SLOVENSKI STANDARD
SIST EN 474-12:2007

01-maj-2007

Stroji za zemeljska dela - Varnost - 12. del: Zahteve za bagre s kablom

Earth-moving machinery - Safety - Part 12: Requirements for cable excavators

Erdbaumaschinen - Sicherheit - Teil 12: Anforderungen für Seilbagger

Engins de terrassement - Sécurité - Partie 12: Prescriptions applicables aux pelles a câbles

Ta slovenski standard je istoveten z: **EN 474-12:2006**

ICS:

53.100 Stroji za zemeljska dela Earth-moving machinery

SIST EN 474-12:2007 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 474-12

November 2006

ICS 53.100

English Version

Earth-moving machinery - Safety - Part 12: Requirements for cable excavators

Engins de terrassement - Sécurité - Partie 12: Prescriptions applicables aux pelles à câbles

Erdbaumaschinen - Sicherheit - Teil 12: Anforderungen für Seilbagger

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.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 474-12:2006: E

Contents

Page

Figures

Tables

Foreword

This document (EN 474-12:2006) 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 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 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 cable excavators 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 European Standard applies also to cable excavators, their undercarriage and upper-structure, if intended for use in combination with other equipment or attachment, such as drill rigs, pile driving and extracting equipment and moving equipment (e.g. rail track, walking legs, pontoon, ship) or stationary undercarriage. This European Standard is not dealing with the specific hazards due to these additional equipment or attachment.

NOTE For these additional equipment or attachment, relevant specific European Standards should be considered where available, for example:

- for pile driving and extracting equipment: EN 996:1995;
- for drill rigs: EN 791:1995.

The requirements of this part are complementarily 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 cable excavators.

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 the machinery in the scope.

This European Standard is not applicable to cable excavators 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 791:1995, *Drill rigs — Safety*

EN 12643:1997, *Earth-moving machinery — Rubber-tyred machines — Steering requirements (ISO 5010:1992, modified)*

EN 60204-32:1998, *Safety of machinery — Electrical equipment of machines — Part 32: Requirements for hoisting machines (IEC 60204-32:1998)*

EN ISO 2867:2006, *Earth-moving machinery — Access systems (ISO 2867:2006)*

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 4310:1981, *Cranes — Test code and procedures*

ISO 6014:1986, *Earth-moving machinery — Determination of ground speed*

ISO 7546:1983, *Earth moving machinery — Loader and front loading excavator buckets — Volumetric ratings*

ISO 10262:1998, *Earth-moving machinery — Hydraulic excavators — Laboratory tests and performance requirements for operator protective guards*

ISO 15219:2004, *Earth-moving machines — Cable excavators — Terminology and commercial specifications*

3 Terms and definitions, symbols and abbreviated terms

For the purposes of this European Standard, the terms and definitions given in EN 474-1:2006, EN ISO 12100-1:2003, , ISO 15219:2004 and the following apply.

NOTE 1 The terms used for hydraulic excavators are defined in ISO 15219:2004 and illustrated in Annex C.

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

3.1
cable excavator
excavator (see EN ISO 6165:2006), having a wire rope-operated upper structure primarily designed for excavating with a dragline bucket, a front shovel or grab, used for compacting material with a compaction plate, for demolition work by hook or ball and for material handling with special equipment and attachment

3.2
boom hoist system
consists of the boom (lower-, intermediate- and head-section), the A-frame system and the boom hoist winch system

3.3
lift system
consists of the main winch system used for earth-moving-, demolition-, compaction- and object-handling (e. g. with hook assembly) application

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

Cable excavators 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 Access

EN 474-1:2006, 5.2 applies with the following exception:

Dimension code G in Figure 2 of EN ISO 2867:2006 may be > 600 mm when the hand rails/handholds are placed in the door opening.

5.3 Operator's station

5.3.1 General

EN 474-1:2006, 5.3 applies with the following provision:

5.3.2 Roll-over protective structures (ROPS)

EN 474-1:2006, 5.3.3 does not apply for cable excavators.

5.3.3 Operator's protective guard

EN 474-1:2006, 5.3.4 is replaced by the following:

Cable excavators shall be designed so that an operator’s protective structure (top and front guard) can be fitted.

A protective structure (top and front guard) shall be offered by the manufacturer and selected by the user according to the existing risk of the application. The protective structures shall be in accordance with ISO 10262:1998 (see Clause 7).

5.3.4 Operator's seat, vibrations

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

The seat shall meet the EN ISO 7096:2000 input spectral class EM 6.

5.4 Operator's controls and indicators

5.4.1 Controls for driving and steering

EN 474-1:2006, 5.5.1 d) and 5.6.1 apply with the following addition relating to controls for driving and steering.

