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

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

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

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53.060 Industrijski tovornjaki Industrial trucks

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

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

Geländegängige Flurförderzeuge - 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.

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Foreword

This document (prEN 1459-1:2013) 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 1459:1998+A3:2012.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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

- Part 1: Variable-reach trucks
- Part 2: Rotating trucks
- Part 3: Additional requirements for variable reach trucks fitted with work platform
- Part 4: Additional requirements for variable reach trucks handling freely suspended loads
- Part 5: Additional requirements for attachments and attachment interface

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Introduction

This European Standard covers general safety requirements and the means for verification of these requirements for variable reach rough-terrain trucks (here-after also referred to as trucks) as defined in EN 15830.

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

Trucks may also be equipped with a variety of attachments (e.g., mower, sweeper).

All quantities are in metric units.

Considering the technical improvements to the previous version of EN 1459, a transition period of 12 months is permitted after the date of publication, such that manufacturers can develop their products sufficiently to meet the requirements of this European Standard.

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prEN 1459-1:2013 (E)**1 Scope**

This European Standard specifies the general safety requirements of non-slewing variable-reach rough-terrain trucks, articulated or rigid chassis, equipped with a telescopic lifting means (pivoted boom), on which a load handling device (e.g., carriage and fork arms) is typically fitted.

Fork arms and other integrated attachments are considered to be parts of the truck. For attachments the appropriate clauses of this standard are applicable and other specific standards may also apply.

This European Standard does not apply to:

- slewing variable reach rough terrain trucks covered by prEN 1459-2;
- industrial variable reach trucks covered by EN ISO 3691-2;
- lorry-mounted variable reach trucks;
- variable reach trucks fitted with tilting or elevating operator position;
- variable reach rough terrain trucks designed for container handling;
- mobile cranes covered by EN 13000;
- machines designed primarily for earth moving, such as loaders and dozers, 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 covered by prEN 1459-4;
- trucks fitted with personnel/work platforms, designed to move persons to elevated working positions covered by prEN 1459-3;
- trucks designed primarily for container handling;
- trucks incorporating tractor specific devices;
- trucks on tracks.

This European Standard does not address hazards linked to:

- hybrid power systems;
- gas power systems
- battery power systems.

This European Standard does not address hazards which may occur:

- a) during manufacture;
- b) when handling suspended loads which may swing freely;
- c) when using trucks on public roads;
- d) when operating in potentially explosive atmospheres;
- e) when operating underground.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

prEN 1459-5, *Rough-terrain trucks — Safety requirements and verification — Part 5: Additional requirements for attachments and attachment interface*

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

EN 12895:2000, *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*

EN 60204-32:2008, *Safety of machinery – Electrical equipment of machines – Part 32: Requirements for hoisting machines*

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

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 3164:2008, *Earth-moving machinery - Laboratory evaluations of protective structures - Specifications for deflection-limiting volume (ISO 3164:1995)*

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 6683:2008, *Earth-moving machinery - Seat belts and seat belt anchorages - Performance requirements and tests (ISO 6683:2005)*

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

EN ISO 13849-1:2008/AC:2009, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2006/Cor 1:2009)*

EN ISO 13850:2008, *Safety of machinery - Emergency stop - Principles for design (ISO 13850:2006)*

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EN ISO 13857:2008, *Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

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

ISO 5010:2007, *Earth-moving machinery – Rubber-tyred machines – Steering requirements*

ISO 6011:2003, *Earth-moving machinery – Visual display of machine operation*

ISO 6016:2008, *Earth-moving machinery -- Methods of measuring the masses of whole machines, their equipment and components*

ISO 6292:2008, *Powered industrial trucks and tractors -- Brake performance and component strength*

ISO 6682:1986/A1:1989, *Earth-moving machinery — Zones of comfort and reach for controls*

ISO 7000:2012, *Graphical symbols for use on equipment — Registered symbols*

ISO 7096:2000, *Earth-moving machinery — Laboratory evaluation of operator seat vibration*

ISO 9533:2010, *Earth-moving machinery — Machine-mounted audible travel alarms — 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 10532:1995/A1:2004/AC1:2006, *Earth-moving machinery – Machine-mounted retrieval device – Performance requirements*

