

# Earth-moving machinery — Safety —

## Part 2: Requirements for tractor-dozers

The European Standard EN 474-2:2006 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 474-2:2006. It supersedes BS EN 474-2:1996, which will be withdrawn on 1 November 2008.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 474-2:1996 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.

**Compliance with a British Standard cannot confer immunity from legal obligations.**

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Engins de terrassement - Sécurité - Partie 2: Prescriptions applicables aux boteurs

Erdbaumaschinen - Sicherheit - Teil 2: Anforderungen für Planiermaschinen

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

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## Foreword

This document (EN 474-2:2006) 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of an identical text or by endorsement, at the latest by May 2007, and conflicting national standards shall be withdrawn at the latest by November 2008.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 474-2:1996.

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 wheel and crawler tractor-dozers 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).

This part also deals with rear-mounted winches for use on tractor-dozers.

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

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

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 tractor-dozers.

This European Standard is not applicable to tractor-dozers 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 ISO 3411:1999, *Earth-moving machinery — Human physical dimensions of operators and minimum operator space envelope (ISO 3411:1995)*

EN ISO 6165:2006, *Earth-moving machinery — Basic types — Identification and terms and definitions (ISO 6165:2006)*

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 6405-2:1993, *Earth-moving machinery — Symbols for operator controls and other displays — Part 2: Specific symbols for machines, equipment and accessories*

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

## 3 Terms and definitions

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

NOTE 1 Terminology for tractor-dozers is specified in ISO 6747:1998 and is 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**

#### **tractor-dozer**

self-propelled crawler or wheeled machine with equipment having either dozing attachment which cuts, moves, and grades material through forward motion of the machine or a mounted attachment used to exert a push or a pull force (see EN ISO 6165:2006)

### **3.2**

#### **attachment (working tool)**

component or assembly of components, which can be mounted onto the base machine or equipment (see ISO 6746-1:2003 and ISO 6746-2:2003) for a specific use (see ISO 6016:1998)

EXAMPLES Ripper, scarifiers, winch.

## **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**

Tractor-dozers 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 Operator's seat**

EN 474-1:2006, 5.4.1.4 applies with the following addition:

The seat shall meet the input spectral according to EN ISO 7096:2000:

- class EM6 for crawler dozers less than 50 000 kg operating mass according to ISO 6016:1998;
- class EM5 for wheel dozers;
- for crawler dozer greater than or equal to 50 000 kg, see EN ISO 7096:2000.

### **5.3 Rear window(s)**

EN 474-1:2006, 5.3.2.7 and 5.3.2.9 apply for rear window(s) with the following provisions:

- arrangement to defrost the rear window(s) shall be made;
- the rear window(s) shall be fitted with a motorised wiper(s) and washer.

## 5.4 Rear-mounted winch

### 5.4.1 Mounting

The means for securing a winch to the machine structure shall be designed to withstand a force of twice the maximum line-pull that can be exerted by the rope without permanent deformation.

NOTE ISO 19472:2006 should be used as guidance for design of the mounting system.

### 5.4.2 Controls

The winch controls shall be located at the operator's station and shall fulfil the requirements stated in ISO 10968:2004.

### 5.4.3 Protection

Where a rear-mounted winch is fitted, provision shall be made to allow for protection.

Tractor-dozers equipped with a rear winch shall be equipped with adequately sized protective screen(s) (minimum steel wire diameter 6 mm woven wire mesh with a maximum opening of 45 mm x 45 mm), or equivalent protection between the operator and the winch.

NOTE ISO 8084:2003 should be used as guidance for design.

The screen width and height shall cover at least:

- the rear window, for machines fitted with cab;
- the rear of the minimum space envelope as specified in EN ISO 3411:1999 (see Figure 5) for machines without a cab.

## 6 Information for use

### 6.1 Warning signs

EN 474-1:2006, 7.2 applies with the addition of a specific warning sign using a symbol according to ISO 6405-2:1993 if a winch is fitted.

### 6.2 Operation manual

EN 474-1:2006, 7.2 applies with the addition that the manufacturer shall provide instruction for operation and safe use of winches, if fitted.

### 6.3 Machine marking

EN 474-1:2006, 7.2 applies with the addition of the marking of the maximum pull force of the winch in Newton (N), if fitted.

