



SLOVENSKI STANDARD
oSIST prEN ISO 23063:2020
01-julij-2020

Livarski stroji - Varnostne zahteve za stroje za tlačno litje (ISO/DIS 23063:2020)

Foundry machinery - Safety requirements for high pressure die casting machines
(ISO/DIS 23063:2020)

Sicherheit von Maschinen - Sicherheitsanforderungen an Metall-Druckgießanlagen
(ISO/DIS 23063:2020)

Machines de fonderie - Prescriptions de sécurité pour les unités à mouler les métaux
sous haute pression (ISO/DIS 23063:2020)

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ICS:

13.110	Varnost strojev	Safety of machinery
25.120.30	Livarska oprema	Moulding equipment
77.180	Oprema za metalurško industrijo	Equipment for the metallurgical industry

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en,fr,de

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DRAFT INTERNATIONAL STANDARD

ISO/DIS 23063

ISO/TC 306

Secretariat: SAC

Voting begins on:
2020-03-10Voting terminates on:
2020-06-02

Foundry machinery — Safety requirements for high pressure die casting machines

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

ICS: 13.110; 77.180

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Reference number
ISO/DIS 23063:2020(E)

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	3
4 List of significant hazards	7
4.1 General.....	7
4.2 Mechanical hazards.....	8
4.3 Electrical and control system hazards.....	8
4.3.1 Electrical hazards.....	8
4.3.2 Control system hazards.....	8
4.4 Thermal hazards.....	8
4.5 Fire hazards.....	9
4.6 Noise hazards.....	9
4.7 Hazards caused by gases, vapours, fumes and dusts.....	9
4.8 Hazards generated by neglecting ergonomic principles in machinery design.....	9
4.10 Hazards during the setting mode.....	10
4.11 Falls from heights.....	10
4.12 Hazards related to cold-chamber die casting machines.....	10
4.12.1 Bursting of biscuits.....	10
4.12.2 Injection drive area.....	10
4.13 Hazards related to hot-chamber die casting machines.....	10
4.13.1 Nozzle.....	10
4.13.2 Initiation of the casting process due to a fault in the control system.....	10
4.14 Hazards due to hydraulics and pneumatics.....	10
5 Safety requirements and/or protective measures	10
5.1 General.....	10
5.2 Mechanical.....	11
5.2.1 General.....	11
5.2.2 Guards and protective devices for die area.....	11
5.2.3 Access to the die closing mechanism area.....	13
5.2.4 Additional requirements for movable guards and access doors.....	14
5.2.5 Die casting units.....	15
5.3 Electric equipment and control systems.....	15
5.3.1 Electric equipment.....	15
5.3.2 Safety related parts of the control system: General.....	15
5.3.3 Emergency stop functions.....	15
5.3.4 Safety related control system of the dangerous movements of the die.....	16
5.3.5 Control of ancillary equipment.....	17
5.4 Measures against thermal hazards.....	17
5.4.1 Spurting of molten metal.....	17
5.4.2 Contact with hot surfaces.....	17
5.5 Hydraulics, pneumatics, combustible fluids.....	17
5.5.1 Hydraulics, pneumatics.....	17
5.5.2 Pressure fluids.....	18
5.5.3 Spray systems for release agents.....	18
5.6 Noise.....	18
5.6.1 Noise reduction as a safety requirement.....	18
5.6.2 Noise emission measurement on die casting machines.....	18
5.6.3 Noise emission measurement and declaration.....	19
5.7 Gases, vapours, fumes and dusts.....	21
5.8 Ergonomic aspects.....	21

ISO/DIS 23063:2020(E)

5.9	Protective measures when setting-up die casting machines, inserting and removal appliances, tie bar pulling devices, and other ancillary equipment.....	21
5.9.1	Setting-up without protective devices for the die area	21
5.9.2	Movement of core pullers and ejectors	22
5.9.3	Movement of tie bars.....	22
5.9.4	Movement of the plunger of cold chamber machines.....	22
5.10	Elevated working places.....	22
5.11	Additional protective measures for cold-chamber die casting machines.....	23
5.11.1	Bursting and removal of biscuit.....	23
5.11.2	Guards and protective devices for the injection area.....	23
5.12	Additional protective measures for hot-chamber die casting machines.....	23
5.12.1	Metal splashing.....	23
5.12.2	Movement of the injection piston.....	23
6	Verification of the safety requirements and/or protective measures.....	24
7	Information for use.....	25
7.1	General.....	25
7.2	Warning devices and safety signs.....	25
7.3	Accompanying documents.....	25
7.3.1	Instruction handbook.....	25
7.4	Marking.....	28
	Annex A (informative) Examples.....	29
	Annex ZA (informative) Relationship between this European Standard and the essential requirements of EU Directive 2006/42/EC aimed to be covered <i>NOTE to the drafter, Annex ZA to be removed before ISO publication</i>	41
	Bibliography.....	43

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 306, Foundry machinery.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

ISO/DIS 23063:2020(E)

Introduction

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

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

When requirements of this type C standard are 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.

