



SLOVENSKI STANDARD
oSIST prEN 1459-1:2026
01-julij-2026

**Tovornjaki za neravne terene - Varnostne zahteve in preverjanje - 1. del:
Tovornjaki z variabilnim dosegom**

Rough-terrain trucks - Safety requirements and verification - Part 1: Variable-reach trucks

Geländegängige Stapler - Sicherheitstechnische Anforderungen und Verifizierung - Teil 1: Stapler mit veränderlicher Reichweite

Chariots tout-terrain - Prescriptions de sécurité et vérification - Partie 1 : Chariots à portée variable

Ta slovenski standard je istoveten z: prEN 1459-1

ICS:

53.060 Industrijski tovornjaki Industrial trucks

oSIST prEN 1459-1:2026

en,fr,de

Sample Document

get full document from standards.iteh.ai

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 1459-1

July 2026

ICS 53.060

Will supersede EN 1459-1:2025

English Version

Rough-terrain trucks - Safety requirements and verification - Part 1: Variable-reach trucks

Chariots tout-terrain - Prescriptions de sécurité et vérification - Partie 1 : Chariots à portée variable

Geländegängige Stapler - Sicherheitstechnische Anforderungen und Verifizierung - Teil 1: Stapler mit veränderlicher Reichweite

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 150.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

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.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2026 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. prEN 1459-1:2026 E

Contents		Page
European foreword		5
Introduction		6
1	Scope.....	7
2	Normative references.....	8
3	Terms and definitions	12
4	Safety requirements and/or protective/risk reduction measures	17
4.1	General.....	17
4.1.1	Introduction.....	17
4.1.2	Sharp edges and acute angles.....	17
4.1.3	Stored energy components.....	17
4.2	Starting/stopping of engine and moving machine	17
4.2.1	Starting	17
4.2.2	Switch-off device	17
4.2.3	Unintended movement	17
4.2.4	Uncontrolled motion	18
4.2.5	Powered travel movement	18
4.3	Brakes	18
4.3.1	General.....	18
4.3.2	Service brakes.....	18
4.3.3	Parking brake.....	18
4.4	Electrical and electronic systems.....	19
4.4.1	General.....	19
4.4.2	Degree of protection	20
4.4.3	Identification of wiring.....	21
4.4.4	Protection against electric shock.....	21
4.4.5	Batteries.....	21
4.5	Safety related parts of control systems.....	21
4.5.1	General.....	21
4.5.2	Software	21
4.5.3	Protection against corruption.....	22
4.6	Controls at the normal operating position	22
4.6.1	General.....	22
4.6.2	Differential locking	23
4.6.3	Steering controls	23
4.6.4	Load handling controls	25
4.6.5	Multi-function controls.....	26
4.6.6	Stabilizing device control.....	26
4.6.7	Axle oscillation locking.....	26
4.6.8	Brakes controls.....	26
4.7	Power systems and accessories.....	26
4.7.1	Exhaust system	26
4.7.2	Cooling system	27
4.7.3	Tanks and pressure vessels	27
4.8	Stabilizing devices	28
4.9	Design requirements for maintenance purposes	28

4.9.1	General	28
4.9.2	Boom support device.....	29
4.9.3	Tiltable cab support device.....	29
4.10	Systems for lifting, tilting and reaching.....	29
4.10.1	Chains and wire ropes.....	29
4.10.2	Hydraulic system	30
4.10.3	Maximum load lowering speed.....	31
4.10.4	Limitation of stroke	31
4.10.5	Fork arms	31
4.10.6	Attachment interface.....	32
4.11	Normal operator's position.....	32
4.11.1	General requirements.....	32
4.11.2	Operator's manual storage.....	32
4.11.3	Pipes and hoses	32
4.11.4	Operator's station.....	32
4.11.5	Operator's seat	36
4.11.6	Control panels, and symbols on displays.....	37
4.12	Operator access.....	38
4.12.1	General requirements.....	38
4.12.2	Operator's station openings	38
4.13	Protective measures and devices	39
4.13.1	Hot parts	39
4.13.2	Protection against crushing, shearing and trapping	39
4.13.3	Guards.....	39
4.13.4	Engine compartment.....	39
4.13.5	Fenders.....	40
4.13.6	ROPS and FOPS	40
4.13.7	Audible warning devices.....	40
4.14	Stability requirements.....	40
4.15	Visibility	40
4.16	Lighting.....	40
4.17	Fire protection.....	41
4.17.1	Fire resistance	41
4.17.2	Fire extinguisher.....	41
4.18	Retrieval, transportation and lifting	41
4.18.1	General	41
4.18.2	Retrieval.....	41
4.18.3	Tying-down	41
4.18.4	Lifting.....	41
4.19	Structural calculations.....	41
4.19.1	General	41
4.19.2	Loads and forces	42
4.19.3	Calculations	42
4.20	Noise	44
4.20.1	Noise emission reduction	44
4.20.2	Emission sound pressure level at the normal operating position and sound power level.....	45
4.21	Electromagnetic radiation.....	45
4.21.1	Electromagnetic emissions	45
4.21.2	Electromagnetic immunity.....	45
4.22	Towing.....	45
5	Verification of safety requirements and/or protective/risk reduction measures.....	46
5.1	General	46

prEN 1459-1:2026 (E)