ISO 10533:1993/A1:2005, *Earth-moving machinery – Lift-arm support devices*

ISO 10570:2004, *Earth-moving machinery – Articulated frame lock – Performance requirements*

ISO 10968:2004, *Earth-moving machinery -- Operator's controls*

ISO 11112:1995, *Earth-moving machinery – Operator's seat – Dimensions and requirements*

ISO 11862:1993, *Earth-moving machinery – Auxiliary starting aid electrical connector*

ISO 12508:1994, *Earth-moving machinery – Operator station and maintenance areas – Bluntness of edges*

ISO 12509:2004, *Earth-moving machinery – Lighting, signalling and marking lights, and reflex-reflector devices*

ISO 13333:1994, *Earth-moving machinery – Dumper body support and operator's cab tilt support devices*

ISO 13732-1:2006, *Ergonomics of the thermal environment -- Methods for the assessment of human responses to contact with surfaces -- Part 1: Hot surfaces*

ISO 15817:2012, *Earth-moving machinery – Safety requirements for remote operator control systems*

ISO/FDIS 15818:2012, *Earth-moving machinery – Lifting and tying down attachment points – Performance requirements*

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 22915-10:2008, *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 22915-20:2008, *Industrial trucks -- Verification of stability -- Part 20: Additional stability test for trucks operating in the special condition of offset load, offset by utilization*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5053:1987 and the following apply.

3.1

rough-terrain truck

truck designed for operation on unimproved natural terrain as well as the disturbed terrain of work sites

3.2

compact truck

truck having:

- a maximum height in normal travel mode of 2 150 mm, and
- a maximum operating mass of 6 000 kg according to ISO 6016:2008, and/or
- a maximum width in normal travel mode of 1 850 mm

3.3

actual capacity

maximum load, established by the manufacturer based on component strength and truck stability, that the truck can carry, lift and stack to a specified height, at a specified 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:

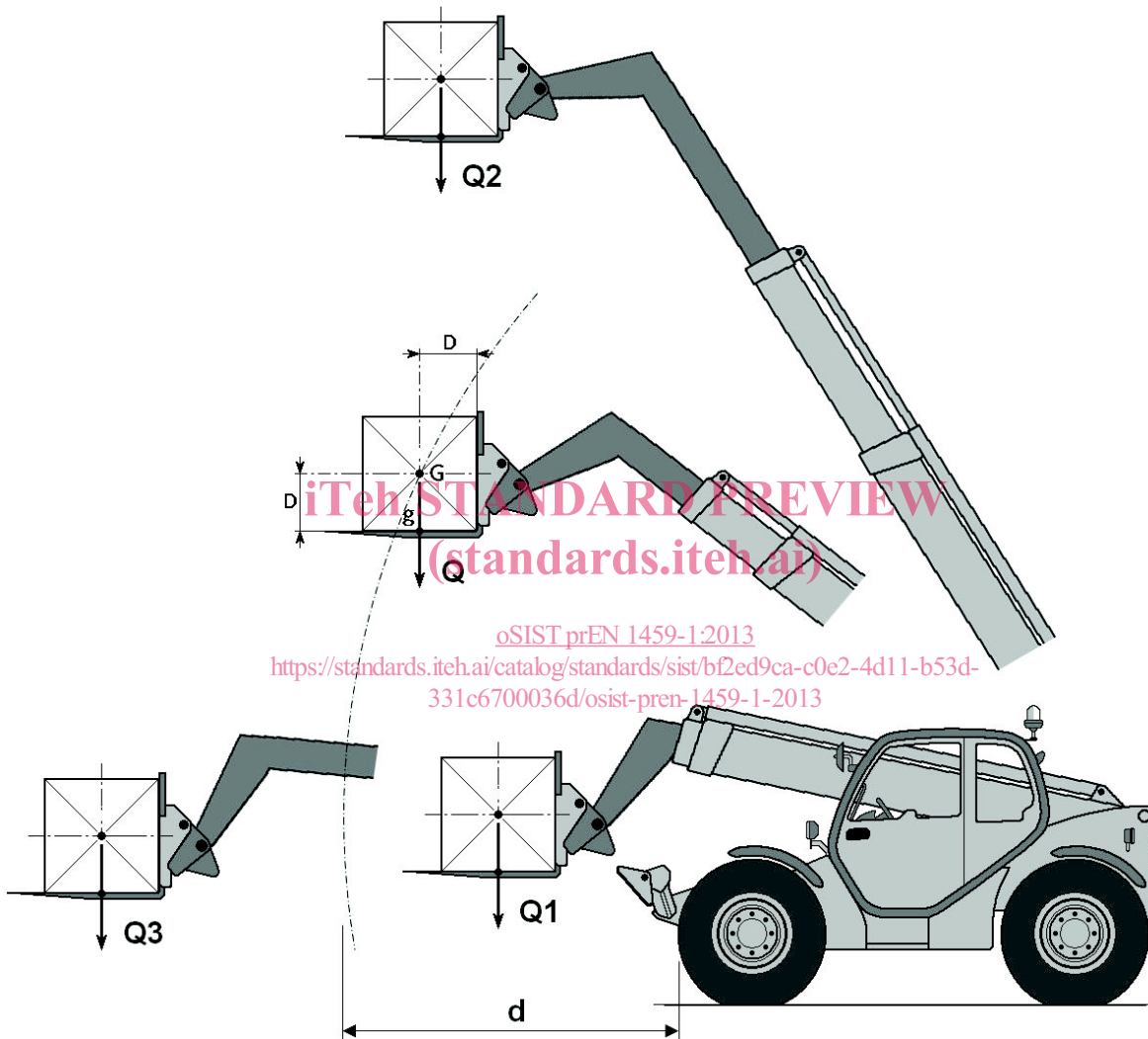
- lift height;
- reach of the boom (measured from the forward-most part of the front tyres);
- actual load centre;
- load handling device (fork arms or attachment fitted);
- stabilising devices.

