SLOVENSKI STANDARD
SIST EN 14753:2008

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Varnost strojev - Varnostne zahteve za stroje in opremo za zvezno litje jekla

Safety of machinery - Safety requirements for machinery and equipment for continuous casting of steel

Sicherheit von Maschinen - Sicherheitsanforderungen für Maschinen und Einrichtungen zum Stranggießen von Stahl

Sécurité des machines - Prescriptions de sécurité pour les machines et équipements de coulée continue de l'acier

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Safety of machinery - Safety requirements for machinery and equipment for continuous casting of steel

Sécurité des machines - Prescriptions de sécurité pour les machines et équipements de coulée continue de l'acier

Sicherheit von Maschinen - Sicherheitsanforderungen für Maschinen und Einrichtungen zum Stranggießen von Stahl

This European Standard was approved by CEN on 4 November 2007.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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

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Foreword

This document (EN 14753:2007) has been prepared by Technical Committee CEN/TC 322 “Equipments for making and shaping of metals - Safety requirements”, 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of an identical text or by endorsement, at the latest by June 2008, and conflicting national standards shall be withdrawn at the latest by June 2008.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(s).

For relationship with EU Directive(s), see informative Annex ZA and ZB which are an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: 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 United Kingdom.

Introduction

This document is a type C standard as stated in EN ISO 12100.

The machines and equipment concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this standard.

When provision of this type C standard is different from those which are 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 European Standard applies for plant (containing machinery and equipment) used in the process of continuous casting of liquid steel (hereafter referred to as continuous casting machine, CCM) as defined in 3.1 and illustrated in Annex B.

This European Standard deals with all significant hazards, hazardous situations and events relevant to machinery and equipment for the continuous casting of steel, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4).

This European Standard specifies the safety requirements to be met during design, assembly, transport, commissioning, operation, maintenance (as described in Clause 5) and decommissioning of the equipment.

This European Standard assumes that the machinery and equipment of the plant is operated and maintained by adequately trained and competent personnel (see 7.4). Manual intervention for setting, adjustment and maintenance is accepted as part of the intended use of the plant.

This European Standard assumes that the machinery is used with adequate workplace lighting conforming to EN 12464-1.

NOTE Local regulations regarding lighting should be considered and could differ from requirements of EN 12464-1.

This European Standard applies to:

CCM for the transformation of molten liquid steel into solid products in sections (e.g. square, rectangular, beam blank, circular)

— from the point where overhead cranes or other transport systems deposit ladles (e.g. in a ladle turret or ladle car);

— via casting process;

— via cutting equipment;

— to the run-out-area where the cut product is collected.

This European Standard does not cover safety requirements for:

— auxiliary plants (e.g. water treatment, refractory handling);

— ladles;

— cranes;

— winches and hoists;

— conveyors or handling systems.

This European Standard is not applicable to CCM, manufactured before the date of publication of this standard by CEN.

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 294, *Safety of machinery — Safety distance to prevent danger zones being reached by the upper limbs*

EN 349, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 574, *Safety of machinery — Two-hand control devices — Functional aspects — Principles for design*

EN 614-1, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 614-2, *Safety of machinery — Ergonomic design principles — Part 2: Interactions between the design of machinery and work tasks*

EN 626-1:1994, *Safety of machinery — Reduction of risks to health from hazardous substances emitted by machinery — Part 1: Principles and specifications for machinery manufacturers*

EN 626-2:1996, *Safety of machinery — Reduction of risk to health from hazardous substances emitted by machinery — Part 2: Methodology leading to verification procedures*

EN 811, *Safety of machinery — Safety distances to prevent danger zones being reached by the lower limbs*

EN 842, *Safety of machinery — Visual danger signals — General requirements, design and testing*

EN 953:1997, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 981, *Safety of machinery — System of auditory and visual danger and information signals*

EN 982, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics*

EN 983, *Safety of machinery — Safety requirements for fluid power systems and their components — Pneumatics*

EN 1037:1995, *Safety of machinery — Prevention of unexpected start-up*

EN 1050, *Safety of machinery — Principles for risk assessment*

EN 1088, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN 1837, *Safety of machinery — Integral lighting of machines*

EN 12094-1, *Fixed firefighting systems — Components for gas extinguishing systems — Part 1: Requirements and test methods for electrical automatic control and delay devices*

EN 13478, *Safety of machinery — Fire prevention and protection*

EN ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850:2006, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

prEN 15004-1, *Fixed firefighting systems — Gas extinguishing systems — Part 1: General requirements for planning and installation (ISO 14520-1, modified)*

EN 50171, *Central power supply systems*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 61310-1, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual,,auditory and tactile signals (IEC 61310-1:1995)*

EN 61310-2, *Safety of machinery — Indication, marking and actuation — Part 2: Requirements for marking (IEC 61310-2:1995)*

EN ISO 4871:1996, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 7731, *Ergonomics — Danger signals for public and work areas — Auditory danger signals (ISO 7731:2003)*

EN ISO 11064-1, *Ergonomic design of control centres — Part 1: Principles for the design of control centres (ISO 11064-1:2000)*

EN ISO 11202, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Survey method in situ (ISO 11202:1995)*

EN ISO 11688-1, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

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

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

EN ISO 13732-1, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 14122-1, *Safety of machinery - Permanent means of access to machinery — Part 1: Choice of fixed means of access between two levels (ISO 14122-1:2001)*

EN ISO 14122-2, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2001)*

EN ISO 14122-3, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2001)*

EN ISO 14122-4, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders (ISO 14122-4:2004)*

IEC 60405, *Nuclear instrumentation — Constructional requirements and classification of radiometric gauges*

ISO 7000, *Graphical symbols for use on equipment — Index and synopsis*

ISO 7745, *Hydraulic fluid power — Fire-resistant (FR) fluids — Guidelines for use*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003, EN ISO 12100-2:2003 and the following apply.

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

3.1
continuous casting machines (CCM)
CCM can deliver the steel from one or more strands

NOTE The CCM can be vertical, bow-shaped, horizontal or mixed type. The list of machinery covered is given in Annex B.

3.2
casting platform
area where liquid steel is handled and the casting process is performed

3.3
cooling chamber
room located underneath the casting platform to cover the cooling area of the strands

3.4
crop and/or sample collecting system
device to collect crops or samples

3.5
cutting system
device to cut the product to desired length

3.6
run-out-area (cooling bed and product collecting system)
area with devices to transport, cool down and/or collect the products

3.7
dummy bar system
device to start casting

3.8
electromagnetic braking device (EMBR)
device to brake liquid steel movement in the mould

3.9
electromagnetic mould stirring device (EMS)
device to stir the liquid steel

3.10
electromagnetic strand stirring device
device to stir the liquid steel in the strand area

3.11
ladle
vessel to collect, transport and discharge molten steel

3.12
ladle emergency system
system to convey and collect liquid steel in case of uncontrolled steel flow from ladle

3.13
tundish emergency system
system to stop or convey and collect liquid steel in case of uncontrolled steel flow from tundish

3.14
ladle supporting system
installed on the casting platform move the ladles received from the charging area into casting position

3.15
ladle/tundish shrouding system
protection of the liquid steel stream from ladle to tundish

3.16
ladle/tundish steel stream flow control system
installed on the ladle/tundish to control the liquid steel flow

3.17
local control stand
free-standing control desk usually situated adjacent to equipment

3.18
marking system
device to mark the product

3.19
mould
device that solidifies the strand shell

3.20
mould level control system
control system of the steel level of the mould

3.21
movable control box
box connected to the control system, e.g., to position equipment more precisely

3.22
oscillating device
device for oscillating movement of the mould

3.23
pulpit
enclosed room in which the control desk and monitoring facilities for a CCM are located

3.24
transfer system
device to transfer the strand product, e.g., roller table

3.25
scale collecting system
device to collect scale

3.26
slag detecting system
system to detect the slag flow into the tundish

3.27
strand support system
device to support and guide the steel product of each strand from mould outlet to the withdrawal unit system

3.28
submerged entry nozzle (SEN)
device to pour the steel from the tundish into the mould

3.29
tundish
trough to collect and distribute the liquid steel poured from the ladle among the various strands

3.30
tundish launder and slag box system
system to collect and/or divert liquid steel poured out of the ladle/tundish in case of failure, installed on the casting platform

3.31
tundish supporting system
system that supports/transfers/rotates the tundish from parking/preheating into casting position, installed on the casting platform

3.32
withdrawal and straightening system
device to withdraw and straighten the strands and transfer them to the cutting machine area

3.33
unauthorised person
person not permitted to enter certain areas or to perform certain actions in the area of the CCM in relation with the operation and/or maintenance equipment, because not having the required specific knowledge and skill, and/or not being properly equipped, in order to avoid the related hazards

3.34
emergency position
position where the ladle and/or tundish is moved in case of an emergency situation

3.35
safe operating area
area where persons will be protected in case of emergency and where specific devices are located, e.g., for shut-off gas pipes, emergency control for ladle turret

3.36
fire-resistant fluid
fluid with low flame propagation (see ISO 5598)

3.37
hydraulic fluid
fluid used to transmit hydraulic energy (see EN ISO 6743-4)

4 List of significant hazards

This clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this standard, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk.

The significant hazards and hazardous situations identified are listed in columns 1 and 2 of 5.2, Table 1.

In addition the manufacturer shall identify through his own risk assessment (see EN 1050) which of the hazards listed in Table 1 are significant for equipment made to customer's specifications.