5.2	Functional verification.....	46
5.3	Structural verification.....	46
5.3.1	Test loads.....	46
5.3.2	Static test.....	46
5.3.3	Dynamic tests	47
5.4	Load holding verification.....	47
6	Information for use	47
6.1	General.....	47
6.2	Graphical symbols and warning.....	48
6.2.1	Safety Signs and graphical symbols.....	48
6.2.2	Graphical symbol of lift points	48
6.2.3	Graphical symbol of tie-down points.....	48
6.2.4	Graphical symbol of retrieval points	49
6.2.5	Graphical symbol for pneumatic tyre inflation pressures.....	49
6.2.6	Graphical symbol for fuel filling points	49
6.2.7	Graphical symbol for hydraulic fluid filling points	50
6.2.8	Graphical symbols for stored energy components.....	50
6.2.9	Graphical symbol for brake fluid filling points.....	51
6.2.10	Graphical symbol for battery disconnection	52
6.2.11	Graphical symbol for the risk of contact with overhead powerlines.....	52
6.2.12	Warnings.....	53
6.3	Instructions for use	53
6.3.1	General.....	53
6.3.2	Operating and maintenance instructions	54
6.4	Marking	57
6.5	Load chart.....	58
Annex A (informative) List of significant hazards.....		60
Annex B (informative) Consistency of motions.....		66
Annex C (normative) Rules for the construction and layout of pedals.....		68
C.1	Terms and definitions	68
C.2	Requirements.....	68
C.2.1	General.....	68
C.2.2	Service brake pedal.....	69
C.2.3	Clutch pedal	69
C.2.4	Accelerator pedal.....	69
C.2.5	Inching pedal	69
C.3	Design and manufacture	69
Annex D (normative) Safety related parts of control systems.....		72
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Regulation (EU) 2023/1230 aimed to be covered.....		75
Bibliography		79

European foreword

This document (prEN 1459-1:2026) has been prepared by Technical Committee CEN/TC 150 “Industrial Trucks - Safety”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1459-1:2025.

In comparison with the previous edition, the following technical modifications have been made:

- addition of requirements for the operator restraint;
- addition of requirements for protection against corruption;
- additional requirements for safety functions;
- addition of requirements for visibility at height;
- addition of requirements for software;
- addition of requirements for towing.

EN 1459 consists of the following parts, under the general title *Rough-terrain trucks — Safety requirements and verification*:

- Part 1: Variable-reach trucks
- Part 3: Interface between the variable-reach truck and the work platform
- Part 4: Additional requirements for variable-reach trucks handling suspended loads
- Part 5: Attachment interface
- Part 6: Application of EN ISO 13849-1 to slewing and non-slewing variable-reach rough-terrain truck (technical report)
- Part 7: Electrification
- Part 9: Variable-reach trucks equipped with work platforms having a frontguard that can be opened

This document has been prepared under a standardization request given to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

prEN 1459-1:2026 (E)

Introduction

This document covers general safety requirements and the means for verification of these requirements for rough-terrain variable-reach trucks.

All quantities are in SI units, and this includes metric units.

This document is a type C standard as stated in EN ISO 12100:2010.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous 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.

1 Scope

This document specifies the safety requirements of self-propelled rough-terrain variable-reach trucks (hereafter referred to as trucks), intended to handle loads, equipped with a telescopic lifting means (pivoted boom), on which a load handling device (e.g. carriage and fork arms) is fitted.

For the purpose of this document, rough-terrain variable-reach trucks are designed to transport, lift and place loads and can be driven on unimproved terrain.

Fork arms are considered to be part of the truck. Trucks can also be equipped with a variety of attachments (e.g. bale spikes, mowers, sweepers).

This document deals with all the significant hazards, hazardous situations and events relevant to the trucks when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Annex A).

This document does not apply to:

- slewing rough-terrain variable-reach trucks covered by EN 1459-2:2015+A1:2018;
- rough-terrain variable-reach tractors covered by prEN 17968:2025;
- industrial variable reach trucks covered by EN ISO 3691-2:2023;
- lorry-mounted variable-reach trucks covered by ISO 20297-1:2017;
- variable-reach trucks fitted with tilting or elevating operator position;
- mobile cranes covered by EN 13000:2010+A1:2014;
- machines designed primarily for earth moving, even if their buckets and blades are replaced with forks (see EN 474 series);
- trucks designed primarily with variable length load suspension elements (e.g. chain, ropes) from which the load may swing freely in all directions;
- trucks designed primarily for container handling;
- trucks on tracks;
- trucks with articulated chassis;
- attachments.

This document does not cover sales literature.

This document does not address hazards linked to:

- operation of the truck from a position other than the normal operating position;
- operation of the truck by a remote control;
- gas power systems;
- gasoline engine systems;
- autonomous functions;

prEN 1459-1:2026 (E)

- self-evolving behaviour;
- hybrid or battery power systems having a voltage greater than 32 V DC or 21 V AC r.m.s.

NOTE EN 1459-7:2026 deals with hybrid and battery power systems having a voltage greater than 32 V DC or 21 V AC r.m.s.

This document does not address hazards which may occur:

- a) when handling suspended loads which may swing freely (additional requirements are given in EN 1459-4:2020+A1:2025);
- b) when using trucks on public roads;
- c) when operating in potentially explosive atmospheres (additional requirements are given in EN 1755:2024);
- d) when operating underground;
- e) when fitted with a personnel work platform (additional requirements are given in EN 1459-3:2015 and EN 1459-9:2021);
- f) when using system capable of controlling the speed of the truck as set by the operator (cruise-control).

This document is not applicable to trucks manufactured before the date of its publication.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1032:2003+A1:2008, *Mechanical vibration — Testing of mobile machinery in order to determine the vibration emission value*

EN 1459-5:2020+A1:2025, *Rough-terrain trucks — Safety requirements and verification — Part 5: Attachment interface*

EN 12053:2001+A1:2008, *Safety of industrial trucks — Test methods for measuring noise emissions*

EN 12895:2015+A1:2019, *Industrial trucks — Electromagnetic compatibility*

EN 13059:2002+A1:2008, *Safety of industrial trucks — Test methods for measuring vibration*

EN 15000:2008, *Safety of industrial trucks — Self propelled variable reach trucks — Specification, performance and test requirements for longitudinal load moment indicators and longitudinal load moment limiters*

EN 15830:2012, *Rough-terrain variable reach trucks — Visibility — Test methods and verification*

prEN 50742:2025, *Protection against corruption*

EN 60204-1:2018,¹ *Safety of machinery — Electrical equipment of machines — General requirements (IEC 60204-1:2016)*

EN 60529:1991,² *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN IEC 62061:2021,³ *Safety of machinery — Functional safety of safety-related control systems (IEC 62061:2021)*

EN ISO 2860:2008, *Earth-moving machinery — Minimum access dimensions (ISO 2860:1992)*

EN ISO 2867:2011, *Earth-moving machinery — Access systems (ISO 2867:2011)*

EN ISO 3449:2008, *Earth-moving machinery — Falling-object protective structures — Laboratory tests and performance requirements (ISO 3449:2005)*

EN ISO 3457:2008, *Earth-moving machinery — Guards — Definitions and requirements (ISO 3457:2003)*

EN ISO 3471:2008, *Earth-moving machinery — Roll-over protective structures — Laboratory tests and performance requirements (ISO 3471:2008)*

EN ISO 4413:2010, *Hydraulic fluid power — General rules and safety requirements for systems and their components (ISO 4413:2010)*

EN ISO 5353:1998, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point (ISO 5353:1995)*

EN ISO 6682:2008, *Earth-moving machinery — Zones of comfort and reach for controls (ISO 6682:1986, including Amd 1:1989)*

EN ISO 6683:2025, *Earth-moving machinery — Seat belts and seat belt anchorages — Performance requirements and tests (ISO 6683:2025)*

EN ISO 7096:2020, *Earth-moving machinery — Laboratory evaluation of operator seat vibration (ISO 7096:2020)*

EN ISO 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13766-1:2018, *Earth-moving and building construction machinery — Electromagnetic compatibility (EMC) of machines with internal electrical power supply — Part 1: General EMC requirements under typical electromagnetic environmental conditions (ISO 13766-1:2018)*

¹ This reference is impacted by the following amendment: EN 60204-1:2018/A1:2025.

