



BSI Standards Publication

Earth-moving machinery — Safety

Part 1: General requirements

National foreword

This British Standard is the UK implementation of EN 474-1:2022. It supersedes BS EN 474-1:2006+A6:2019, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/513/1, Earth moving machinery (International).

A list of organizations represented on this committee can be obtained on request to its committee manager.

BSI, as a member of CEN, is obliged to publish EN 474-1:2022 as a British Standard. However, attention is drawn to the fact that during the development of this European Standard, the UK committee voted against its approval.

The basis for a negative vote on behalf of the UK committee relates to clause 4.12.7, Fitness for purpose, and specifically the following sub clauses:

- 4.12.7.2, Static tests; and
- 4.12.7.3, Dynamic tests.

The UK committee, comprising a range of stakeholder groups, found that for certain earth moving machinery (e.g. hydraulic excavators), neither test procedure took account of technical limitations regarding hydraulically limited lifting capacity, a fundamental design characteristic of such machinery. Furthermore, the requirement for a dynamic test lacked suitable guidance regarding how such a test should be practically implemented considering the technical limitations previously mentioned.

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association. It is intended to support requirements of the EU legislation detailed in the European Foreword. A European Annex, usually Annex ZA or ZZ, describes how this publication relates to that EU legislation.

For the Great Britain market (England, Scotland and Wales), if UK Government has designated this publication for conformity with UKCA marking (or similar) legislation, it may contain an additional National Annex. Where such a National Annex exists, it shows the correlation between this publication and the relevant UK legislation. If there is no National Annex of this kind, the relevant Annex ZA or ZZ in the body of the European text will indicate the relationship to UK regulation applicable in Great Britain. References to EU legislation may need to be read in accordance with the UK designation and the applicable UK law. Further information on designated standards can be found at www.bsigroup.com/standardsandregulation.

For the Northern Ireland market, UK law will continue to implement relevant EU law subject to periodic confirmation. Therefore Annex ZA/ZZ in the European text, and references to EU legislation, are still valid for this market.

UK Government is responsible for legislation. For information on legislation and policies relating to that legislation, consult the relevant pages of www.gov.uk.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2022
Published by BSI Standards Limited 2022

ISBN 978 0 580 96892 1

ICS 53.100

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 31 May 2022.

Amendments/corrigenda issued since publication

| Date | Text affected |
|------|---------------|
|------|---------------|

EUROPEAN STANDARD

EN 474-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2022

ICS 53.100

Supersedes EN 474-1:2006+A6:2019

English Version

Earth-moving machinery - Safety - Part 1: General requirements

Engins de terrassement - Sécurité - Partie 1 :
Prescriptions générales

Erdbaumaschinen - Sicherheit - Teil 1: Allgemeine
Anforderungen

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

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 CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

| Contents | | Page |
|--|---|-------------|
| European foreword | | 4 |
| Introduction | | 6 |
| 1 | Scope | 7 |
| 2 | Normative references | 7 |
| 3 | Terms and definitions | 11 |
| 4 | Safety requirements and/or protective/risk reduction measures | 14 |
| 4.1 | General | 14 |
| 4.2 | Access | 14 |
| 4.3 | Operator's station | 15 |
| 4.4 | Seat | 18 |
| 4.5 | Operator's controls and indicators | 18 |
| 4.6 | Steering system | 20 |
| 4.7 | Brake systems for travelling | 20 |
| 4.8 | Visibility | 21 |
| 4.9 | Forward horns and machine safety labels | 21 |
| 4.10 | Tyres and rims | 21 |
| 4.11 | Stability | 22 |
| 4.12 | Lifting operation | 22 |
| 4.13 | Noise | 24 |
| 4.14 | Protective measures and devices | 25 |
| 4.15 | Recovery, towing away for recovery purposes (TARP), tying-down, lifting and transporting | 26 |
| 4.16 | Electro-magnetic compatibility (EMC) | 27 |
| 4.17 | Electrical and electronic systems | 27 |
| 4.18 | Hydraulic fluid systems | 29 |
| 4.19 | Fuel tanks, DEF/urea tanks, hydraulic tanks and pressure vessels | 30 |
| 4.20 | Fire protection | 30 |
| 4.21 | Quick coupler | 30 |
| 4.22 | Maintenance | 31 |
| 4.23 | Underground operation in non-explosive atmosphere | 32 |
| 4.24 | Speed limit for non-riding machines | 32 |
| 5 | Verification of the safety requirements and/or protective/risk reduction measures | 32 |
| 6 | Information for use | 36 |
| 6.1 | General | 36 |
| 6.2 | Machine safety labels | 36 |
| 6.3 | Operator's manual | 37 |
| 6.4 | Machine marking | 39 |
| Annex A (informative) List of significant hazards | | 40 |
| Annex B (normative) Requirements for movable operator's station with the operator at the operator's station | | 46 |
| B.1 | Terms and definitions | 46 |
| B.2 | General | 46 |
| B.3 | Control of movement | 47 |
| B.4 | Emergency descent | 47 |