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.

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3.4 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 tangent to the curve described by the centre-of-gravity (G) of the load (see Table 1) moving from its highest position to its lowest position (see Figure 1).

Note 1 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.

**Key**

- d reach
- D standard load centre distance
- G centre of gravity of the load
- g the vertical projection of the centre-of-gravity (G) of the load onto the plane of the top surface of the fork arms
- Q_1 rated capacity
- Q_2 rated capacity at maximum high
- Q_3 rated capacity at maximum reach

Figure 1 — Parameters for the designation of the actual capacity of the truck with fork

3.5

lift height

height from the ground to the upper face of the fork arms or to the underside of the load

3.6**standard load centre distance (*D*)**

distance from the centre of gravity (*G*) of the load measured horizontally back to the fronts of the fork shanks and vertically down to the upper faces of the fork arms, as specified in Table 1

Table 1 — Standard load centre distance

		400	500	600	900	1 200
0	< 1 000	X				
≥ 1 000	< 5 000		X			
≥ 5 000	< 10 000			X		
> 10 000	< 20 000			X	X	X
≥ 20 000	< 25 000				X	X
	≥ 25 000					X

Note 1 to entry: Trucks may be rated for special applications with load centres related to those applications.

3.7**rated capacity of attachments**

maximum load that the attachment is permitted by its manufacturer to handle in normal operation under specified conditions

Note 1 to entry: The rated capacity of the attachment can be associated with the load centre distance.

3.8**axle oscillation locking mechanism**

mechanism designed to prevent oscillation of an axle to improve truck stability

3.9**stabilising devices**

extendable and/or pivoting mechanical supports used to improve stability of a truck when stationary

3.10**lateral levelling**

changing the lateral inclination angle between the chassis and the ground to ensure the boom operates in a vertical plane even when the truck is positioned on a side slope

3.11**fork arms**

device including two or more solid fork arms (hook-mounted or shaft-mounted), which are fitted on the carriage and usually adjusted manually

3.12**side shift carriage**

device that displaces the load laterally from the longitudinal axis of the truck

3.13**fork arms extensions**

devices fitted over the fork arms to increase their length

3.14**boom**

pivoting support member that permits horizontal and vertical placement of the load or attachment

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3.15

crab steering mode

steering mode where all wheels of the truck steer in the same direction

3.16

Normal operator's position

position as specified by the manufacturer in which the operator is capable of controlling the truck operations, including load handling functions

Note 1 to entry: Other positions may be necessary if it is not possible to control all the functions of the truck from a single position.