² This reference is impacted by the following amendments/corrigenda's:

EN 60529:1991/A1:2000

EN 60529:1991/A2:2013

EN 60529:1991/AC:2016-12

EN 60529:1991/corrigendum May 1993

³ This reference is impacted by the following amendment: EN IEC 62061:2021/A1:2024.

prEN 1459-1:2026 (E)

EN ISO 13849-1:2023, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2023)*

EN ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2019)*

prEN ISO 24882:2026, *Agricultural machinery, tractors, and earth-moving machinery — Product cybersecurity (ISO/DIS 24882:2025)*

ISO 2328:2011, *Fork-lift trucks — Hook-on type fork arms and fork arm carriages — Mounting dimensions*

ISO 2330:2002, *Fork-lift trucks — Fork arms — Technical characteristics and testing*

ISO 3767-1:2016,⁴ *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 1: Common symbols*

ISO 3795:1989, *Road vehicles, and tractors and machinery for agriculture and forestry — Determination of burning behaviour of interior materials*

ISO 3864-1:2011, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

ISO 3864-2:2016, *Graphical symbols — Safety colours and safety signs — Part 2: Design principles for product safety labels*

ISO 3864-3:2024, *Graphical symbols — Safety colours and safety signs — Part 3: Design principles for graphical symbols for use in safety signs*

ISO 3864-4:2011, *Graphical symbols — Safety colours and safety signs — Part 4: Colorimetric and photometric properties of safety sign materials*

ISO 5053-1:2020, *Industrial trucks — Vocabulary — Part 1: Types of industrial trucks*

ISO 6011:2023, *Earth-moving machinery — Visual display of machine operation*

ISO 6292:2020, *Powered industrial trucks and tractors — Brake performance and component strength*

ISO 7000:2019, *Graphical symbols for use on equipment — Registered symbols*

ISO 7010:2019,⁵ *Graphical symbols — Safety colours and safety signs — Registered safety signs*

⁴ This reference is impacted by the following amendment: ISO 3767-1:2016/Amd 1:2020

⁵ This reference is impacted by the following amendment:

ISO 7010:2019/Amd 1:2020

ISO 7010:2019/Amd 2:2020

ISO 7010:2019/Amd 3:2021

ISO 7010:2019/Amd 4:2021

ISO 7010:2019/Amd 5:2022

ISO 7010:2019/Amd 6:2022

ISO 7010:2019/Amd 7:2023

ISO 7010:2019/Amd 8:2024

ISO 7010:2019/Amd 9:2025

ISO 7010:2019/Amd 10:2025

- ISO 9244:2008,⁶ *Earth-moving machinery — Machine safety labels — General principles*
- ISO 9533:2010, *Earth-moving machinery — Machine-mounted audible travel alarms and forward horns — Test methods and performance criteria*
- ISO 10263-2:2009, *Earth-moving machinery — Operator enclosure environment — Part 2: Air filter element test method*
- ISO 10263-3:2009, *Earth-moving machinery — Operator enclosure environment — Part 3: Pressurization test method*
- ISO 10263-4:2009, *Earth-moving machinery — Operator enclosure environment — Part 4: Heating, ventilating and air conditioning (HVAC) test method and performance*
- ISO 10896-8:2024, *Rough-terrain trucks — Safety requirements and verification — Part 8: Requirements for trucks designed for towing*
- ISO 11112:1995,⁷ *Earth-moving machinery — Operator's seat — Dimensions and requirements*
- ISO 12508:1994, *Earth-moving machinery — Operator station and maintenance areas — Bluntness of edges*
- ISO 12509:2023, *Earth-moving machinery and rough-terrain trucks — Lighting, signalling and marking lights, and reflex reflectors*
- ISO 13333:1994, *Earth-moving machinery — Dumper body support and operator's cab tilt support devices*
- ISO 15818:2017, *Earth-moving machinery — Lifting and tying-down attachment points — Performance requirements*
- ISO 15870:2000, *Powered industrial trucks — Safety signs and hazard pictorials — General principles*
- ISO 16528-1:2007, *Boilers and pressure vessels — Part 1: Performance requirements*
- ISO 16528-2:2007, *Boilers and pressure vessels — Part 2: Procedures for fulfilling the requirements of ISO 16528-1*
- ISO 21507:2010, *Earth-moving machinery — Performance requirements for non-metallic fuel tanks*
- ISO 22915-10:2023, *Industrial trucks — Verification of stability — Part 10: Additional stability test for trucks operating in the special condition of stacking with load laterally displaced by powered devices*
- ISO 22915-14:2010, *Industrial trucks — Verification of stability — Part 14: Rough-terrain variable-reach trucks*
- ISO 22915-20:2023, *Industrial trucks — Verification of stability — Part 20: Additional stability test for trucks operating in the special condition of offset load, offset by utilization*

