

# Earth-moving machinery — Safety —

## Part 8: Requirements for graders

The European Standard EN 474-8:2006 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 474-8:2006. It supersedes BS EN 474-8:1998, which will be withdrawn on 1 November 2008.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 474-8:1998 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.

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 28 February 2007

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English Version

## Earth-moving machinery - Safety - Part 8: Requirements for graders

Engins de terrassement - Sécurité - Partie 8: Prescriptions applicables aux niveleuses

Erdbaumaschinen - Sicherheit - Teil 8: Anforderungen für Grader

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

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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## Foreword

This document (EN 474-8:2006) 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of an identical text or by endorsement, at the latest by May 2007, and conflicting national standards shall be withdrawn at the latest by November 2008.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 474-8:1998.

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 graders 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 graders equipped with attached snowplough.

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 graders.

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 graders.

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

NOTE When graders are intended for use in winter service, see EN 13021:2003 "Winter service machines — Safety requirements"

## 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 7096:2002, *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)*

## 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 graders is specified in ISO 7134:1993 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

#### **grader**

self-propelled, wheeled machine which has an adjustable blade positioned between the front and rear axles

NOTE 1 The grader can be equipped with a front-mounted blade or scarifier that can also be located between the axles.

NOTE 2 The grader is primarily designed for grading, sloping, ditching and scarifying of materials through its forward motion.

NOTE 3 The grader can be equipped with a rear-mounted ripper.

## **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**

Graders 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 position**

#### **5.2.1 Operator's seat**

EN 474-1:2006, 5.4.1 applies with the addition that the seat shall meet the requirements of EN ISO 7096:2000, tested with the input spectral class of EM4.

#### **5.2.2 Rear window(s)**

EN 474-1:2006, 5.3.2.7 and 5.3.2.9 apply also 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.

### **5.3 Fenders**

EN 474-1:2006, 5.14.7 applies with the exception that front wheels do not require fenders.

### **5.4 Steering system**

#### **5.4.1 General**

EN 474-1:2006, 5.6.1 and 5.6.2 apply with the additions in 5.4.2 and 5.4.3.

#### **5.4.2 Controls**

Wheel, articulated and bogie steering shall be actuated by separate controls.

#### **5.4.3 Steering performance test**

EN 474-1:2006, 5.6.2 applies with the following additions:

- the steering performance test shall be conducted with the front steering system (Ackermann steering system) only;
- during testing, leaning front wheels and articulated or bogie steering systems shall be kept in the vertical and straight ahead positions respectively.

#### 5.4.4 Safety requirements for travelling mode

For travelling on public roads or long distance travelling off road the following is required:

- the leaning front wheel system shall be in the vertical position and the corresponding controls shall be mechanically locked;
- all blades and equipment shall be in their transport-position and so positioned that they are within the defined transport-width of the machine.

## 6 Information for use

EN 474-1:2006, 7.2 applies with addition of instruction on how to use the grader steering on public roads.

## Annex A (normative)

### List of additional significant hazards – Graders

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
	<b>Additional hazards, hazardous situations and hazardous events due to mobility</b>	
<b>18</b>	<b>Relating to travelling functions</b>	
18.4	Travelling functions	5.4.2
<b>19</b>	<b>Linked to operator's station on the machine</b>	
19.4	Mechanical hazards at the operator's station(s): a) contact with the wheels	5.3
19.5	Insufficient visibility from the operator's station(s)	5.2.2
19.7	Inadequate seating	5.2.1
<b>20</b>	<b>Due to the control system</b>	
20.3	Inadequate design of manual controls and their mode of operation	5.4.3
<b>24</b>	<b>Insufficient instructions for the operator</b> (operation manual, signs, warnings and markings)	6

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

**Annex B**  
(informative)

**Illustrations**

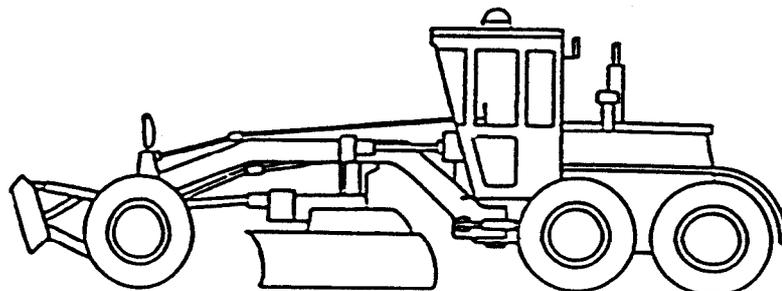


Figure B.1 — Articulated steered grader

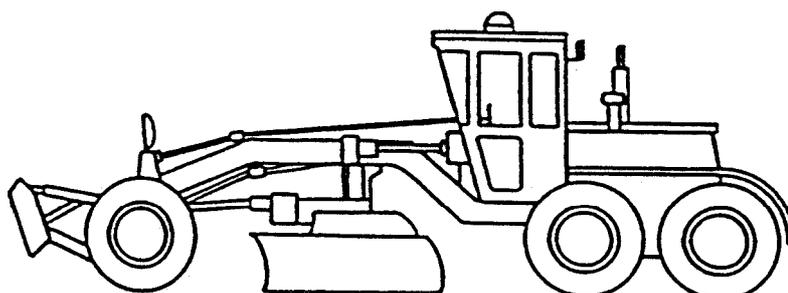


Figure B.2 — Wheel steered grader

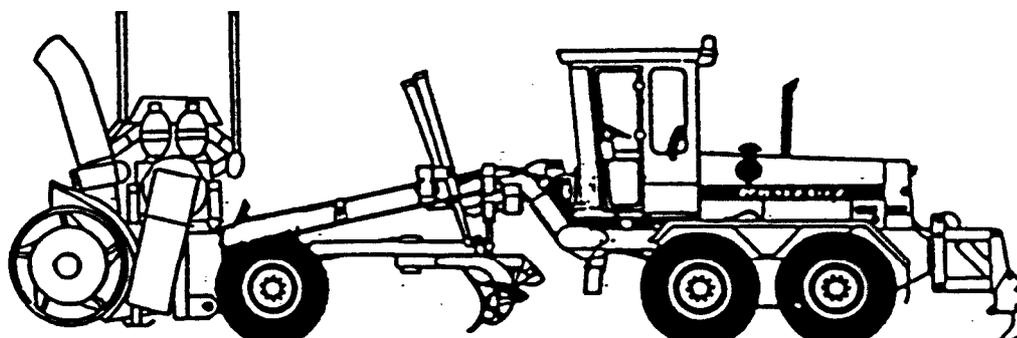


Figure B.3 — Grader with snowblower

**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 7134:1993, *Earth-moving machinery — Graders — Terminology and commercial specifications*
- [2] ISO 10570:2004, *Earth-moving machinery — Articulated frame loader — Performance requirements*
- [3] EN 13021:2003, *Winter service machines — Safety requirements*
- [4] EN ISO 6165:2006, *Earth-moving machinery — Basic types — Vocabulary Identification and terms and definitions (ISO 6165:2006)*

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