SLOVENSKI STANDARD
SIST EN 474-13:2022

01-maj-2022

Stroji za zemeljska dela - Varnost - 13. del: Zahteve za valjarje

Earth-moving machinery - Safety - Part 13: Requirements for rollers

Erdbaumaschinen - Sicherheit - Teil 13: Anforderungen für Walzen

Engins de terrassement - Sécurité - Partie 13 : Prescriptions applicables aux compacteurs

Ta slovenski standard je istoveten z: **EN 474-13:2022**

ICS:

53.100 Stroji za zemeljska dela Earth-moving machinery

SIST EN 474-13:2022 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 474-13

March 2022

ICS 53.100

English Version

Earth-moving machinery - Safety - Part 13: Requirements for rollers

Engins de terrassement - Sécurité - Partie 13 : Prescriptions applicables aux compacteurs

Erdbaumaschinen - Sicherheit - Teil 13: Anforderungen für Walzen

This European Standard was approved by CEN on 14 February 2022.

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Ref. No. EN 474-13:2022 E

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European foreword

This document (EN 474-13:2022) has been prepared by Technical Committee CEN/TC 151 “Construction equipment and building material machines - Safety”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by September 2022, and conflicting national standards shall be withdrawn at the latest by March 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document partially supersedes EN 500-4:2011.[1]

This document has been prepared under a standardization request 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.

For bibliographic references, see EN 474-1:2022.

EN 474 “Earth-moving machinery — Safety” comprises the following parts:

— Part 1: General requirements
— Part 2: Requirements for tractor-dozers
— Part 3: Requirements for loaders
— Part 4: Requirements for backhoe-loaders
— Part 5: Requirements for hydraulic excavators
— Part 6: Requirements for dumpers
— Part 7: Requirements for scrapers
— Part 8: Requirements for graders
— Part 9: Requirements for pipelayers
— Part 10: Requirements for trenchers
— Part 11: Requirements for earth and landfill compactors
— Part 12: Requirements for cable excavators
— Part 13: Requirements for rollers

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

[1] This document supersedes EN 500-4 together with prEN ISO 20500-4. Stage at time of publication of this document: prEN ISO 20500-4:2022.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: 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, Turkey and the United Kingdom.

Introduction

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

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

1 Scope

This document together with EN 474-1:2022 deals with all significant hazards, hazardous situations and events relevant to rollers when used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer (see Annex A) associated with the whole lifetime of the machine as described in EN ISO 12100:2010, 5.4.

The requirements of this document are complementary to the common requirements formulated in EN 474-1:2022. This document does not repeat the requirements of EN 474-1:2022 but supplements or modifies the requirements for rollers.

This document does not provide requirements for main electrical circuits and drives of machinery when the primary source of energy is an external electrical supply.

The following significant and relevant hazards are not covered in this document:

— Laser;

— Lightning.

This document does not provide performance requirements for safety related functions of control system(s).

This document does not deal with towing of trailers.

This part of EN 474:2022 is not applicable for seated ride-on operated rollers with a drum width less than nominal 0,8 m.

This document is not applicable to rollers which are manufactured before the date of publication of this document by CEN.

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 474-1:2022, *Earth-moving machinery — Safety — Part 1: General requirements*

EN ISO 3164:2013, *Earth-moving machinery — Laboratory evaluations of protective structures — Specifications for deflection-limiting volume (ISO 3164:2013)*

EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 6165:2012, *Earth-moving machinery — Basic types — Identification and terms and definitions (ISO 6165:2012)*

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

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

EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 13850:2015, *Safety of machinery — Emergency stop function — Principles for design (ISO 13850:2015)*

EN ISO 20643:2008, *Mechanical vibration — Hand-held and hand-guided machinery — Principles for evaluation of vibration emission (ISO 20643:2005)*

ISO 5006:2017, *Earth-moving machinery — Operator's field of view — Test method and performance criteria*

ISO 5353:1995, *Earth-moving machinery, and tractors and machinery for agriculture and forestry - Seat index point*

ISO 5805:1997, *Mechanical vibration and shock — Human exposure — Vocabulary*

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 474-1:2022, EN ISO 6165:2012, EN ISO 12100:2010 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
roller
self-propelled or towed machine having a compaction device, consisting of one or more metallic cylindrical bodies (drums) or rubber tyres, which compacts material such as crushed rock, earth, asphalt or gravel through a rolling and/or vibrating action of the compaction device

[SOURCE: EN ISO 6165:2012, 4.10]

Note 1 to entry: The wheel bodies (metallic cylinders) can be rubber-coated or fitted with pads.

