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Stroji za zemeljska dela - Varnost - 10. del: Zahteve za rovokopače

Earth-moving machinery - Safety - Part 10: Requirements for trenchers

Engins de terrassement - Sécurité - Partie 10 : Prescriptions applicables aux trancheuses

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Earth-moving machinery - Safety - Part 10: Requirements for trenchers

Engins de terrassement - Sécurité - Partie 10 : Prescriptions applicables aux trancheuses

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

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European foreword

This document (prEN 474-10:2017) 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 document is currently submitted to the CEN Enquiry.

This document will supersede EN 474-10:2006+A1:2009.

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.

For bibliographic references, see prEN 474-1:2017.

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

This European Standard is intended for use in combination with part 1 of the prEN 474 series and with other specific part of the prEN 474 series if the carrier-vehicle is an earth-moving machinery (e.g. prEN 474-3 for a compact loader, prEN 474-4 for a backhoe loader).

Introduction

This part of prEN 474 is a type C standard as stated in EN ISO 12100:2010.

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

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 part of prEN 474 deals with all significant hazards, hazardous situations and events relevant to trenchers as defined in EN ISO 6165:2012 and trenchers with mechanized laying unit, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4). It deals with:

— self-propelled integrated trencher;

— combinations of a carrier-vehicle (truck, tractor, special vehicle) and a trenching attachment;

— trenching interchangeable equipment fitted to a derivative machinery (e.g. compact loader) or a compact tool carrier).

— For self-propelled integrated trencher, this part deals with all specific health and safety requirements.

— For machinery which are a combination of a carrier-vehicle and a trenching attachment integrated to it (e.g. to a truck) or mounted on it (e.g. on a tractor), this part of prEN 474 deals with all specific health and safety requirements of the trenching attachment itself and of the interface (e.g. mechanical, electric, hydraulic, controls) between the carrier-vehicle and its attachment as well as the interaction and effects on each other when used together (e.g. stability, visibility).

NOTE Carrier-vehicles are subject to other regulations (e.g. road regulations).

— For derivative machinery, this part deals with specific health and safety requirements of the interchangeable equipment and the interface with derivative machinery or tool carrier.

— For those machinery, this part doesn't deal with the earth-moving machinery itself which can be subject to other standards (e.g. prEN 474-3 for a compact loader, prEN 474-4 for a backhoe loader).

This European Standard does not deal with continuous surface miners as defined in ISO/CD 19224, truck-trenchers that do not incorporate a vacuum extraction system and self-propelled ride-on and pedestrian controlled floor cutting-off machinery (e.g. ground saw) which are under the scope of EN 13862.

This document, together with part 1, deals with all significant hazards for earth-moving machinery – trenchers when they are used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer associated with the whole life time of the machine (see Clause 4).

The requirements of this part are complementary to the common requirements formulated in prEN 474-1. This document does not repeat the requirements from prEN 474-1, but adds or replaces the requirements for application for trenchers.

This European Standard is not applicable to trenchers manufactured before the date of publication of this European Standard by CEN.

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 474-1:2017, *Earth-moving machinery — Safety — Part 1: General requirements*

EN 795:2012, *Personal fall protection equipment — Anchor devices*

EN ISO 3411:2007, *Earth-moving machinery — Physical dimensions of operators and minimum operator space envelope (ISO 3411:2007)*

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

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 1857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

ISO 6393:2008, *Earth-moving machinery — Determination of sound power level — Stationary test conditions*

ISO 6394:2008, *Earth-moving machinery — Determination of emission sound pressure level at operator's position — Stationary test conditions*

ISO 13539:1998, *Earth-moving machinery — Trenchers — Definitions and commercial specifications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 474-1:2017, ISO 13539:1998 and EN ISO 12100:2010 and the following apply.

3.1
trencher
self-propelled crawler or wheeled machine, having rear- and/or front-mounted equipment [attachment (3.2)], primarily designed to produce a trench in a continuous operation, through motion of the machine (see examples in B.1)

Note 1 to entry: The attachment can be a digging chain, disc, plough blade or similar tool (see EN ISO 6165:2012).

[SOURCE ISO 13539:1998, 3.1, modified to include 2nd sentence as NOTE 1 and reference to Figures added]

Note 2 to entry: For trenching attachment combined with a carrier-vehicle, the carrier-vehicle can be a tractor, a truck, an earth-moving machinery or other special vehicle.

3.2
trenching attachment
assembly of components for a making a trench (3.5) and which can be mounted onto either the base machine, an earth-moving machinery or its equipment

[SOURCE: ISO 13539:1998, 3.7 modified to make it more specific to trencher and adding “an earth-moving machinery”]

3.3
trencher with mechanized laying unit
trencher designed and manufactured in order to produce in a single operation a trench and a mechanized laying for simultaneous deployment of networks (e.g. pipes for gas, electricity, water or cables for telecommunication) in urban or rural environment

Note 1 to entry: This machine can be fitted with a cable holder equipment, a cable guide equipment and a towing device of slip formwork (see examples in B.2).

