests described without overturning.

B.3 Description of tests

B.3.1 Dynamic longitudinal test

Test method: the unladen truck pushed at a stabilised speed of 1 m/s ± 10 % at the level of the lower platform, shall be crashed into a vertical obstacle 20 mm high with its wheel or, with both wheels at the same time. The force to push the truck shall cease when the truck hits the obstacle (Figure B.1).

The same test shall be carried out when pulling.

Dimensions in millimetres

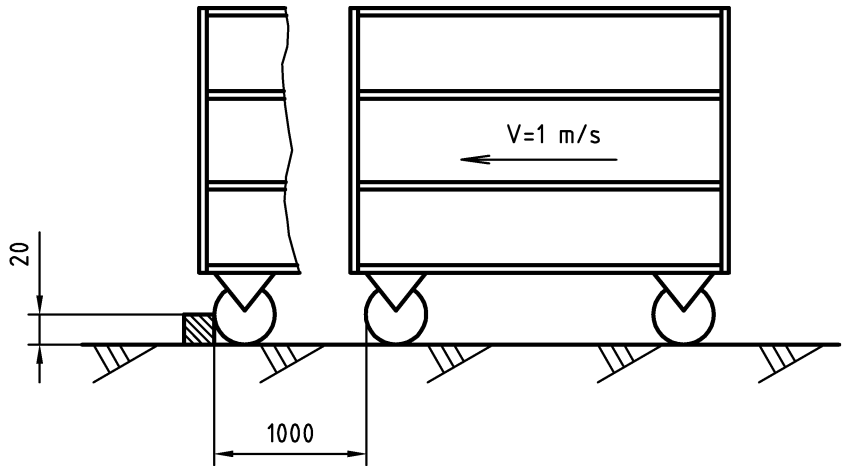


Figure B. 1 - Dynamic test

B.3.2 Static tests

NOTE These tests require a tilting platform.

A series of longitudinal and lateral stability tests shall be carried out depending on the truck type with the positions of the truck on the platform as below and Table B.2, with the load distribution and the platform tilting angles indicated as below and in Table B.1.

For trucks with only one loading surface tests n°1 and 2 shall be completed.

For trucks with several loading surfaces tests n°1, 3 and 4 shall be completed.

B.3.2.1 Condition of the truck

The truck and the castors shall be placed according to Table 2 in the worst condition for stability, the swivelling wheels especially shall be turned upwards.

As the tests are carried out with the truck stationary, the wheel rotation shall be prevented by the application of the parking brake which shall be secured in the «on» position, alternatively, the wheels may be wedged by a device which does not counteract its overturning. The wedge of square cross-section 20 mm $\times$ 20 mm is fixed parallel to the pivoting axle on the platform.

B.3.2.2 Test load and platform tilting angle

The test load, where applicable, shall be applied according to 6.1 and Table B.1.