3.1.1
non-vibrating (static) roller
roller that performs compaction by its static weight

3.1.2
vibrating roller
roller that have a vibrating and/or oscillating mechanism in at least one drum

3.1.2.1
single-drum roller
self-propelled roller with one vibrating metallic cylindrical body (drum) and two rubber tyres

3.1.2.2
tandem roller
self-propelled roller with one metallic cylindrical body (drum) in the front and one in the rear

Note 1 to entry: They can be either static or vibrating and they can be split.

3.1.2.3
combined roller
self-propelled roller with one or more metallic cylindrical body (drum) and more than two rubber tyres

3.1.2.4
three-wheel roller
self-propelled roller with one metallic body (drum) in the front (or rear) and two in the rear (or front)

Note 1 to entry: The drums can be split.

3.1.2.5
pneumatic-tyre roller
self-propelled roller with three or more tyres in the front and the rear

3.1.3
pedestrian-controlled roller
self-propelled compact roller (4 500 kg or less) with one or more metallic cylindrical bodies (drums) or rubber tyres in which the operating facilities for travelling, steering, braking and vibrating are disposed in such a way that the intended operation of the machine has to be undertaken by an attending operator or by remote control

Note 1 to entry: A pedestrian-controlled roller is considered to be non-riding machine in the sense of EN 474-1:2022, 3.13.

3.1.4
towed roller
roller with one or more metallic cylindrical bodies (drums) or rubber tyres which do not possess an independent drive system and where the operator's station is located at the towing unit

3.2
operating mass
OM

mass of the base machine, with equipment and empty attachment in the most usual configuration as specified by the manufacturer, and with the operator (75 kg), full fuel tank and all fluid systems (i.e. hydraulic oil, transmission oil, engine oil, engine coolant) at the levels specified by the manufacturer and, when applicable, with sprinkler water tank(s) half full

Note 1 to entry: The mass of an operator is not included for non-riding machines.

Note 2 to entry: Ballast mass at delivery can be included if specified by the manufacturer.

[SOURCE: ISO 6016:2008, 3.2.1]

3.3
operator's place
area as defined by the manufacturer on rollers other than ride-on, from which an operator controls the travel and work functions of the roller

4 Safety requirements and/or protective/risk reduction measures

4.1 General

4.1.1 Context

Rollers shall comply with the safety requirements and/or protective/risk reduction measures of this clause. In addition, the machines shall be designed according to the principles of EN ISO 12100:2010 for relevant but not significant hazards which are not dealt with by this document.

4.1.2 Specific relation to EN 474-1

Rollers shall comply with the requirements of EN 474-1:2022, as far as not modified or replaced by the requirements of this part.

4.2 Operator's station

4.2.1 General requirements

EN 474-1:2022, 4.3 shall apply with the following modification:

If the operator's position is offset from the space envelope width centreline, then the internal distance from the seat centreline to the side of the enclosure shall not be less than 295 mm.

EN 474-1:2022, 4.3.1.1, first paragraph shall be replaced by:

The operator’s station of seated ride-on rollers shall be fitted with a cab. This requirement does not apply to rollers with an operating mass < 6 000 kg; or rollers with an operating mass ≥ 6 000 kg and < 12 000 kg where either an operator’s cab or a canopy shall be fitted.

EN 474-1:2022, 4.3.1.2 shall apply with the following addition:

EN 474-1:2022, 4.3.1.3, 4.3.1.4 and 4.3.1.5 do also apply to the operator’s place.

4.2.2 Roll-over protective structures (ROPS)

EN 474-1:2022, 4.3.3 shall apply with the following addition:

For ROPS test, the position of the DLV (see EN ISO 3164:2013, 5.2) for machines which have multiple seat locations and therefore multiple SIPs (see ISO 5353:1995, 5.3.3), the SIP used by the operator in working mode in the most lateral position (as defined by the manufacturer) shall be used.

4.2.3 Falling-object protective structures (FOPS)

EN 474-1:2022, 4.3.4 applies only for single drum rollers > 6 000 kg. For single drum rollers > 6 000 kg EN ISO 3449:2008, Level I applies.

4.3 Operator's controls and indicators

4.3.1 General

EN 474-1:2022, 4.5 applies with the additions/modifications in 4.3.2, 4.3.3, 4.3.4.

4.3.2 Emergency stop

EN 474-1:2022, 4.5.2 shall apply with the following addition:

Rollers, except non-remote pedestrian-controlled rollers, shall be fitted with an emergency stop within the zone of comfort as specified in EN ISO 6682:2008.

It shall stop the movement of the machine. The emergency stop shall be in accordance with EN ISO 13850:2015 and meet at least the requirements of stop category 1.