Where for clarity an example of a preventive measure is given in this document, this should not have been considered as the only possible solution. Any other solution leading to the same risk reduction is permissible if an equivalent level of safety is achieved.

It is assumed that the machinery according to the scope is operated and maintained by trained personnel (see [3.40](#)).

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

machine manufacturers (small, medium and large enterprises);

health and safety bodies (regulators, accident prevention organizations, market surveillance etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups: **(standards.iteh.ai)**

machine users/employers (small, medium and large enterprises);

machine users/employees (e.g. trade unions, organizations for people with special needs);

service providers, e.g. for maintenance (small, medium and large enterprises);

consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

Foundry machinery — Safety requirements for high pressure die casting machines

1 Scope

This document applies to high pressure die casting machines:

- a) hot-chamber die casting machines (horizontal die closing system), and
- b) horizontal cold-chamber die casting machines (horizontal die closing system).

It applies to high pressure die casting units, i.e., high pressure diecasting machines (HPDCM) and their interfaces with the following ancillary equipment:

- c) die,
- d) melting, holding and dosing furnaces (see ISO 13577-1),
- e) metal feeding equipment,
- f) inserting and removal devices,
- g) spraying appliances,
- h) heating and cooling devices for the die.

This ancillary equipment itself is not covered.

Additional risks arising from the material being cast are not covered.

This standard does not apply to low pressure die casting machines and/or gravity die casting machines.

This standard deal with all significant hazards, hazardous situations and events relevant to pressure die casting machines when used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see [Clause 4](#)). This includes hazards coming from intentional interactions as well as unintentional but foreseeable interactions between movable parts of the machine and persons. It provides the requirements to be met by the manufacturer to ensure the safety of persons and property during transport, commissioning, use, de-commissioning and maintenance periods, as well as in the event of foreseeable failures or malfunctions that can occur in the equipment.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3743-1:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small movable sources in reverberant fields — Part 1: Comparison method for a hard-walled test room*

ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

ISO 3746:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane*

ISO/DIS 23063:2020(E)

ISO 9614-1:1993, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 1: Measurement at discrete points*

ISO 9614-2:1996, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning*

ISO 3864-1:2011, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

ISO 4413:2010, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

ISO 4414:2010, *Pneumatic fluid power — General rules and safety requirements for systems and their components*

ISO 7000:2019, *Graphical symbols for use on equipment — Registered symbols*

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

ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections*

ISO 11202:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying approximate environmental corrections*

ISO 11204:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections*

ISO 11428:1996, *Ergonomics — Visual danger signals — General requirements, design and testing*

ISO 11429:1996, *Ergonomics — System of auditory and visual danger and information signals*

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

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

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

ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

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

ISO 13851:2002, *Safety of machinery — Two-hand control devices — Functional aspects and design principles*

ISO 13854:2017, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

ISO 13855:2010, *Safety of machinery — Positioning of safeguards with respect to the approach speeds of parts of the human body*

ISO 13856-2:2013, *Safety of machinery — Pressure-sensitive protective devices — Part 2: General principles for design and testing of pressure-sensitive edges and pressure-sensitive bars*

ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 14119:2013, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

ISO 14120:2015, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

ISO 14122-1:2016, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means and general requirements of access*

ISO 14122-2:2016, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways*

ISO 14122-3:2016, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails*

IEC 60204-1:2016, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 61310-1:2007, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, auditory and tactile signals*

IEC 61310-2:2007, *Safety of machinery — Indication, marking and actuation — Part 2: Requirements for marking*

IEC 61496-1:2012, *Safety of machinery — Electro- sensitive protective equipment — Part 1: General requirements and tests*

ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections*

ISO 11202:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying approximate environmental corrections*

ISO 11204:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

casting

to cast a component/product by the use of pressure diecasting

3.2

die casting

process in which molten metal is injected into a die and held under pressure until complete solidification

ISO/DIS 23063:2020(E)**3.3****die casting machine**

machine with the purpose to inject molten metal under pressure into a parted die which is connected to the platens of the machine

3.4**die casting cell**

die casting machine, together with auxiliary and ancillary equipment, which form a complete production unit

3.5**auxiliary equipment**

devices which carry out additional process functions within a die casting cell

3.6**ancillary equipment**

devices which automatically carry out process functions additional to those of the die casting machine itself, e. g., feeding the metal, removing the castings, spraying the die

3.7**metal**

material being cast

3.8**hot-chamber diecasting machine**

die casting machine with an inclined or horizontal die closing system having the shot sleeve and plunger which are submerged in the molten metal of the furnace

Note 1 to entry: See Figure A.1.

