SLOVENSKI STANDARD
SIST EN 869:2000

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Safety requirements for high pressure metal diecasting units

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Sicherheitsanforderungen für Metall-Druckgießanlagen

Prescriptions de sécurité pour les unités a mouler les métaux sous haute pression

Ta slovenski standard je istoveten z: **EN 869:1997**

ICS:

25.120.30 Livarska oprema Moulding equipment

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Descriptors: machine tools, profiling machines, die casting, safety of machines, dangerous machines, safety requirements, accident prevention, specifications, hazardous areas, hazards, human factors engineering, safety measures, safety devices, protection against mechanical hazards, engine noise, utilisation, information, marking

English version

Safety requirements for high pressure metal diecasting units

Prescriptions de sécurité pour les unités à mouler les métaux sous haute pression

Sicherheitsanforderungen für Metall-Druckgießanlagen

This European Standard was approved by CEN on 26 January 1997.

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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Content

FOREWORD

This European Standard has been prepared by Technical Committee CEN/TC 202 "Foundry machinery", 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 March 1998, and conflicting national standards shall be withdrawn at the latest by March 1998.

This European Standard 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).

An assessment of the foreseeable risks arising from the use of the machinery was carried out when this standard was drafted by CEN/TC 202/WG 1, comprising experts from the following countries: Denmark, France, Germany, Italy, Sweden, Switzerland and United Kingdom.

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

0 INTRODUCTION

This European standard is a type C standard as defined in EN 292-1.

The extent to which hazards are covered is indicated in the scope of this standard (see clause 1) and in the listing of hazards (see clause 4). In addition, machinery shall comply, as appropriate, with EN 292-1 and EN 292-2 for hazards which are not covered by this standard.

1 SCOPE

This European standard specifies the safety requirements for high pressure metal diecasting units.

It applies to high pressure diecasting machines and to integration of ancillary equipment such as metal feeding, inserting and removal, or spraying appliances.

This standard does not apply to low pressure diecasting machines, gravity casting machines nor to wax model moulding machines.

This standard provides the requirements to be met by the manufacturer to ensure the safety of persons and property during construction, transport, commissioning, use, de-commissioning and maintenance periods, as well as in the event of foreseeable faults or malfunctions which may occur in the equipment. It defines the safety requirements at all stages in the life of the equipment and its design, arrangement, construction and use.

This standard applies to equipment which is placed on the market after the date of issue of this standard.

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.

EN 292-1:1991	Safety of machinery - Basic concepts, general principles for design Part 1: Basic terminology, methodology
EN 292-2:1991	Safety of machinery - Basic concepts, general principles for design Part 2: Technical principles and specifications
EN 294:1992	Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs
EN 349:1993	Safety of machinery - Minimum distances to avoid crushing of parts of the human body
EN 418:1992	Safety of machinery - Emergency stop equipment; Functional aspects - Principles for design
EN 60204-1:1992	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 61310-1:1995	Safety of machinery - Indicating, marking and actuating principles Part 1: Visual, audible and tactile signals (IEC 1310-1:1995 and Corrigendum 1995)
prEN 574:1995	Safety of machinery - Two-hand control devices - Functional aspects - Principles for design
prEN 614-1:1991	Safety of Machinery Part 1: Terminology and general principles
prEN 953:1992	Safety of machinery - General requirements for the design and construction of guards (fixed, movable)
prEN 954-1	Safety of machinery - Safety related parts of control systems Part 1: General principles for design
prEN 1005-1:1993	Safety of machinery - Human physical performance Part 1: Terms and definitions
prEN 1005-2:1993	Safety of machinery - Human physical performance Part 2: Manual handling of items associated to machinery
prEN 1005-3:1993	Safety of machinery - Human physical performance Part 3: Recommended force limits for machinery operation

prEN 1265:1993	Noise test codes for foundry machines and equipment
prEN 50100-1:1994	Safety of machinery - Electro-sensitive protective devices Part 1: General requirements and tests
ISO 7745:1989	Hydraulic fluid power - Fire-resistant (FR) fluids; Guidelines for use
ISO/TR 11688-1:1995	Acoustics - Recommended practice for the design of low noise machinery and equipment Part 1: Planning

3 GENERAL, DEFINITIONS

For the purposes of this standard, the following definitions apply:

3.1 Terms, Definitions

The terms and definitions used in this standard are those listed in EN 292-1 and EN 292-2. For the purpose of this standard, the term "casting" shall be understood to mean "high pressure diecasting". Other terms are defined as follows:

Table 1

term	definition
diecasting	a process in which molten metal is injected into a die and held under high pressure until completely solidified
diecasting machine	a powered machine that injects molten metal under pressure into a reusable split die which is attached to the platens of the machine
diecasting unit	a diecasting machine, together with supplement-ary devices, which form one production unit
ancillary equipment	automatic devices which carry out process steps additional to those of the diecasting machine itself e.g.: feeding the metal / removing the castings / spraying the die
metal	the material being cast

3.2 Types of machines, subassemblies, machine parts, machine areas, protective devices, protective measures

3.2.1 Types of machines

Table 2

term	definition
hot-chamber diecasting machine	diecasting machine having the shot sleeve and plunger immersed beneath the surface of the molten metal in the holding furnace
cold-chamber diecasting machine	diecasting machine where molten metal is delivered to the shot sleeve in measured amounts from a separate holding furnace
horizontal cold-chamber diecasting machine	cold-chamber diecasting machine with the shot sleeve mounted horizontally
vertical cold-chamber diecasting machine	cold-chamber diecasting machine with the shot sleeve mounted vertically

Principles of the different types of machines are shown in figures 1 to 3.

All types of machines shown in figures 1 to 3 can be manufactured with a horizontal or a vertical die closing system.

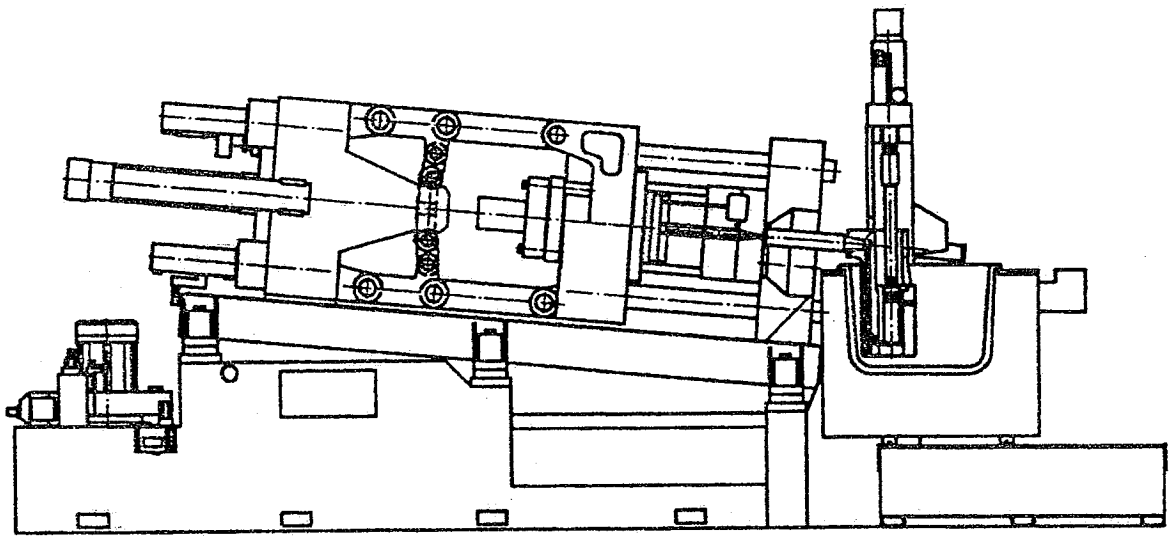

Figure 1: Hot chamber diecasting machine

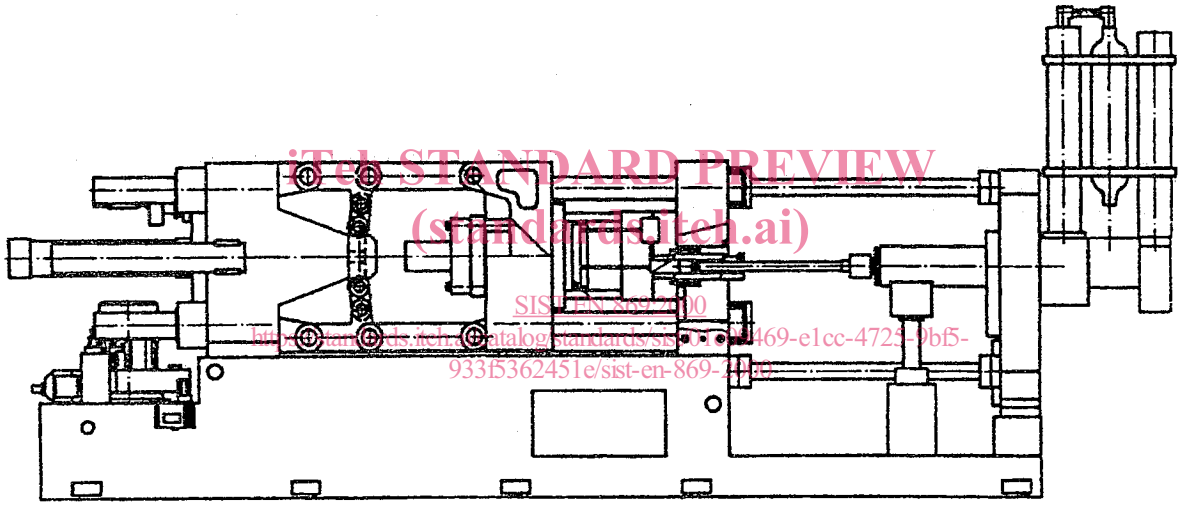

Figure 2: Horizontal cold-chamber diecasting machine

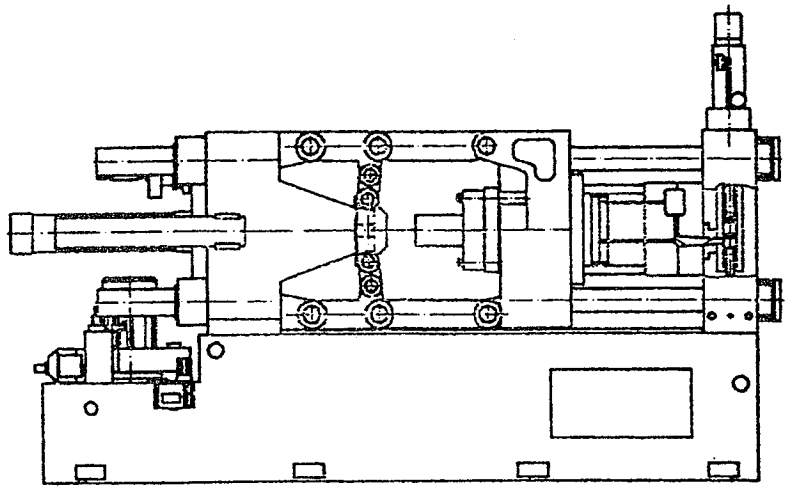

Figure 3: Vertical cold-chamber diecasting machine

3.2.2 Subassemblies

Table 3

term	definition
die closing system	assembly which opens and closes the die and holds the die against the force exerted on the metal during solidification
injection system	assembly which forces metal from the shot sleeve into the die and pressurises the metal during solidification
ejector system	assembly which ejects castings from the die cavity
core puller	the assembly which actuates and controls motions of cores
automatic tie bar puller	device for automatically pulling tie bars in order to facilitate die set up procedure
automatic ejector coupler	device for automatically coupling the ejector plate of the machine with the ejector device of the die
automatic die clamper	device for automatically attaching the die to the platens of the machine

3.2.3 Machine parts

die closing system

Table 4

term	definition
fixed platen	platen to which the fixed die half and the metal injection system are attached
moving platen	platen to which the moving die half is attached
thrust platen	platen to which the die closing mechanism and the closing cylinder are attached
tie bar	bars which carry the locking load and may guide the moving platen

injection system

Table 5

term	definition
injection drive	power system, e.g. hydraulic, which moves the plunger and applies forces to it
shot sleeve (cold-chamber diecasting machine)	cylindrical container in which pressure is applied to molten metal

(continued)

Table 5 (concluded)

term	definition
plunger	piston which forces metal from the shot sleeve into the die and applies pressure during solidification
plunger rod	the rod which joins the plunger to the injection drive
counter plunger (horizontal cold-chamber diecasting machine with vertical injection)	a piston which forms the base of the shot sleeve by closing the sprue opening before casting and which ejects the slug after casting
gooseneck (hot-chamber diecasting machine)	that part of an injection system (containing the shot sleeve and metal flow channel) which is submerged in molten metal