NOTE For non-remote pedestrian controlled rollers, the requirements are described in 4.7.1.3.

4.3.3 Controls for towed machines

For towed-rollers, it shall be possible to at least control the on-off operation of the vibration from the operator's station on the towing unit.

4.3.4 Remote control

EN 474-1:2022, 4.5.7 shall apply to rollers.

EN 474-1:2022, 4.5.7 shall apply for pedestrian-controlled rollers with the modifications/additions in Annex B.

4.3.5 Controls of ride-on machinery accessible from ground level

EN 474-1:2022, 4.5.9 applies with the following addition:

Ride-on operated machines shall prevent uncontrolled travelling of the machine if the operator is not on the operator's station.

NOTE This requirement can be achieved by technical means like seat switches, sensors on the armrest, etc. in conjunction with a time delay.

The delay time before stopping shall be less than the time to reach the hazardous area from operator's station.

4.4 Brake systems for travelling

EN 474-1:2022, 4.7 shall apply.

For ride-on machines, EN 474-1:2022, 4.7.1 applies with the following addition:

If a hydrostatic drive is provided, it shall be interrupted when activating the secondary brake.

4.5 Visibility

EN 474-1:2022, 4.8 shall apply with the following addition:

ISO 5006:2017 shall be applied with the following clarification:

For rollers, which can be ballasted and where the operational weight may exceed one of the thresholds of ISO 5006:2017, Table 2 concerning the height of the test-object, the height of the test object shall be 1,2 m for the rectangular boundary (RB).

4.6 Noise

EN 474-1:2022, 4.13 and 6.3.2 shall apply with the following modifications:

— the noise emission of vibratory rollers shall be determined according to Annex D;

— the noise emission of non-vibratory rollers shall be determined according to Annex E.

NOTE A main source of noise for rollers is also the compaction process.

4.7 Protective measures and devices

4.7.1 Pedestrian-controlled rollers

4.7.1.1 General

EN 474-1:2022, 4.14 shall apply with the additions/modifications stated in 4.7.1.2, 4.7.1.3 and 4.7.2.

4.7.1.2 Handle bar

To prevent dangerous vertical swinging of the steering element (handle bar) of the single-drum pedestrian-controlled rollers, movement of the handle shall be not less than 0,2 m and not more than 1,4 m above the ground (see Figure 1).

