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CEN/TS 13001-3-2

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English Version

Cranes - General design - Part 3-2: Limit states and proof of competence of wire ropes in reeving systems

Appareils de levage à charge suspendue - Conception générale - Partie 3-2: Etats limites et vérification d'aptitude des systèmes de mouflage

Krane - Konstruktion allgemein - Teil 3-2: Grenzzustände und Sicherheitsnachweis von Drahtseilen in Seiltrieben

This Technical Specification (CEN/TS) was approved by CEN on 5 February 2008 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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

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Foreword

This document (CEN/TS 13001-3.2:2008) has been prepared by Technical Committee CEN/TC 147 “Cranes — Safety”, the secretariat of which is held by BSI.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document will supersede CEN/TS 13001-3-2:2004.

CEN/TC 147/WG 2 "Cranes — Design" is held by DIN.

This European Technical Specification is one part of EN 13001 and CEN/TS 13001, *Cranes — General design*. The other parts are:

Part 1: General principles and requirements;

Part 2: Load actions;

Part 3-1: Limit states and proof of competence of steel structures;

Part 3-3: Limit states and proof of competence of wheel/rail contacts;

Part 3-5: Limit states and proof of competence of forged hooks.

The following has been changed:

— 6.4.8, Rope type – the last paragraph has been changed and Table 8 has been added;

— Annex C has been updated.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, 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 Technical Specification has been prepared to be a harmonized standard to provide one means for the mechanical design and theoretical verification of cranes to conform to the essential health and safety requirements of the Machinery Directive, as amended. This Technical Specification also establishes interfaces between the user (purchaser) and the designer, as well as between the designer and the component manufacturer, in order to form a basis for selecting cranes and components.

This Technical Specification is a type C standard as stated in EN ISO 12100-1:2003.

The machinery concerned and the extent to which hazards are covered are indicated in the scope of this Technical Specification.

1 Scope

This Part 3-2 of the Technical Specification CEN/TS 13001 is used together with Part 1 and Part 2 and as such they specify general conditions, requirements and methods to prevent mechanical hazards of wire ropes in reeving systems of cranes by design and theoretical verification.

NOTE 1 Specific requirements for particular types of crane are given in the appropriate Technical Specification for the particular crane type.

Exceeding the limits of strength could result in risks to persons during normal use and foreseeable misuse. Clauses 5 to 6 of this Technical Specification are necessary to reduce or eliminate these risks.

This Technical Specification is applicable to cranes which are manufactured after the date of approval by CEN of this Technical Specification and serves as reference base for the Technical Specifications for particular crane types.

NOTE 2 CEN/TS 13001-3-2 deals only with the limit state method in accordance with EN 13001-1.

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 1990:2002, *Eurocode: Basis of structural design*

EN 12385-2, *Steel wire ropes — Safety — Part 2: Definitions, designation and classification*

EN 12385-4, *Steel wire ropes — Safety — Part 4: Stranded ropes for general lifting applications*

EN 13001-1, *Cranes — General design — Part 1: General principles and requirements*

EN 13001-2, *Cranes — General design — Part 2: Load actions*

EN 13411-1, *Terminations for steel wire ropes — Safety — Part 1: Thimbles for steel wire rope slings*

EN 13411-2, *Terminations for steel wire ropes — Safety — Part 2: Splicing of eyes for wire rope slings*

EN 13411-3, *Terminations for steel wire ropes — Safety — Part 3: Ferrules and ferrule-securing*

EN 13411-4, *Terminations for steel wire ropes — Safety — Part 4: Metal and resin socketing*

EN 13411-6, *Terminations for steel wire ropes — Safety — Part 6: Asymmetric wedge socket*

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

ISO 4306-1:1990, *Cranes — Vocabulary — Part 1: General*

ISO 4309, *Cranes — Wire ropes — Care, maintenance, installation, examination and discard*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003, EN 1990:2002 and Clause 6 of ISO 4306-1:1990 apply.

3.2 Symbols and abbreviations

For the purposes of this document, the symbols and abbreviations given in Table 1 apply.

Table 1 — Symbols and abbreviations

Symbols, abbreviations	Description
a	Acceleration
C	Total number of working cycles (see EN 13001-1) during useful life of crane
D	Relevant diameter
D_{drum}	Minimum pitch diameter of drum
D_{sheave}	Minimum pitch diameter of sheave
D_{comp}	Minimum pitch diameter of compensating sheave
d	Rope diameter
$d_{bearing}$	Diameter of bearing or shaft
F_{equ}	Equivalent force
F_{gd}	Part of F_{equ} induced by gravity, exclusive of mass of payload, amplified by γ_p
F_{gl}	Part of F_{equ} induced by gravity forces of mass of payload, amplified by γ_p
F_o	Part of F_{equ} induced by any other forces, amplified by γ_p
$F_{Rd,s}$	Limit design rope force for the proof of static strength
$F_{Rd,f}$	Limit design rope force for the proof of fatigue strength
$F_{Sd,s}$	Design rope force for the proof of static strength
F_r	Part of F_{equ} induced by resistances, amplified by γ_p
$F_{Sd,f}$	Design rope force for the proof of fatigue strength
F_t	Part of F_{equ} induced by rope tightening forces, amplified by γ_p
F_u	Minimum rope breaking force
F_w	Part of F_{equ} induced by wind forces, amplified by γ_p
f_f	Factor of further influences
f_{f1}	Factor of diameter ratio influence
f_{f2}	Factor tensile strength of wire influence
f_{f3}	Factor of fleet angle influence
f_{f4}	Factor of lubrication influence
f_{f5}	Factor of multilayer drum influence