ISO 7010:2019/Amd 11:2026

⁶ This reference is impacted by the following amendment: ISO 9244:2008/Amd 1:2016

⁷ This reference is impacted by the following amendment : ISO 11112:1995/Amd 1:2001

prEN 1459-1:2026 (E)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010, ISO 5053-1:2020 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

rough-terrain variable-reach truck

variable-reach truck intended primarily for operation on unimproved natural terrain and on the disturbed terrain of, for example, construction site

[SOURCE: ISO 5053-1:2020, 3.21]

3.2

variable-reach truck

lift truck fitted with one or more articulated arms, telescopic or not, non-slewing or having a slewing movement of not more than 5° either side of the longitudinal axis of the truck used for stacking loads

[SOURCE: ISO 5053-1:2020, 3.20]

Note 1 to entry: See Figure 1.

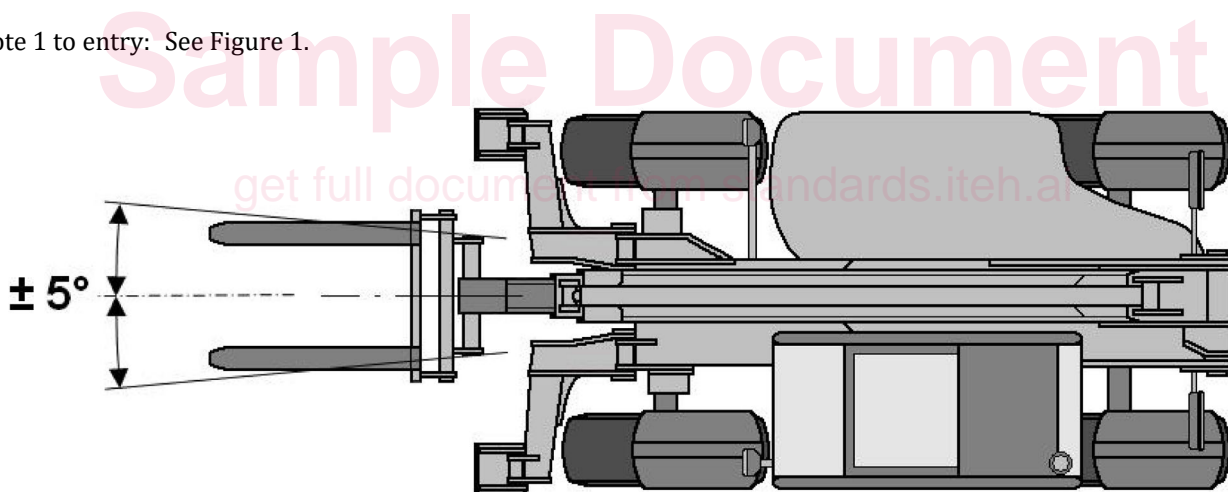


Figure 1 — Variable-reach truck

3.3

compact truck

truck having a maximum height in normal travel mode of 2 200 mm and at least one of the following conditions:

- a maximum operating mass of 7 000 kg;
- a maximum width in normal travel mode of 2 000 mm

Note 1 to entry: These dimensions do not include equipment such as working lights, mirrors, etc.

Note 2 to entry: If different tyre sizes are available for the truck, these values include the tyres size providing for the minimum track width.

3.4 actual capacity

Q

maximum load, established by the manufacturer based on components strength and truck stability, that the truck can carry, lift and stack to a specified height, at a specified standard load centre distance and reach, in normal operating conditions

Note 1 to entry: The actual capacity depends on the configuration of the truck in terms of such variables as:

- lift height;
- reach of the boom;
- standard load centre distance;
- load handling device (fork arms or attachment fitted);
- stabilizing devices.

Note 2 to entry: This actual capacity defines the load handling ability of the particular truck as equipped. Additional actual capacity ratings with removable attachments may also be established where permitted by the appropriate stability test or by calculation verified by empirical data.

3.5 rated capacity

Q1

maximum load permitted by the manufacturer at the standard load centre distance (D) that the truck is capable of lifting and transporting on fork arms in normal conditions with the boom fully retracted

3.6 reach

d

distance between two vertical parallel planes, one plane tangent to the front of the outside diameter of the front tyres, the other plane described by the vertical projection of the centre-of-gravity of the load to the ground

Note 1 to entry: The centre-of-gravity of the load (G) is defined in Table 1.

Note 2 to entry: See Figure 2 for examples of reach.

Note 3 to entry: For practical matters, d can be measured referring to point g, being g the vertical projection of the centre-of-gravity (G) of the load onto the plane of the top surface of the fork arms.