Dimensions in millimetres

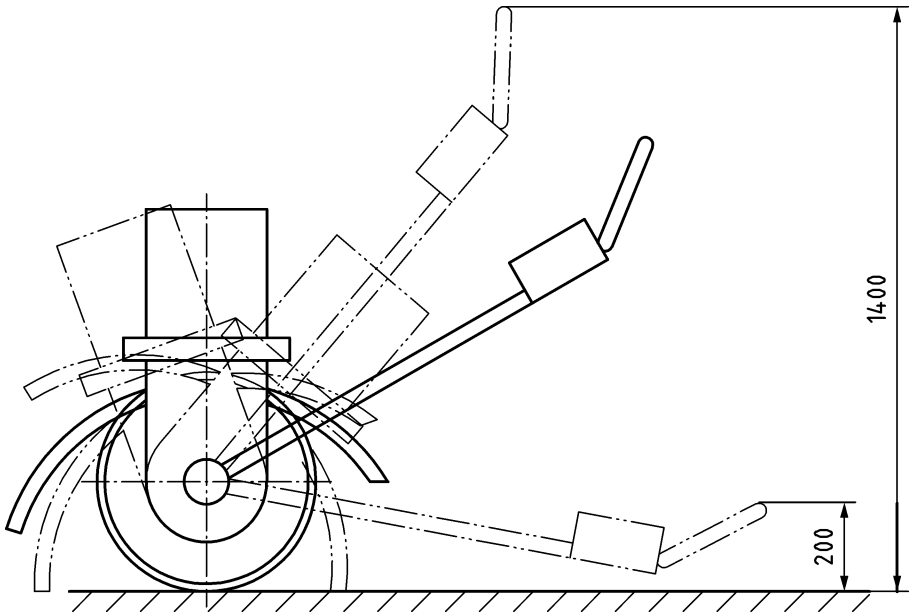


Figure 1 — Vertical swinging of single-drum walk-behind rollers

4.7.1.3 Protection against crushing

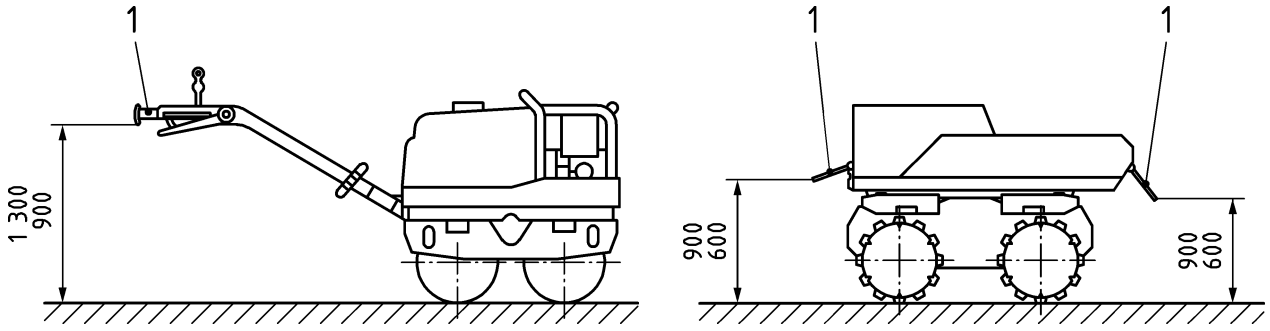
Pedestrian-controlled rollers shall be provided with a device against crushing which is designed to prevent the operator from being trapped between the machine and an obstacle.

If this device is of mechanical type (see Figure 2), e.g. force actuated protective device, it shall be so designed to stop the machine in a distance that is less than the total operating range of the device and its effective operating force shall not exceed 230 N.

NOTE 1 Further guidance on protective devices can be found in EN ISO 13855:2010.

NOTE 2 This device can be of a mechanical type as shown in Figure 2 or provide its function by other means (e.g. laser scanner, ultrasonic, radar, transponder system). See B.2, first paragraph.

Dimensions in millimetres



Key

1 stopping device

a) rollers with handle bar

b) remote controlled rollers

Figure 2 — Position of the protective device on non-riding rollers

4.7.2 Articulated machines

EN 474-1:2022, 4.14.2.3 applies with the following modification:

Rollers with pivot articulated components shall be equipped with an integral, rigid locking device to prevent pivoting during maintenance and/or transport. The locking device shall meet the requirements of ISO 10570:2004, but with a safety factor of 1,5 instead of 2 as indicated in ISO 10570:2004, 4.4, second paragraph.

4.8 Fuel tanks, DEF/urea tanks, hydraulic tanks and pressure vessels

EN 474-1:2022, 4.19 applies with the following exemption:

The requirements for fluid level indicators in EN 474-1:2022, 4.19.1 are not applicable for fuel tanks of rollers with an operating mass ≤ 2 000 kg.

4.9 Maintenance

EN 474-1:2022, 4.22.2, 3rd paragraph does not apply to compact rollers with an operating mass ≤ 4 500 kg.

5 Verification of safety requirements and/or protective/risk reduction measures

Safety requirements and/or protective/risk reduction measures of Clause 4 of this document shall be verified according to Table 1.

Table 1 sets out verification methods which shall be applied for each safety requirement in this document.

Where X(s) is indicated in the table, the corresponding verification method(s) shall be applied.

Table 1 shall be read in conjunction with the corresponding clauses.

Table 1 includes the following verification methods:

a) calculation: to establish that the requirements of this document have been met;

b) visual verification: to establish that something is present (e.g. a guard, a marking, a document);

c) measurement: to show that the required numerical values have been met (e.g. geometric dimensions, safety distances, resistance of insulation of the electric circuits, results of physical tests);

d) functional tests: to show that the adequate signals intended to be forwarded to the main control system of the complete machine are available and comply with the requirements and with the technical documentation;

e) special verification: by reference to a standard which is mentioned in the corresponding clause.

Table 1 — Verification of safety requirements and/or protective/risk reduction measures

Clause number		a) Calculation	b) Visual verification	c) Measurement	d) Functional test	e) Special verification
4.1	General					X
4.2.1	Operator's station, General requirements		X			X
4.2.2	Roll-over protective structure (ROPS)					X
4.2.3	Falling object protective structure (FOPS)					X
4.3.2	Emergency stop					X
4.3.3	Controls for towed machines		X			
4.3.4	Remote control			X	X	X
4.3.5	Controls of ride-on machinery accessible from ground level				X	
4.4	Brake systems for travelling					X
4.5	Visibility					X
4.6	Noise			X		
4.7.1.2	Handle bar			X		
4.7.1.3	Protection against crushing			X	X	
4.7.2	Articulated machines					X

6 Information for use

6.1 General

Information for use shall be provided in accordance with EN ISO 12100:2010, 6.4.

6.2 Machine safety labels

EN 474-1:2022, 6.2 applies with the following addition: