



SLOVENSKI STANDARD
SIST EN 14653-2:2005

01-julij-2005

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

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

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

Ta slovenski standard je istoveten z: EN 14653-2:2005

ICS:

93.020	Zemeljska dela. Izkopavanja. Gradnja temeljev. Dela pod zemljo	Earthworks. Excavations. Foundation construction. Underground works
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EUROPEAN STANDARD
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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

This European Standard was approved by CEN on 28 February 2005.

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

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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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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EN 14653-2:2005 (E)**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.

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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)*

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3 Terms and definitions

<https://standards.iteh.ai/catalog/standards/sist/07384a43-fe65-41bc-b84a-acb99e3c2655/sist-en-14653-2-2005>

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.

EN 14653-2:2005 (E)**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.

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

7.3 Test procedures

7.3.1 Structural tests for hydraulic waler struts and for rams

7.3.1.1 Principle

The value of the characteristic compression resistance R_{kc} is determined or verified.

7.3.1.2 Apparatus

The test apparatus shall be any calibrated hydraulic testing machine capable of:

- a) accepting the sample size;
- b) delivering a force in excess of that predicted at failure.

7.3.1.3 Procedure

The procedure shall take the following points into account:

- a) compression tests shall be carried out in which the load is applied until failure, the point at which no further increase in load is possible, is reached. Alternatively, if reaching failure of the component is not required, the test shall cease where a load value is reached that satisfies the design requirements determined in EN 14653-1. Tests shall be carried out by force controlled methods only;
- b) the test load shall either be applied in increments not exceeding 20 % of the estimated failure load, or alternatively load shall be applied continuously at a constant rate not exceeding 20 % of the estimated failure load per minute;
- c) axial, and lateral deflections shall be monitored at the point at which their greatest values are expected to occur. All displacements shall be plotted on force-displacement diagrams;
- d) the specimens shall be mounted horizontally in the test apparatus. End conditions shall closely represent those likely to occur when in use. The waler struts shall be mounted in sections of waler rail;
- e) only screws, bolts, nuts and pins that are specified in the instruction manual shall be used to connect components. Screws, bolts, and nuts shall be tightened to the specified torques;
- f) where it is necessary to test the specimens in a vertical plane, a horizontal load equal to half the combined weight of the strut and extension bars shall be applied to the centre of the strut assembly before and during the test;
- g) where one value is to be declared for the full operating range of the hydraulic waler strut or ram, the test configuration shall be with the ram or strut fully extended with the maximum permitted number of extension bars fitted. Where a range of values are to be declared over the operating range of the strut or ram, (or a load curve produced), tests shall be carried out on a total of four strut lengths throughout the operating range. In the case of struts with fewer than four extension bars, tests shall be carried out at each incremental length with the strut or ram at its maximum extension.

Where only one characteristic value for a system is to be used, the tests shall be carried out on the longest strut length only;