3.9**cold-chamber diecasting machine**

die casting machine with a horizontal die closing system, where molten metal is delivered to the shot sleeve in measured amounts from a separate furnace. There are cold chamber die casting machines with toggle (see Figure A.2) and toggle free (see Figure A.3) closing systems

3.10**die closing system**

assembly which opens and closes the die and holds the die against the force exerted on the molten metal during injection and solidification

3.11**injection system**

assembly which forces molten metal from the shot sleeve into the die cavity and applies pressure to the molten metal during solidification

3.12**ejector system**

assembly which ejects castings from the die cavity

3.13**core puller**

assembly which controls movements of cores

3.14**tie bar pulling device**

for pulling tie bars in order to facilitate die set-up procedure

3.15**die clamping device**

device for clamping the die to the platens of the machine (automatically or manually)

3.16**fixed platen**

platen to which the fixed die-half and the metal injection system are connected

Note 1 to entry: Also known as stationary platen.

3.17**moving platen**

platen to which the moving die-half is connected

Note 1 to entry: Also known as movable platen.

3.18**cylinder platen**

platen to which the die closing mechanism and the closing cylinder are connected

Note 1 to entry: Also known as thrust platen, reaction platen, link housing or rear platen.

3.19**tie bar**

bars which carry the locking load and guide the moving platen

3.20**injection drive**

system, e. g. hydraulic which moves the plunger and applies force to it

3.21**shot sleeve**

cylindrical container of a cold-chamber die casting machine in which pressure is applied to molten metal

3.22**Plunger**

piston which forces molten metal from the shot sleeve into the die and applies pressure to the molten metal during solidification

Note 1 to entry: Also known as plunger tip.

3.23**gooseneck**

that part of an injection system (containing the shot sleeve and metal flow channel) which is submerged in molten metal

Note 1 to entry: Only applies to hot-chamber die casting machines.

3.24**nozzle**

connection between the gooseneck and the fixed die-half

3.25**biscuit**

metal surplus which solidifies in the cold-chamber shot sleeve and is ejected with the casting

Note 1 to entry: Also known as slug.

3.26**ejector plate**

part which transmits movement to the ejector device of the die

3.27**die area**

area between fixed platen and moving platen

ISO/DIS 23063:2020(E)**3.28****die closing mechanism area**

area between moving platen and cylinder platen

3.29**injection drive area**

area between fixed platen and shot cylinder

3.30**closing safety device**

device, actuated by the movable guard, which prevents the die from closing if a failure occurs in the control system

3.31**setting mode**

operating mode where any step in the process can be selected and hand operated in any sequence with restricted operation of the safety functions, see chapter [5.9](#)

Note 1 to entry: For example, to perform individual steps of the process (not necessarily in operating cycle sequence), e. g., like changing a die.

3.32**manual mode**

operating mode where the individual steps in the machine cycle are hand initiated

Note 1 to entry: For example, to perform individual steps of the process (only in the sequence which is fixed by the program), e. g., like to finish the casting cycle or to run the casting cycle in order to examine or to look for faults.

3.33**semi-automatic mode**

operating mode where each cycle is hand initiated but thereafter automatically proceeds to completion

Note 1 to entry: For example, 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

Note 2 to entry: Also known as one cycle automatic.

3.34**automatic mode**

operating mode where the completion of a casting cycle initiates the next casting cycle

Note 1 to entry: For example, to continuously produce castings with any external process steps being automatically carried out by ancillary device.

Note 2 to entry: Also known as full-automatic.

3.35**machine-setter**

designated person, trained and skilled to carry out adjusting, die changing, setting and starting-up the die casting process

3.36**operator**

designated person trained and skilled to run the die casting machine

3.37**Access door**

Access doors are the doors of the distance guards of a die casting cell

3.38 maintenance

combination of service, inspection, reconditioning and functional test of the equipment

Note 1 to entry: The purpose is to preserve the working condition or returning to this condition so that the required function can be performed (including safety requirements).

3.38.1 service

measure to maintain the nominal condition

Note 1 to entry: The nominal condition can be maintained in general without dismantling/disassembling major parts of the equipment, e.g. cleaning, lubrication of the work equipment as well as addition or replacement of agents or by replacing tools or operational changing parts.

3.38.2 inspection

measure to observe and assess the current condition as well as fault finding

Note 1 to entry: Measures, e.g. measuring, testing, diagnostics including the determination of the causes of wear or damage and the derivation of the necessary consequences for the continued use.

Note 2 to entry: 3.41.2 does not cover "material inspection", see [3.14](#)

3.38.3 reconditioning

measure to return to the nominal condition

Note 1 to entry: Foreseeable measures to replace worn parts or parts having expired the foreseen lifetime (could require dismantling/disassembling). These parts should meet manufacturers' specification.

3.38.4 functional test

checking the functionality of the exchanged or repaired parts

Note 1 to entry: It is maybe required to carry out adjustment work, e.g. test runs, verifying safety functions.

3.39 repair

non-regular work, not foreseeable, required to re-establish the nominal condition

Note 1 to entry: Measure to replace damaged parts, requires in general dismantling/disassembling.

3.40 dry cycle

operation mode of the die casting machine, with all movements of the die machine, which are typical for a production cycle, e. g. with injection cylinder movements but without molten metal and with die opening, die closing and interlocking using a die or a test block mounted in the die area.

3.41 Test block

object for simulating the presence of a die in the die area of the machine

4 List of significant hazards

4.1 General

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