| | | |
|--|--|-----------|
| B.5 | Crushing hazards | 47 |
| B.6 | Falling down protection for the operator | 47 |
| B.7 | ROPS | 47 |
| B.8 | Operator's manual | 47 |
| B.9 | Marking | 48 |
| B.10 | Verification of the safety requirements and/or protective/risk reduction measures | 48 |
| Annex C (normative) Requirements for lifting devices used for lifting operations | | 50 |
| C.1 | General | 50 |
| C.2 | Terms, definitions and abbreviations | 50 |
| C.3 | Safety requirements | 50 |
| C.4 | Additional requirements for attachable hooks used as lifting device(s) | 52 |
| C.5 | Additional information to the operator's manual | 54 |
| C.6 | Verification of the safety requirements and/or protective/risk reduction measures | 54 |
| Annex D (normative) Requirements for earth-moving machinery used in underground working in non-explosive atmosphere | | 56 |
| D.1 | General | 56 |
| D.2 | Operator's station | 56 |
| D.3 | Engine exhaust emission and fuel | 56 |
| D.4 | Lighting, signalling and marking lights and reflex-reflector devices | 57 |
| D.5 | Fire protection | 57 |
| D.6 | Verification of the safety requirements and/or protective/risk reduction measures | 57 |
| Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2006/42/EC machinery, and amending Directive 95/16/EC (recast) [2006 L157] aimed to be covered | | 59 |
| Bibliography | | 65 |

European foreword

This document (EN 474-1:2022) 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 supersedes EN 474-1:2006+A6:2019.

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.

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

To confer a presumption of conformity with the relevant essential requirements of Directive 2006/42/EC, this standard (providing general/common requirements for a whole machine family) has to be applied together with one of those standards as specified in the scope (providing specific requirements for a particular category of machinery within this family), once this standard is cited in the Official Journal of the European Communities under Directive 2006/42/EC.

The main differences between this document and EN 474-1:2006+A6:2019 are as follows:

- a) safety-related functions of control systems (excluded);
- b) requirements for demolition machinery (deleted);
- c) requirements for attachments, multi-purpose and derivative machinery (deleted);
- d) normative references (updated);
- e) cab requirements for non-compact machines (added);
- f) lifting requirements and fitness for purpose (added);
- g) recovery, TARP, tying down lifting and transporting requirements (modified);
- h) electrical and electronic systems requirements (modified);
- i) quick couplers requirements (modified);
- j) verification methods table (Clause 5) (added);
- k) requirements for no-text safety signs (deleted);
- l) requirements for moveable operator's station (modified);
- m) requirements for rollers, addressed in a new part 13 (added);
- n) list of significant hazards (Annex A) (modified);
- o) Annex ZA (modified).

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.

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 at 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 specifies the general safety requirements for earth-moving machinery, hereinafter also referred to as machines, described in EN ISO 6165:2012, except horizontal directional drills.

NOTE 1 Horizontal directional drills are covered by EN 16228-1 and EN 16228-3.

This document gives the common safety requirements for earth-moving machinery families (see EN ISO 6165:2012, 3.4) and is intended to be used in conjunction with relevant parts of EN 474-2 to EN 474-13. These machine specific parts (EN 474-2 to EN 474-13) do not repeat the requirements from EN 474-1:2022 but supplement or modify the requirements for the family in question.

NOTE 2 The requirements specified in this part of the standard are common to two or more families of earth-moving machinery.

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.

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 document does not deal with demolition machinery.

This document deals with significant hazards, hazardous situations and events relevant to earth-moving machinery, when used as intended and under conditions foreseen but also taking into account any reasonably foreseeable misuse thereof (see Annex A).

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

- Laser;
- Lightning.

This document specifies the appropriate technical measures to reduce risks arising from the significant hazards, hazardous situations and events during the whole foreseeable lifecycle of the machinery as described in EN ISO 12100:2010, 5.4.

This document is not applicable to earth-moving machinery which are manufactured before the date of publication of this document by CEN.

NOTE 3 For travelling on public roads, national traffic regulations apply (e.g. braking, steering, lighting, towing, etc.) until harmonized requirements are available.

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 286-2:1992, *Simple unfired pressure vessels designed to contain air or nitrogen — Part 2: Pressure vessels for air braking and auxiliary systems for motor vehicles and their trailers*

EN 1677-2:2000+A1:2008, *Components for slings — Safety — Part 2: Forged steel lifting hooks with latch, Grade 8*

EN 1679-1:1998+A1:2011, *Reciprocating internal combustion engines — Safety — Part 1: Compression ignition engines*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*