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Sistemi za razpiranje izkopov - 2. del: Dokaz z raļ unom ali preskusom

Trench lining systems - Part 2: Assessment by calculation or test

Grabenverbaugeräte - Teil 2: Nachweis durch Berechnung oder Prüfung

Dispositifs de blindage de tranchées - Partie 2: Evaluation par calculs ou essais

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EUROPEAN STANDARD

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English version

Trench lining systems - Part 2: Assessment by calculation or test

Dispositifs de blindage de tranchées - Partie 2: Evaluation par calculs ou essais

Grabenverbaugeräte - Teil 2: Nachweis durch Berechnung oder Prüfung

This European Standard was approved by CEN on 6 July 2002.

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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 Management Centre has the same status as the official versions.

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

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

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Contents

Foreword

This document (EN 13331-2:2002) has been prepared by Technical Committee CEN/TC 53 "Temporary works equipment", 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of an identical text or by endorsement, at the latest by February 2003, and conflicting national standards shall be withdrawn at the latest by February 2003.

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

EN 13331 *Trench lining systems* consists of the following parts:

— *Part 1: Product specifications.*

— *Part 2: Assessment by calculation or test.*

These standards are to be read in conjunction with prEN 12811-2 and prEN 12811-3.

Introduction

Trench lining systems are intended to ensure the stability of vertical trench walls and to protect workers from the effects of collapse of trenches.

Part 1 of the series deals with materials and specifications on the manufacture of trench lining systems.

Part 2 of the series deals with the evaluation methods using both calculations and tests for the trench lining systems.

A trench lining system comprises a variety of components, which, when assembled, create trench support. The instruction manual provides all the necessary information on the safe use of trench lining systems.

1 Scope

This European Standard specifies methods of calculation and tests to assess the conformity of trench lining systems with the requirements of EN 13331-1.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 10002-1, *Metallic materials - Tensile testing - Part 1: Method of test at ambient temperature.*

EN 10003-1, *Metallic materials - Brinell hardness test - Part 1: Test method*.

EN 10204, *Metallic products – Types of inspection documents.*

prEN 12811-3:2001, *Temporary works equipment - Scaffolds - Part 3: Load testing*.

EN 13331-1:2002, *Trench lining systems – Part 1: Product specifications*.

ENV 1993-1-1:1992, *Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings.*

ENV 1999-1-1, *Eurocode 9: Design of aluminium structures - Part 1-1: General rules - General rules and rules for buildings.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 13331-1:2002 apply.

4 Symbols

For the purposes of this European Standard, the symbols given in EN 13331-1:2002 apply.

5 General

5.1 Structural configuration to be assessed

A trench lining system shall be assessed under the structural configuration which will induce the most severe loading effects in the system components. All options for the assembly of components indicated in the instruction manual shall be assessed.

For slide rail systems two configurations shall be considered:

— with panels on both sides;

— with panels on one side only.

5.2 Loading configurations to be considered

A trench lining system shall be assessed under the configurations specified in EN 13331-1:2002, 7.1.1.

5.3 Choice of testing or calculation

5.3.1 Assessment shall be carried out by calculation in accordance with ENV 1993 for the bending resistance of all panels, slide rails, soldiers and supporting frames and the structural capacity of the front pulling strut or pulling points of a drag box.

5.3.2 Assessment shall be carried out by structural testing for the establishment of the compressive resistance of struts with variable length adjustment.

5.3.3 Assessment shall be carried out by calculation or structural testing for all other cases, i.e.:

a) the tensile resistance of struts;

b) the compressive resistance of struts with incremental length adjustment and non adjustable struts;

c) deflections of panels and slide rails given in EN 13331-1:2002, 7.3;

d) the moments of strut to panel or slide rail connections required to be declared in EN 13331-1:2002, 7.6.4;

e) the resistance of extracting, vertical connecting points and panel connectors in accordance with EN 13331-1:2002, 7.4.16.

Where figures are declared that are based on tests not described in either prEN 12811-3 or this standard, the method used shall be fully documented in accordance with prEN 12811-3.

6 Assessment by calculation

Assessment by calculation of the requirements of EN 13331-1 shall be carried out as follows. For steel it shall be in accordance with ENV 1993-1-1 and for aluminium with ENV 1999-1-1. For cast iron, ENV 1993-1-1 shall be used provided that the requirements of ENV 1993-1-1:1992, 3.2.2.2 are fulfilled.

The internal forces and moments shall be calculated using elastic analysis methods, i.e. no plastic redistribution of moments and forces are permitted.

The influence of the deflection on the internal forces and moments shall be determined either by using second order analysis or by first order analysis combined with an indirect provision for second order effects.

7 Assessment by testing

7.1 General

Unless otherwise stated in 7.2 and 7.3 structural testing shall follow the specifications given in prEN 12811-3.

7.2 Examination of material properties

The relevant materials properties shall be taken from 3.1.B certificates when available (in accordance with EN 10204). Hardness tests in accordance with EN 10003-1 shall be performed on 20 % of the components under test in order to confirm the type of material declared in the 3.1.B certificate.

If 3.1.B certificates are not available, yield strength, tensile strength and fracture elongation shall be checked in tensile tests of relevant materials in accordance with EN 10002-1.

7.3 Test procedure for struts with variable length adjustment

7.3.1 Principle

The strut samples are located in the test apparatus and force applied until failure occurs. Load and deflection data is recorded during the test to enable characteristic compressive resistance to be determined from statistical analysis.

7.3.2 Apparatus

The test apparatus can be any calibrated universal hydraulic testing machine of appropriate dimensions capable of delivering in excess of the predicted failure force.

7.3.3 Procedure

a) Prior to any test, a force equal to the estimated characteristic resistance divided by 2 shall be applied and then removed in order to bed down the test specimen onto the end plates of the test apparatus.

b) Ideally struts should be mounted horizontally in the test apparatus, and placed on the appropriate sections of panel soldiers or slide rails.

c) Where struts are tested in vertical position, a horizontal force representing half the weight of the strut shall be applied in the centre of the strut before and during the test.

d) For each strut length, a minimum of three separate tests shall be carried out. For struts with more than four extensions bars a minimum of three separate tests for four different lengths shall be conducted. Tests shall be conducted on the longest and the shortest strut lengths. Where only one characteristic strut resistance for a system is declared the tests shall be carried out on the longest strut length only.

e) Structural tests shall be carried out with the threaded bars extended to their maximum length, any moving parts being turned back by a quarter of a turn. Nuts shall be placed in the most unfavourable position in which they can be used in the struts.

f) Only fasteners and pins specified in the instruction manual shall be used to connect extension bars in the tests. The tightening torque specified in the instruction manual shall be applied.

7.4 Evaluation of characteristic resistance from test results

Calculations shall be in accordance with prEN 12811-3:2001, 10.2, 10.3, 10.6, 10.7, 10.8 and 10.9.

NOTE A worked example is given in prEN 12811-3:2001, annex B.