The movements of the controls for driving and steering do not need to correspond to the intended direction of movement if the upper structure is not in the normal driving direction.

5.4.2 Warning indicator

EN 474-1:2006, 5.5.1 applies with the following additions:

Warning indicators shall be provided at the operator's station or other relevant location to indicate the activation of the free fall operations (see 5.7.2) and to indicate the deactivation of the load moment limiting devices (see 5.8.1) during dragline bucket, grab and front shovel application.

5.5 Steering

EN 474-1:2006, 5.6 applies with the following exception:

EN 474-1:2006, 5.6.2 applies only for rubber-tyred cable excavators with a travelling speed of more than 30 km/h measured according to ISO 6014:1986.

For rubber-tyred machines with a travel speed equal or lower than 30 km/h EN 12643:1997 shall be applied, except for the requirements for emergency steering.

5.6 Swing brakes

Cable excavators shall be equipped with swing service and swing parking brake systems, which shall meet the requirements as defined in Annex B.

5.7 Lift system

5.7.1 Force controlled operation (lifting, lowering)

The lift system of cable excavators shall be fitted with a brake, which actuates immediately after releasing lever or pedal controls.

The brake system shall automatically act in case of loss of energy or force controlled lowering. There shall be no effect on stability of the excavator during this operation.

The brake system shall be capable to hold the rated load, as defined in 5.9.

5.7.2 Free fall operation

The lift system of cable excavators shall be fitted with a brake, which applies immediately after:

— corresponding activation of the pedal control, or

— release of hand-operated lever control.

The brake shall be so designed that a dynamic load and a progressive actuation is possible. The rope guide shall be so designed that an uncontrolled run-up or run-off of the rope is avoided.

5.7.3 Switch-over

There shall be no load lowering in case of switchover from the “force controlled lift/lowering" operation to the operation ”free fall”.

5.7.4 Boom

The boom of cable excavators shall be secured against repulsing in case of a sudden release of the load.

The boom shall be equipped with a limit switch to avoid a backward overload.

The connection (bolts) of the boom-pieces shall be so designed that mounting and disassembling can be made without the need for a person staying under the boom.

5.7.5 Ropes

The ropes of cable excavators shall have safety factors according to Table 1.

Table 1 — Safety factors of ropes

Attachments: Dragline Grab Hook	Group 1 [a]					
	Lift or closing ropes	Digging ropes	Boom-holding ropes			
			Operating with load connected		Lifting the boom without load	
			Active ropes	Static ropes	Active ropes	Static ropes
	3,55	3,0	3,55	3,0	3,05	3,0
[a] Group 1: The factors are the relation between the minimum breaking force of the rope and the maximum static load of the cable excavator when used as intended.						

5.7.6 Rope drum, rope pulley

5.7.6.1 General

The rope drum and rope pulley shall be built and designed so that damage of the rope and run-off or trip-out of the rope guide is avoided.

5.7.6.2 Rope drum

The relationship between the rope drum diameter and the rope diameter shall be 1:20 at a minimum.

5.7.6.3 Rope pulley

The relationship between the rope pulley diameter and the rope diameter shall be 1:22 at a minimum, measured at thread of groove. Exceptions from the above requirements can be made for fair leads of drag ropes, rope guidance pulleys and auxiliary ropes, such as grab guidance rope, digging guidance rope, ballast guidance rope of fair leads.

5.7.6.4 Flanged wheel projection

The beaded edge of the winch drums shall be at least 1,5 times the rope diameter.

5.8 Limiting devices

5.8.1 Load moment limiting device

The lift system and boom hoist system of cable excavators in object handling application shall have a load moment limiting device to avoid overload. The load moment limiting device shall be adjusted to the rated load as defined in 5.9 with a tolerance of + 10 %. Operations, which will reduce the load moment, shall be possible after functioning of the load moment limiting device.

5.8.2 Lift limiting switch

Cable excavators in object handling application shall be equipped with a limiting switch for lifting movement. It shall be possible to lower the load after activation of the lift limiting switch.

5.8.3 Limit switch for the boom hoist system

The boom hoist system of cable excavators shall be equipped with a limiting switch to avoid a backward overload of the boom. Boom lowering shall be possible after actuation of this limiting switch.

5.9 Calculation of the lift capacity

5.9.1 Calculation method

The calculation of the lift capacity of cable excavators shall be made on the basis of the following criteria:

— flat surface;

— hard surface (depth of penetration = 0);

— tipping line according to 5.5 of EN 791:1995;

— load test according to 3.3 of ISO 4310:1981.

The tipping load of a cable excavator P_{tip} shall be calculated as follows: