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Utgåva 1

Temporära konstruktioner – Manuellt styrda hydrauliska spontningssystem för stöd vid markarbete –

Del 2: Utvärdering genom beräkning eller provning

Manually operated hydraulic shoring systems for groundwork support –

Part 2: Assessment by calculation or test

ICS 93.020

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English version

Manually operated hydraulic shoring systems for groundwork support - Part 2: Assessment by calculation or test

Composants des blindages de tranchées - Partie 2: Essais et évaluation

Manuell gesteuerte hydraulische Grabenverbaugeräte - Teil 2: Nachweis durch Berechnung oder Prüfung

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EN 14653-2:2005 (E)

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Foreword

This document (EN 14653-2:2005) 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of an identical text or by endorsement, at the latest by October 2005, and conflicting national standards shall be withdrawn at the latest by October 2005.

This European Standard with the general title *Manually operated hydraulic shoring systems for groundwork support* 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 EN 12811-2 and EN 12811-3.

This document includes a Bibliography.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Introduction

Manually operated hydraulic shoring systems comprise prefabricated equipment to support sheeting to the sides of excavations. This document covers two types of equipment whose adjustment is by hydraulic or a combination of hydraulic and mechanical means:

- a) hydraulic bracing frames;
- b) hydraulic waler frames.

A variety of components exist which when assembled forms a full system. The instruction manual provides all the necessary information in the safe use of the systems.

The prefabricated components are used to make frame assemblies of different dimensions and structural capacities.

This equipment is frequently used in conjunction with supplementary equipment, e.g. knee braces and intermediate hydraulic bracing struts.

1 Scope

This document specifies methods of calculation and test to assess the conformity of manually operated hydraulic systems for groundwork support whose performance is specified in EN 14653-1.

2 Normative references

The following referenced documents are indispensable for the application 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 10002-1, *Metallic materials — Tensile testing — Part 1: Method of test at ambient temperature*

EN 10204, *Metallic products — Types of inspection documents*

EN 12811-3:2002, *Temporary works equipment — Part 3: Load testing*

EN 14653-1:2005, *Manually operated hydraulic shoring systems for groundwork support — 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*

EN ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1:1999)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14653-1:2005 apply.

4 Symbols

For the purposes of this document, the symbols given in EN 14653-1:2005 and EN 12811-3:2002 apply.

5 Requirements

5.1 General

All manually operated hydraulic shoring systems and components and their associated instruction manuals shall be assessed to ensure conformity to all of the requirements of EN 14653-1.

5.2 Structural configurations to be assessed

Manually operated hydraulic shoring systems and components shall be assessed under the structural configurations, that will induce the most severe loading effects specified by the manufacturer.

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5.3 Loading configurations to be considered

Manually operated hydraulic shoring systems shall be assessed all under the loading configurations specified in EN 14653-1:2005, 7.4.

5.4 Testing or calculation

5.4.1 Assessment shall be carried out by calculation in accordance with ENV 1993-1-1 (Eurocode 3) for steel or ENV 1999-1-1 (Eurocode 9) for aluminium. For cast iron ENV 1993-1-1 shall be used, subject to 6.2 of EN 14653-1:2005. When appropriate calculation models are not available, structural testing shall be undertaken.

5.4.2 Assessment shall be carried out by structural testing for the following circumstances:

- a) when a calculation model is not available to represent a particular structural component or assembly;
- b) when there is a degree of uncertainty in the validity of the model chosen;
- c) when verification of structural performances is required by EN 14653-1.

The following shall be assessed by structural testing:

- 1) the axial compressive resistance of hydraulic waler struts with spigot type extension bars as defined in EN 14653-1:2005, 3.13.1 c).
- 2) the axial compressive resistance of rams and struts with restraints conditions not conforming to those described in EN 14653-1:2005, 8.5.
- 3) mechanical locking mechanisms on waler struts as defined in EN 14653-1:2005, 3.12.1.
- 4) Non-proprietary valves as defined in EN 14653-1:2005, 8.8.

6 Assessment by calculation

The internal forces and moments shall be calculated using elastic analysis methods. No plastic redistribution of moments and forces are permitted.

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

NOTE This is of particular importance when assessing hydraulic bracing legs for the combined effects of bending and axial load.

7 Assessment by testing

7.1 General

Unless otherwise stated in 7.2 and 7.3, structural testing shall take account of EN 12811-3.

7.2 Examination of material properties

When available the relevant material properties shall be taken from 3.1.B certificates (in accordance with EN 10204). Hardness tests in accordance with EN ISO 6506-1 shall be performed on 20 % of the components under test in order to confirm that they are the materials declared in the 3.1.B certificates.