3.17

attachment bracket

device fitted at the end of the boom to connect and lock interchangeable attachments without the use of a tool to facilitate quick interchange of attachment

3.18

non-slewing

having a slewing movement not greater than 5° to either side of the longitudinal axis of the truck (see Figure 2)

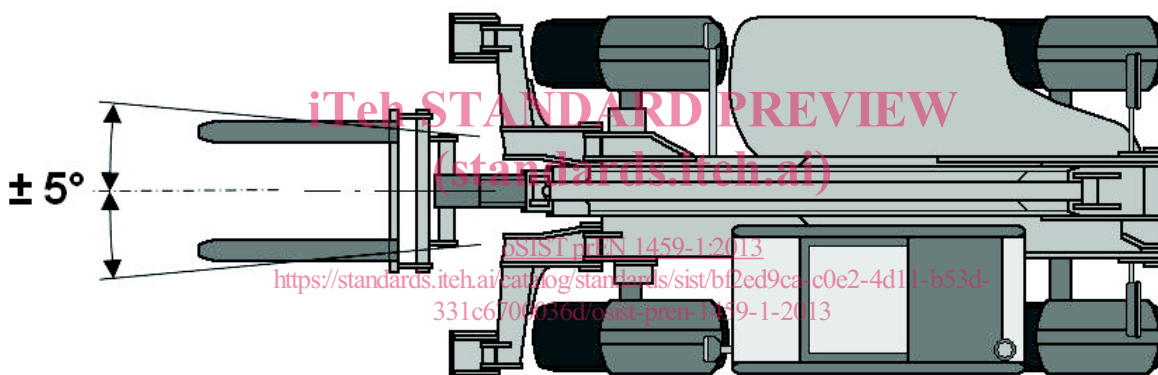


Figure 2 — Non-slewing movement

3.19

boom float

control mode that uses gravity to allow an attachment at the end of the boom to follow a contour (e.g. the ground)

3.20

maximum working pressure

highest pressure at which a hydraulic circuit is intended to operate under normal operating conditions

3.21

rated capacity of truck (Q)

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

3.22

interchangeable equipment

component or assembly of components, which can be mounted on the truck for a specific use

3.23**articulated truck**

truck in which steering is achieved by displacement of the front and rear around a central pivot

3.24**level ground**

ground with a gradient of $(0 \pm 2) \%$

4 List of significant hazards

See Annex A.

5 Requirements**5.1 General****5.1.1 Sharp edges and acute angles**

Sharp edges and acute angles shall meet the requirements specified in ISO 12508:1994 in areas to which the operator can be exposed during operation, access, egress and maintenance.

5.1.2 Stored energy components

Components that store energy and can cause a risk of injury during removal or disassembly, e.g. hydraulic accumulators and spring-applied brakes, shall be provided with a means to release the energy before removal or disassembly and shall be marked according to 7.4.8.

5.2 Starting/Moving**5.2.1 Unauthorised starting**

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All trucks shall be designed in a way that it cannot be started without a key, a code, a magnetic card or other equivalent device.

5.2.2 Unintended movement

Trucks shall be fitted with a device that prevents the engine being started whilst the drive-system is engaged. When the drive system direction control is in neutral, provisions shall be made to locate and maintain it in its neutral position.

5.2.3 Uncontrolled motion

The truck shall not move from rest on level ground until the drive system has been engaged.

5.2.4 Powered travel movement

Means shall be provided to prevent powered travel when the operator is not at the normal operator's position.

Powered travel shall not occur automatically when the operator returns to the normal operator's position without an additional operation, e.g., by requiring resetting the direction control. Application of the parking brake shall apply neutral travel control, except on trucks with hydro-static transmission.

NOTE On trucks with hydro-static transmission, the transmission system achieves the same objective.

5.2.5 Non-activation of the parking brake

A warning shall be activated when the operator is not at the normal operator's position and the parking brake has not been applied.