nozzle	connection between the gooseneck and the fixed die half
sprue	connection between the shot sleeve (cold chamber) or the nozzle (hot chamber) and the fixed die half
slug	metal which solidifies in the cold-chamber shot sleeve and is ejected with the casting

ejector system

Table 6

term	definition
ejector plate	part which transmits movement to the ejector device of the die
ejector rod	part which joins the ejector plate of the machine to the ejector device of the die

3.2.4 Machine areas

Table 7

term	definition
die area	area between fixed platen and moving platen
die closing mechanism area	area between moving platen and thrust platen
injection drive area	area between fixed platen and shot cylinder

3.2.5 Protective devices / protective measures

Table 8

term	definition
fixed guard	see 3.22.1 of EN 292-1:1991 4.2.2.2 of EN 292-2:1991
movable guard	see 3.22.2 of EN 292-1:1991 4.2.2.3 of EN 292-2:1991
two hand control	see prEN 574
closing safety device	A device, actuated directly by the movable guard, which prevents the mould from closing if a fault occurs in the control system
self monitoring control system	Control system in which a fault in the control system which impairs safety does not cause an unintentional dangerous movement and in which the fault can be recognized so that another dangerous movement cannot be produced
electro-sensitive protective device (ESPD)	see prEN 50100-1

3.3 Types of operation

Table 9

type of operation	definition	examples of application
setting	any step in the process can be selected and hand operated in any sequence	to perform individual steps of the process (not necessarily in operating cycle sequence) e.g. in order to change a mould
manual	the individual steps in the machine cycle are hand initiated in a predetermined order	to perform individual steps of the process (only in the sequence which is fixed by the program) e.g. to finish the casting cycle or to run the casting cycle in order to examine or to look for faults
semi-automatic	each cycle is hand initiated but thereafter automatically proceeds to completion	to produce castings in which at least one of the steps of the process which is performed outside the machine is executed by the operator
automatic	completion of a casting cycle initiates the next casting cycle	to continuously produce castings with any external process steps being automatically carried out by supplementary devices