## Annex A (normative)

### List of additional significant hazards – Tractor-dozers

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.1)	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.: mass and stability, mechanical strength	5.4
1.1	Crushing hazard	5.4
<b>5</b>	<b>Hazards generated by vibration</b>	5.2
<b>8</b>	<b>Hazards generated by neglecting ergonomic principles in machinery design</b> as, e. g. hazards from:	
8.7	Inadequate design, location or identification of manual controls	5.4.2
8.10	Inadequate guards and protection devices	5.4.3
<b>19</b>	<b>Linked to operator's station on the machine</b>	
19.5	Insufficient visibility from the operator's station(s)	5.4
24	Insufficient instructions for the operator (operation manual, signs, warnings, and markings)	6
	<b>Additional hazards, hazardous situations and hazardous events due to lifting</b>	
<b>25</b>	<b>Mechanical hazards and hazardous events</b>	
25.2	From insufficient mechanical strength of parts	5.4.1

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

## Annex B (informative)

### Illustrations

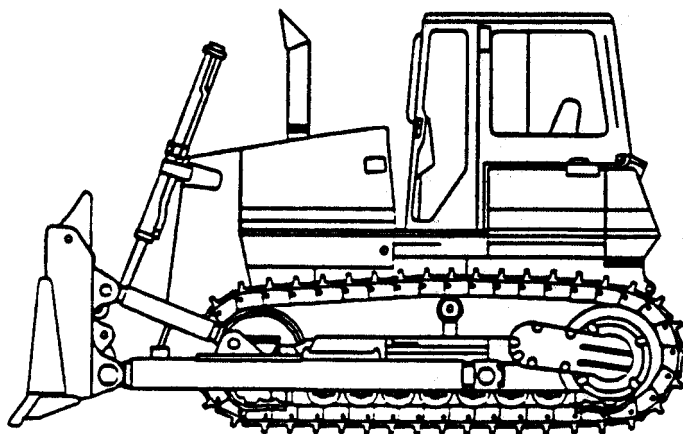


Figure B.1 — Crawler tractor-dozer

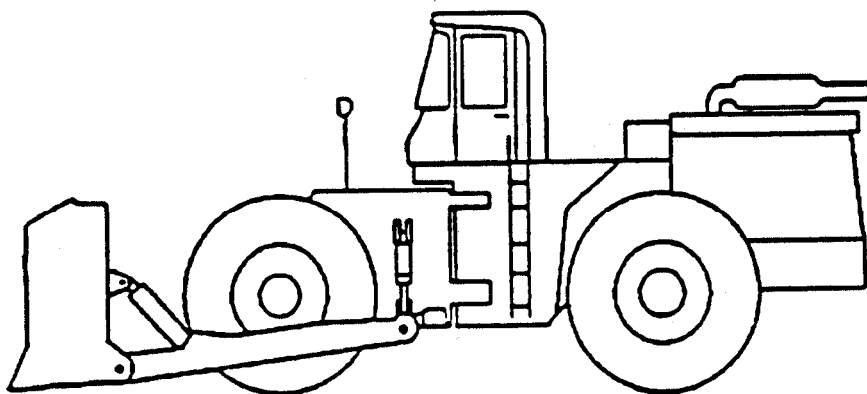


Figure B.2 — Wheel tractor-dozer

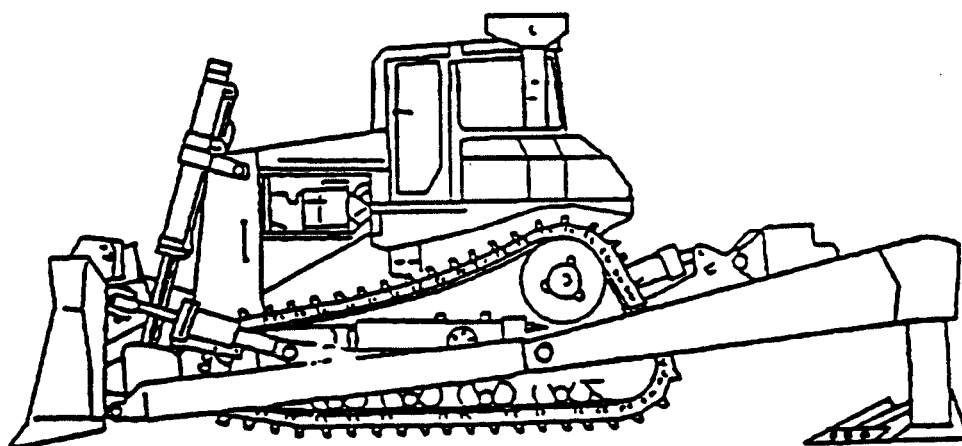


Figure B.3 — Crawler tractor-dozer with a plough

## **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] EN 500 (all parts), *Mobile road construction machinery*
- [2] ISO 19472:2006, *Machinery for forestry -- Winches -- Dimensions, performance and safety*
- [3] ISO 6746-1:2003, *Earth-moving machinery — Definitions of dimensions and codes — Part 1: Base machine*
- [4] ISO 6746-2:2003, *Earth-moving machinery — Definitions of dimensions and codes — Part 2: Equipment and attachments*
- [5] ISO 6747:1998, *Earth-moving machinery — Tractor-dozers — Terminology and commercial specifications*
- [6] ISO 8084:2003, *Machinery for forestry — Operator protective structures — Laboratory tests and performance requirements*



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