

# Earth-moving machinery — Safety —

## Part 10: Requirements for trenchers

The European Standard EN 474-10:2006 has the status of a  
British Standard

ICS 53.100

# National foreword

This British Standard was published by BSI. It is the UK implementation of EN 474-10:2006. It supersedes BS EN 474-10:1998, which will be withdrawn on 1 November 2008.

The UK participation in its preparation was entrusted by Technical Committee B/513, Construction equipment and plant and site safety, to Subcommittee B/513/1, Earth moving machinery (International).

A list of organizations represented on B/513/1 can be obtained on request to its secretary.

The transition period is to allow stock of products manufactured to BS EN 474-10:1998 to be exhausted and for manufacturers to adopt the requirements of the revised standard.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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This European Standard was approved by CEN on 17 April 2006.

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## Foreword

This document (EN 474-10:2006) 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of an identical text or by endorsement, at the latest by May 2007, and conflicting national standards shall be withdrawn at the latest by November 2008.

This European Standard supersedes EN 474-10:1998.

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.

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

For bibliographic references, see EN 474-1:2006.

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

This European Standard is intended for use in combination with Part 1 of the series.

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

## **Introduction**

This part of EN 474 is a type C standard as stated in EN ISO 12100-1:2003.

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 EN 474 deals with all significant hazards, hazardous situations and events relevant to trenchers as defined in EN ISO 6165:2006, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4).

The requirements of this part are complementary to the common requirements formulated in EN 474-1:2006.

This part does not deal with the specific hazards related to derivative use.

This part does not repeat the requirements from EN 474-1:2006, but adds or replaces the requirements for application for trenchers.

This part specifies the appropriate technical measures to eliminate or reduce risks arising from the significant hazards, hazardous situations and events during commissioning, operation and maintenance of 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 referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 474-1:2006, *Earth-moving machinery — Safety — Part 1: General requirements*

EN 13510:2000, *Earth-moving machinery — Roll-over protective structures — Laboratory tests and performance requirements (ISO 3471:1994 including Amendment 1:1997 modified)*

EN ISO 3411:1999, *Earth-moving machinery — Human physical dimensions of operators and minimum operator space envelope (ISO 3411:1995)*

EN ISO 6682:1995, *Earth-moving machinery — Zones of comfort and reach for controls (ISO 6682:1986 including Amendment 1:1989)*

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

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

ISO 6016:1998, *Earth-moving machinery — Methods of measuring the masses of whole machines, their equipment and components*

ISO/DIS 6393:2004, *Earth-moving machinery — Determination of sound power level noise emissions — Stationary test conditions*

ISO/DIS 6394:2004, *Earth-moving machinery — Determination of emission sound pressure level at operator's position — Stationary test conditions*

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

ISO 17063:2003, *Earth-moving machinery — Braking systems of pedestrian-controlled machines — Performance requirements and test procedures*

### 3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 474-1:2006 and EN ISO 12100-1:2003 and the following apply.

NOTE 1 Terminology for trenchers is specified in ISO 13539:1998 and illustrated in Annex B of this European Standard.

NOTE 2 Definitions used in EN and ISO standards referred to in this European Standard are also valid for this document.

#### 3.1

##### **trencher**

self-propelled crawler or wheeled machine, having a rear- and/or front-mounted equipment/attachment, primarily designed to produce a trench in a continuous operation, through a motion of the machine; the attachment can be a digging chain, wheel disk, plough blade or similar tool (see EN ISO 6165:2006)

#### 3.2

##### **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 in Annex B)

#### 3.3

##### **trench**

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

### 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 requirements of EN 474-1:2006, as far as not modified or replaced by the requirements of this part.

#### 5.2 Ride-on operated trenchers

##### 5.2.1 Operator's station

For minimum space envelope EN 474-1:2006, 5.3.1 applies with the exception that, for trenchers with an operating mass according to ISO 6016:1998 of less than 2 000 kg, the minimum space envelope width dimension 920 mm according to EN ISO 3411:1999, Figure 5 may be reduced to 650 mm at elbow height.

##### 5.2.2 Roll-over protective structure (ROPS)

A roll-over protective structure (ROPS) shall be fitted. Force and energy equation shall be according to Table 1, no. 3 of EN 13510:2000.

The operator's station of trenchers with an elevating operator's station shall meet the requirements of EN 474-1:2006, Annex D.



### 5.2.3 Operator's seat

#### 5.2.3.1 General

EN 474-1:2006, 5.4.1.2 applies with the exceptions in 5.2.3.2 and 5.2.3.3.

#### 5.2.3.2 Adjustment

##### 5.2.3.2.1 Seat with a longitudinal position

For machines with an operating mass according to ISO 6016:1998 < 3 500 kg the adjustment range shall comply with EN 474-1:2006, 5.4.1.3 for compact machines.

##### 5.2.3.2.2 Seat with a transversal position

Fore and aft adjustment is not required.

##### 5.2.3.2.3 Vibration

EN 474-1:2006, 5.4.1.4 applies with the following addition that the seat shall comply with EN ISO 7096:2000, input spectral class EM 6.

#### 5.2.3.3 Additional/separate operator's station

If a separate operator's station is required for control of special attachment, the following exceptions apply to this separate operator's station

- a separate cab is not required (EN 474-1:2006, 5.3.1 does not apply);
- a roll-over protective structure is not required (EN 474-1:2006, 5.3.3 does not apply);
- falling object protective structures are not required (EN 474-1:2006, 5.3.4 does not apply).

### 5.2.4 Operator's controls

#### 5.2.4.1 General

EN 474-1:2006, 5.5.1 applies with the additions in 5.2.4.2 and 5.2.4.3.

#### 5.2.4.2 Engine stop

If a separate seat for special attachment is provided (e. g. backhoe equipment) an additional engine stopping device shall be fitted if the normal stopping device is not within the zone of reach according to EN ISO 6682:1995 from the separate seat.

#### 5.2.4.3 Deactivation device

EN 474-1:2006, 5.5.3 applies with the addition that the deactivation device shall stop machine travel and attachment movement when the operator leaves the operator's station.

### 5.2.5 Stability

EN 474-1:2006, 5.11 applies with the exception that for backhoe equipment on trenchers the second paragraph of 5.11 does not apply.

### **5.3 Protective bar**

EN 474-1:2006, 5.14.3 applies with the provision that a protective bar as defined in 3.2 shall be fitted over the top on the whole length of the trenching attachment. A restraint bar or trench cleaner bar as shown in ISO 13539:1998 satisfy this requirement.

### **5.4 Pedestrian-controlled trenchers**

#### **5.4.1 Operator's station**

EN 474-1:2006, 5.3.1.1, 5.3.1.2 and 5.3.1.6 do not apply for pedestrian-controlled machines.

#### **5.4.2 Controls**

##### **5.4.2.1 General**

EN 474-1:2006, 5.5 applies with the additions in 5.4.2.2 and 5.4.2.3.

##### **5.4.2.2 Automatic stop**

Pedestrian controlled trenchers shall be equipped with a hold-to-run device to stop machine travel and hazardous tool movement if the operator releases the operator's controls. Design of the controls shall take into account the hazards from inadvertent movement of the machine towards the operator.

##### **5.4.2.3 Speed limit**

The forward speed of pedestrian controlled machines shall not exceed 6 km/h by design. The speed for travelling towards the operator's position shall not exceed 2,5 km/h by design.

#### **5.4.3 Brake system**

Brake system shall comply with the requirement of ISO 17063:2003.

#### **5.4.4 Lighting**

EN 474-1:2006, 5.8.2 does not apply for pedestrian-controlled trenchers. If provided lighting, signalling and marking lights shall comply with the appropriate clauses of ISO 12509:2004.

#### **5.4.5 Warning devices and safety signs**

EN 474-1:2006, 5.9, first indent does not apply for pedestrian-controlled trenchers. Safety signs shall be in accordance with Annex C of EN 474-1:2006.

#### **5.4.6 Retrieval, transportation, lifting and towing**

EN 474-1:2006, 5.15 applies with the exception that 5.15.2 and 5.15.5 do not apply to pedestrian-controlled trenchers.

### **5.5 Noise**

#### **5.5.1 Sound power level**

EN 474-1:2006, 5.13.2.1 applies.

The sound power level for trenchers shall be measured according to ISO/DIS 6393:2004.

### 5.5.2 Sound pressure level at operator's station

EN 474-1:2006, 5.13.2.2 applies.

The sound pressure level at the operator's station for trenchers shall be measured according to ISO/DIS 6394:2004.

## 6 Information for use

EN 474-1:2006, Clause 7 applies with the following additions for 7.2:

The operation manual shall contain the following additional information:

- 6.1** instructions for wearing hearing protection if 85 dB(A) sound pressure is exceeded;
- 6.2** instruction regarding the deactivating device;
- 6.3** safety rules for the use of protective bar;
- 6.4** instructions and safety precautions to operate pedestrian controlled trenchers (e. g. automatic stop, speed limit, brake systems);

## Annex A (normative)

### List of additional significant hazards – Trenchers

The list of hazards in EN 474-1:2006, Annex A, applies with the following additions:

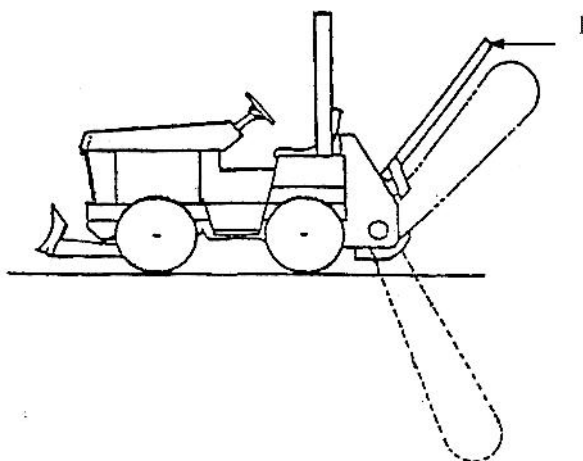
**Table A.1 — List of additional significant hazards**

No <sup>1)</sup>	Hazard	Relevant clauses of this European Standard
	<b>Hazards, hazardous situations and hazardous events</b>	
<b>1</b>	<b>Mechanical hazards</b> due to: — machine parts or working tools, e. g.: — equipment/attachment, e. g.: digging chain, wheel disk, plough blade etc.	5.3
<b>4</b>	<b>Hazards generated by noise</b>	5.5
<b>16</b>	<b>Loss of stability/overturning the machine</b>	5.2.5
	<b>Additional hazards, hazardous situations and hazardous events due to mobility</b>	
<b>19</b>	<b>Linked to operator's station on the machine</b>	
19.4	Mechanical hazards at the operator's station(s): a) rollover; b) additional/separate seat; c) contact of persons with machine parts or tools (pedestrian controlled machines)	5.2.2, 5.2.3.3, 5.4.2.2, 5.4.2.3 5.4.3
19.6	Inadequate operator lighting	5.4.4
19.7	Inadequate seating	5.2.3
19.9	Vibration at the operator's station(s)	5.2.3.2.3
<b>20</b>	<b>Due to the control system</b>	
20.3	Inadequate design of manual controls and their mode of operation	5.2.4
<b>22</b>	<b>Due to the power source and to the transmission of power</b>	
22.3	Hazards from retrieval, transportation, lifting and towing	5.4.6
<b>24</b>	<b>Insufficient instructions for the operator</b> (operation manual, signs, warnings and markings)	5.4.5, 6

1) Number refers to Annex A of EN 474-1:2006.