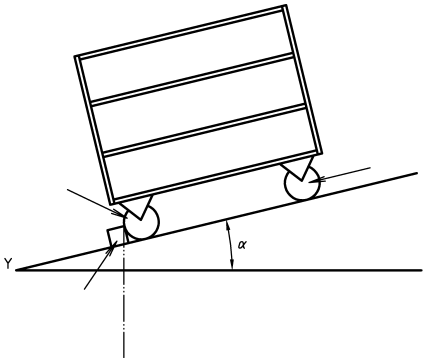
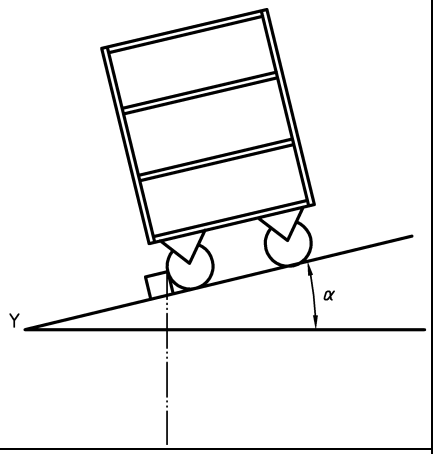
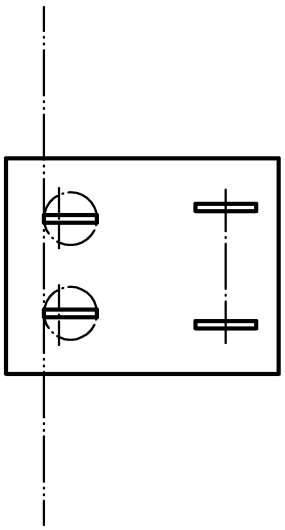
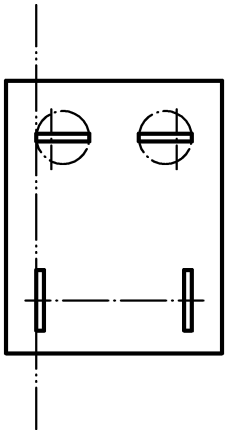
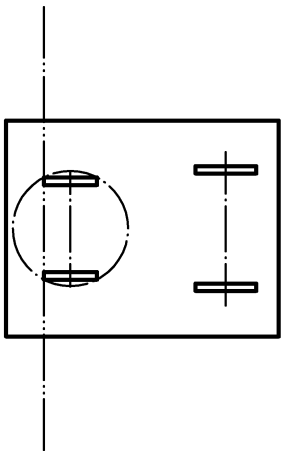
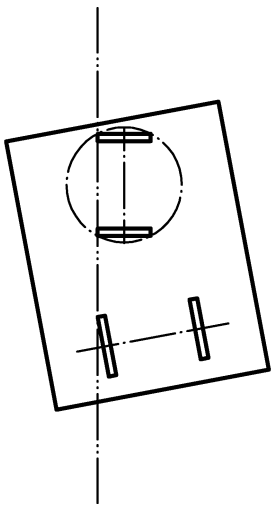
Table B.1 - Load for tests and platform tilting

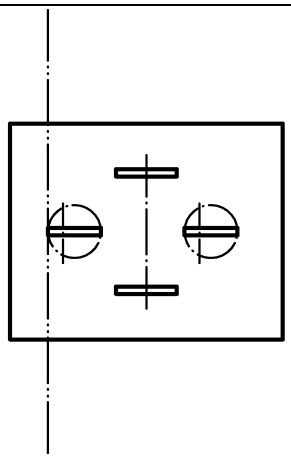
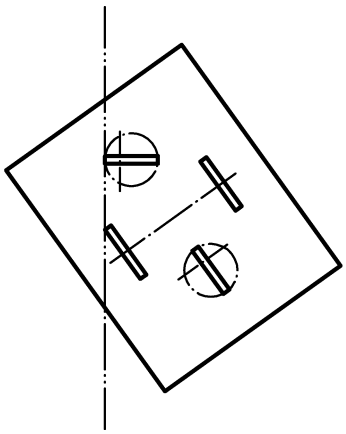
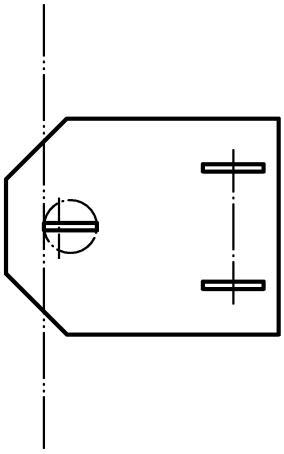
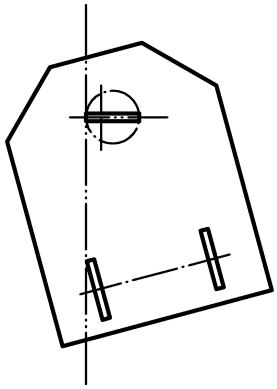
Test n°	Load distribution on the loading surfaces	Platform tilting - %	
		longitudinal	lateral
1	without a load	36	23
2	rated load placed on the loading surface	18	18
3	rated load uniformly distributed on all the loading surfaces	27	23
4	the rated load divided by the number of loading surfaces is placed on the upper surface; the other surfaces being empty	18	18

B.3.2.3 Test procedure

For each test the platform shall be tilted slowly and smoothly up to the tilting angle.

Table B.2 - Position of the truck on the platform

	Longitudinal test	Transversal test
Type of truck		
4 or more wheels, one or more of wich may be swivelling		
Turnable truck		

Diamond wheel pattern, two of which are swivelling		
3 or more wheels of which one or more may be swivelling		

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