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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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 202, *Foundry machinery*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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.

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Introduction

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

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 (e.g. regulators, accident prevention organisations, market surveillance).

Others can be affected by the level of machinery safety achieved with the means of the document by the above mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, for example, 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.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous 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 type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

Where, for clarity, an example of a preventive measure is given in this document, this should not be 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.

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Foundry machinery — Safety requirements for high pressure die casting machines

1 Scope

This document applies to high pressure die casting machines:

- a) ~~a)~~ hot-chamber die casting machines (horizontal die closing system);
- b) ~~b)~~ horizontal cold-chamber die casting machines (horizontal die closing system).

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

- a) ~~a)~~ die;
- b) ~~b)~~ melting, holding and dosing furnaces (see [ISO 13577-1:2016](#));
- c) ~~c)~~ metal feeding equipment;
- d) ~~d)~~ inserting and removal devices;
- e) ~~e)~~ spraying appliances;
- f) ~~f)~~ 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. [D/FDIS 23063.2](#)

This document does not apply to either low pressure die casting machines or gravity die casting machines, or both.

This document deals 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](#)). ~~Clause 4~~.

This includes hazards coming from intentional interactions as well as unintentional but foreseeable interactions between movable parts of the machine and persons.

This document 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 are referred to in the text in such a way that some or all of their content constitutes requirements 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.

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

<std>ISO 4413:2010, Hydraulic fluid power — General rules and safety requirements for systems and their components</std>

<std>ISO 4414:2010, Pneumatic fluid power — General rules and safety requirements for systems and their components</std>

<std>ISO 7000:2019, Graphical symbols for use on equipment — Registered symbols</std>

<std>ISO 7731:2003, Ergonomics — Danger signals for public and work areas — Auditory danger signals</std>

<std>ISO 7745:2024, Hydraulic fluid power — Fire-resistant fluids — Requirements and guidelines for use</std>

<std>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</std>

<std>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</std>

<std>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</std>

<std>ISO 11429:1996, Ergonomics — System of auditory and visual danger and information signals</std>

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

<std>ISO 12100:2010, Safety of machinery — General principles for design — Risk assessment and risk reduction</std>

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

<std>ISO 13849-1:2023, Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design</std>

<std>ISO 13850:2015, Safety of machinery — Emergency stop function — Principles for design</std>

<std>ISO 13851:2019, Safety of machinery — Two-hand control devices — Principles for design and selection</std>

<std>ISO 13854:2017, Safety of machinery — Minimum gaps to avoid crushing of parts of the human body</std>

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

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<std>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</std>

<std>ISO 13857:2019, Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs</std>

<std>ISO 14119:2013, Safety of machinery — Interlocking devices associated with guards — Principles for design and selection</std>

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

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

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

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

<std>IEC 60204-1:2016, Safety of machinery — Electrical equipment of machines — Part 1: General requirements</std>

<std>IEC 61310-1:2007, Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals</std>

<std>IEC 61310-2:2007, Safety of machinery — Indication, marking and actuation — Part 2: Requirements for marking</std>

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 terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

3.1 casting

component or product that has obtained its shape through the process of *die casting* (3.2)(3.2)

3.2 die casting

process in which molten *metal* (3.7)(3.7) is injected into a die and held under pressure until complete solidification

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3.3 die casting machine

machine with the purpose to inject molten metal (3.7)(3.7) under pressure into a parted die which is connected to the platens of the machine

3.4 die casting cell

die casting machine (3.3)(3.3) together with auxiliary and ancillary equipment (3.6)(3.6) which form a complete production unit

3.5 auxiliary equipment

set of all the devices which carry out additional process functions within a die casting cell (3.4)(3.4)

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3.6 ancillary equipment

devices which automatically carry out process functions additional to those of the die casting machine (3.3)(3.3) itself, e.g. feeding the metal (3.7)(3.7), removing the castings, spraying the die

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3.7 metal

material, which is suitable for being cast in the die casting (3.2)(3.2) process

3.8 hot-chamber die casting machine

die casting machine (3.3)(3.3) with an inclined or horizontal die closing system (3.10)(3.10) having the shot sleeve (3.19)(3.19) and plunger (3.20)(3.20) which are submerged in the molten metal (3.7)(3.7) of the furnace

Note 1 to entry: See Figure A.1 Figure A.1.

3.9 cold-chamber die casting machine

die casting machine (3.3)(3.3) with a horizontal die closing system (3.10)(3.10), where molten metal (3.7)(3.7) is delivered to the shot sleeve (3.19)(3.19) in measured amounts from a separate furnace

Note 1 to entry: There are cold-chamber die casting machines with toggle (see Figure A.2 Figure A.2) and toggle-free (see Figure A.3 Figure A.3) closing systems.

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3.10 die closing system

assembly which opens and closes the die, and holds the die against the force exerted on the molten metal (3.7)(3.7) during injection and solidification

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3.11 injection system

assembly which forces molten metal (3.7)(3.7) from the shot sleeve (3.19)(3.19) into the die cavity and applies pressure to the molten metal during solidification

3.12 ejector

system of assembled machine components (e.g. ejector plate and ejector rod) connected to the ejector device of the die, which allows the ejection of castings from the die cavity

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