## Annex B (informative)

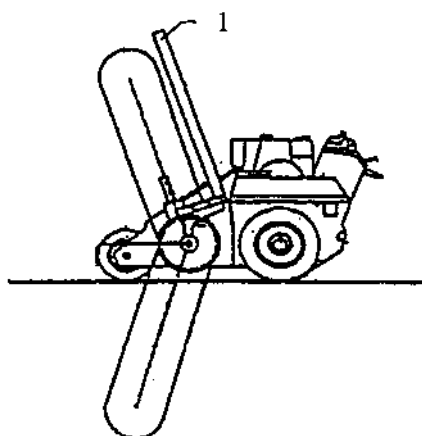
### Illustrations



#### Key

1 protective bar

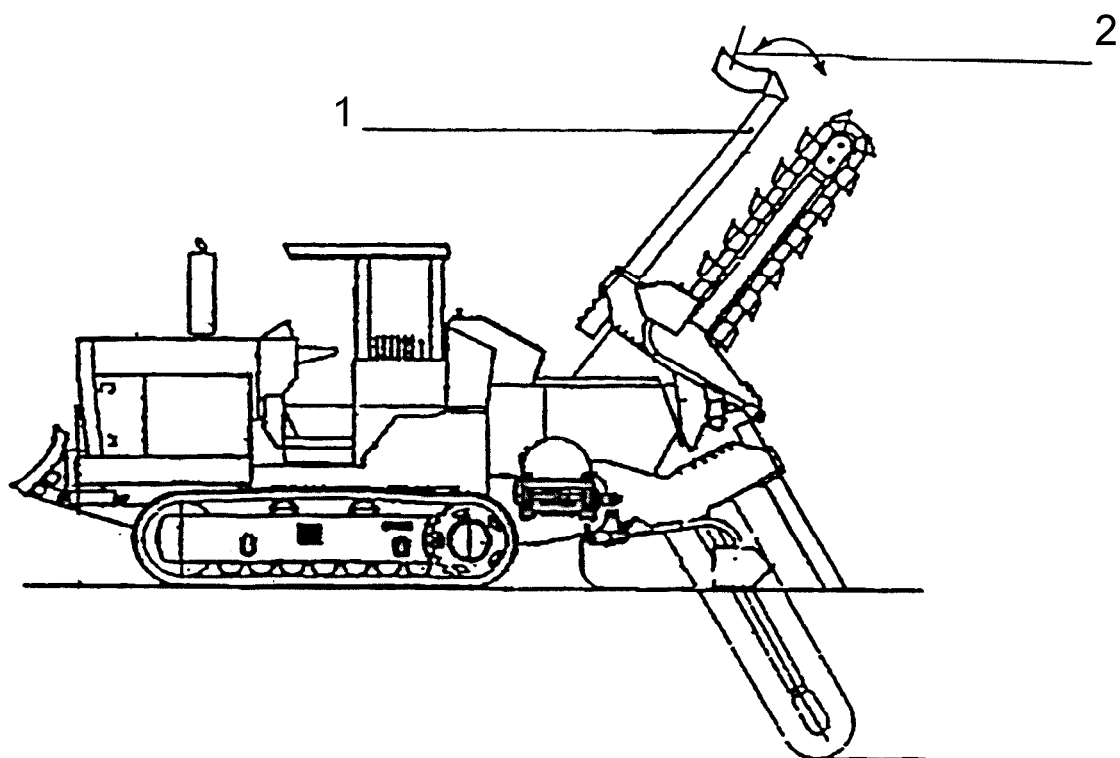
Figure B.1 — Wheel trencher (ride on)



#### Key

1 protective bar

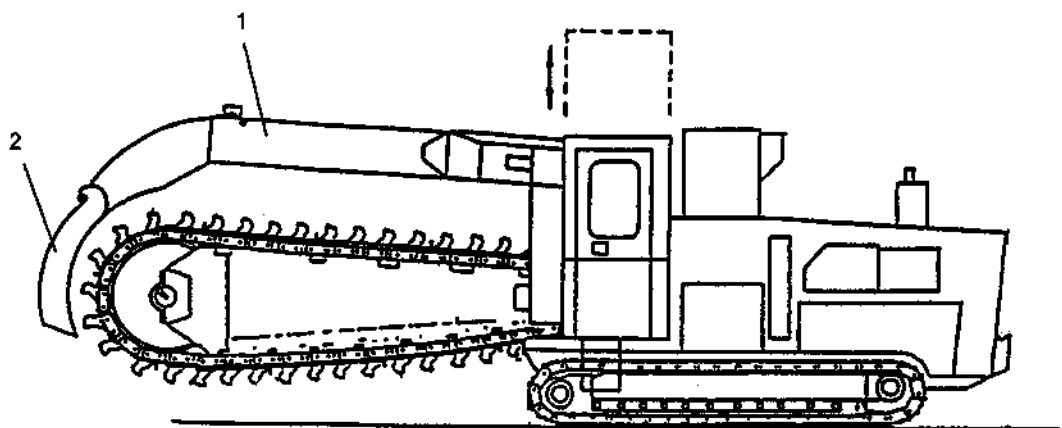
Figure B.2 — Wheel trencher (pedestrian controlled)



**Key**

- 1 protective bar
- 2 trench cleaner

**Figure B.3 — Crawler trencher (ride on)**



**Key**

- 1 protective bar
- 2 trench cleaner

**Figure B.4 — Crawler trencher with elevating operator's station**

## **Annex ZA** (informative)

### **Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC**

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive Machinery 98/37/EC, amended by 98/79/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

**WARNING —** Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

## Bibliography

- [1] ISO/DIS 6395:2004, *Earth-moving machinery — Determination of sound power level noise emission — Dynamic test conditions*
- [2] ISO 13539:1998, *Earth-moving machinery — Trenchers — Definitions and commercial specifications*
- [3] EN ISO 6165:2006, *Earth-moving machinery — Basic types — Identification and terms and definitions (ISO 6165:2006)*





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