3.4
truck-vacuum trencher
combination of a trenching attachment and of a vacuum system integrated to a truck in order to produce micro-trenches (see note in 3.5) and simultaneously remove and store debris (see example in B.3)

3.5
trench
narrow horizontal excavation for which, in general, the depth is greater than the width

[SOURCE: ISO 13539:1998, 3.2]

3.6
reel carrier-equipment
integral structure transporting and dispensing a spool of cables or other material during the trenching operation (see examples in Figures B.1 to B.4)

[SOURCE: ISO 13539:1998, 5.1 modified to be more general]

3.7
continuous handling system
system integrated to the trencher and intended to evacuate materials coming from the trenching application. This system is usually a belt conveyor or a combination of several belt conveyors (see example in Figure B.13) but it can be also a pneumatic transportation equipment (see example in Figure B.14)

3.8
working depth
trenching depth range of the trencher, from minimum depth to maximum depth, as defined by the manufacturer in the instruction's handbook

3.9
barrier
device reducing inadvertent contact with the trenching attachment and signalling the hazards due to the rotating parts of the trenching attachment

3.10
extracted material area
zone where the material is discharged by the machine, as defined by the manufacturer in the instruction's handbook

3.11
protective bar
structure generally above and parallel to the digging chain which provides a degree of protection from contact with the digging element (see Figures B.8 to B.10 for example in Annex B)

Note 1 to entry: A protective bar can be a restraint bar or trench cleaner bar as shown in ISO 13539:1998, Figure 5.

4 List of additional significant hazards

See Annex A.

NOTE Annex A (normative) contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this European Standard, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk.

5 Safety requirements and/or measures

5.1 General

Trenchers shall comply with the relevant requirements of EN 474-1:2017, as far as not modified or replaced by the requirements of this part.

5.2 Operator's station

5.2.1 Non-riding trenchers

prEN 474-1:2017, 5.3.1.6 does not apply for non-riding machines.

5.2.2 Roll -over protective structure (ROPS) for ride-on machinery

prEN 474-1:2017, 5.3.3 only applies to ride-on seated trenchers.

Force and energy equation shall be according to EN ISO 3471:2008, Table 1, no. 1 or 3.

The operator's station of trenchers with an elevating operator's station shall meet the relevant requirements of prEN 474-1:2017, Annex B.

5.3 Operator's seat

5.3.1 General

prEN 474-1:2017, 5.4.1.2 shall apply with the following exemptions stated in 5.3.2 and 5.3.3 of this part.

5.3.2 Adjustment of seat with a transversal position

Fore and aft adjustment is not required.

In addition, the vertical adjustment shall meet the requirements in ISO 11112/Amd1.

5.3.3 Swivel seat

For seated ride-on equipment intended to be operated for long installations, typically base machine mass greater than 3 000 kg, and where the operator shall look over his shoulder to see the attachment from the driving position, a swivel seat shall be available.

5.4 Operator's controls

5.4.1 General

prEN 474-1:2016, 5.5.1 shall apply with the additions in the following 5.4.2 and 5.4.3.

5.4.2 Mode selector

In case of different operating modes (e.g. maintenance mode, working mode, road travelling mode), the trencher shall be fitted with a mode selector.

This mode selector shall be lockable.

This may be in the form of a key-switch, lockable switch, access code, switch in a lockable cab or compartment or other comparable means.

Any change of control mode shall reinitialize the machine controls and stop any hazardous movement.

The selected mode shall be indicated (e.g. position of the mode selector, lighting indicator, visual indication on a screen).

NOTE 2 See also 5.4.4 "Additional requirements for trenchers intended to be used simultaneously by two operators" and 5.12 "Maintenance mode".

(See EN 60204-1:2006, 9.2.3).

5.4.3 Working process controls

For trenching operations, it may be ergonomically beneficial to have a control that is not hold-to-run. Where the trenching ground drive is not a hold-to-run control, the design shall limit the maximum speed to only the capabilities of the machine to perform its trenching function.

All controls shall return to their neutral position when the operator releases control of them unless the functional control of the machine or its equipment dictates otherwise, such as needing a continuously active function or a functionally related detent position.

When return to neutral controls are not provided, one of the following continuously monitoring means shall be fitted to verify the presence of the operator at the controls:

— a means to detect the presence of the operator shall be installed (e.g. a seat switch), the delay time before stopping shall be less than the time to reach the hazardous area from the operator's station, but enough time to prevent creating a nuisance for the operator. The delay shall be no longer than 10 s before movement is stopped

or

— a means to monitor the changes in control activation shall be installed. The delay time before stopping the machine is 10 s and is automatically reset when the operator activates one control. If the machinery is equipped with a remote control, this delay can be increased to no longer than 2 min and 15 m. In that case, a visual or audible alarm shall inform the operator before the end of the delay.

Additionally, if inspection or operation from outside the cab is intended, the machinery shall be equipped with a remote control.

In all case, if the presence of the operator is not detected, all hazardous movements of the machine shall be stopped.