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| STN | Obrábacie a tvárniace stroje Bezpečnosť Elektroerozívne stroje (ISO 28881: 2022) | STN EN ISO 28881 20 0721 |
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Machine tools - Safety - Electrical discharge machines (ISO 28881:2022)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 09/22

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Supersedes EN ISO 28881:2013

English Version

Machine tools - Safety - Electrical discharge machines (ISO 28881:2022)Machines-outils - Sécurité - Machines d'électro-érosion
(ISO 28881:2022)Werkzeugmaschinen - Sicherheit -
Funkenerodiermaschinen (ISO 28881:2022)

This European Standard was approved by CEN on 11 February 2022.

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 CEN-CENELEC Management Centre or to any CEN member.

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EN ISO 28881:2022 (E)

| Contents | Page |
|--|-------------|
| European foreword..... | 3 |
| Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered | 4 |

European foreword

This document (EN ISO 28881:2022) has been prepared by Technical Committee ISO/TC 39 "Machine tools" in collaboration with Technical Committee CEN/TC 143 "Machine tools - Safety" the secretariat of which is held by SNV.

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of an identical text or by endorsement, at the latest by January 2023, and conflicting national standards shall be withdrawn at the latest by January 2023.

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

This document supersedes EN ISO 28881:2013, EN ISO 28881:2013/AC:2013.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

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

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 28881:2022 has been approved by CEN as EN ISO 28881:2022 without any modification.

EN ISO 28881:2022 (E)**Annex ZA**
(informative)**Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered**

This European Standard has been prepared under a Commission's standardization request "M/396 Mandate to CEN and CENELEC for Standardisation in the field of machinery" to provide one voluntary means of conforming to essential requirements of Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast).

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Annex I of Directive 2006/42/EC

| The relevant Essential Requirements of Directive 2006/42/EC (Annex I) | Clause(s)/sub-clause(s) of this EN | Remarks/Notes |
|--|---|----------------------|
| <i>1.1.2 Principles of safety integration</i> | | |
| <i>1.1.2 (a)</i> | 5, 6 | |
| <i>1.1.2 (c)</i> | 5, 6 | |
| <i>1.1.2 (d)</i> | 5, 6 | |
| <i>1.1.2 (e)</i> | 5, 6 | |
| <i>1.1.3 Materials and products</i> | 4 Table 1 No. 7, 7.1, 7.2 5.5 Table 3 D, D1, D11, 6.3.2.5. a) | |
| <i>1.1.4 Lighting</i> | | Not covered |
| <i>1.1.5. Design of machinery to facilitate its handling</i> | | Not Covered |
| <i>1.1.6. Ergonomics</i> | 5.5 Table 3 F, F1, | |
| <i>1.1.7. Operating positions</i> | | Not Covered |
| <i>1.1.8. Seating</i> | | Not Covered |
| <i>1.2.1. Control Systems; Safety and reliability of control systems</i> | 5.1, 5.2 5.5 Table 3 A7 | |
| <i>1.2.2. Control Devices</i> | 5.2 Table 2 5.5 Table 3 F2 6.3.2.2 a) 8) | |

| | | |
|--|--|-------------|
| <i>1.2.3. Starting</i> | | Not covered |
| <i>1.2.4.1. Normal stop</i> | | Not covered |
| <i>1.2.4.2 Operational stop</i> | 5.2 Table 2 5.4.1 | |
| <i>1.2.4.3 Emergency stop</i> | 5.2 Table 2 5.4.2 | |
| <i>1.2.4.4. Assembly of machinery</i> | 5.2 Table 2 | |
| <i>1.2.5. Selection of control or operating modes</i> | 5.3.1 | |
| <i>1.2.6. Failure of the power supply</i> | 5.5 Table 3 E1, E3 | |
| | | |
| <i>1.3.1. Risk of loss of stability</i> | 5.5 Table 3 A9 | |
| <i>1.3.3. Risks due to falling or ejected objects</i> | 5.5 Table 3 A4 6.3.2.2 a) 5) | |
| <i>1.3.4. Risks due to surfaces, edges or angles</i> | 5.5 Table 3 A1, A2, A3, A6, B4 | |
| <i>1.3.7. Risks related to moving parts</i> | 5.5 Table 3 A1, A2, A3 | |
| <i>1.3.8. Choice of protection against risks arising from moving parts</i> | 5.5 Table 3 A1, A2, A3 | |
| <i>1.3.9. Risks of uncontrolled movements</i> | 5.5 Table 3 B6 | |
| <i>1.4.1 General requirements</i> | 5.2 Table 2 | |
| <i>1.4.2.1. Fixed guards</i> | | Not Covered |
| <i>1.4.2.2. Interlocking movable guards</i> | 5.5 Table 3 A1.2.2, A1.2.3, A1.2.4, A3.1.1 | |
| <i>1.5.1. Electricity supply</i> | 5.5 Table 3 B1, E1 | |
| <i>1.5.2. Static electricity</i> | | Not covered |
| <i>1.5.3. Energy supply other than electricity</i> | 5.5 Table 3 E2 | |
| <i>1.5.6. Fire</i> | 5.5 Table 3 D, D1, D8, D9, D10, D11, 6.3.2.5. a) | |
| <i>1.5.7. Explosion</i> | 5.5 Table 3 D4-D12 | |
| <i>1.5.8. Noise</i> | 6.3.2.1 6.3.4 Annex B | |
| <i>1.5.10. Radiation</i> | 5.5 Table B4, B5 | |

EN ISO 28881:2022 (E)

| | | |
|--|---|--|
| <i>1.5.11. External radiation</i> | 5.5 Table D12 6.3.2.7 | |
| <i>1.5.13. Emissions of hazardous materials and substances</i> | 5.5 Table 3 D2-D4 6.3.2.7 | |
| <i>1.5.14. Risk of being trapped in a machine</i> | 5.5 Table 3 A1, A2, A3 | |
| <i>1.5.15. Risk of slipping, tripping of falling</i> | 5.5 Table 3 A6.1 | |
| <i>1.6.1. Machinery maintenance</i> | 6.3.2.2 6), 7), 8) | |
| <i>1.6.2. Access to operating positions and servicing points</i> | Operating: Table 2 4 th line 5.3.1 5.3.2 5.3.2.2 5.5 Table 3 B6 5.5 Table 3 D6 6.3.4 Annex B 1 (operating conditions) Position: 5.2 a) 5.3.1 5.3.2.1 5.4.2 Table 3 B2.1.7 Table 3 E1, E2, E3 Annex B b) | |
| <i>1.7. Information</i> | 6 | |

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

INTERNATIONAL STANDARD

ISO 28881

Second edition
2022-04

Machine tools — Safety — Electrical discharge machines

Machines-outils — Sécurité — Machines d'électro-érosion



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Contents

Page

| | |
|---|-----------|
| Foreword | iv |
| Introduction | v |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Terms and definitions | 4 |
| 4 List of significant hazards | 7 |
| 5 Safety requirements and/or protective measures | 10 |
| 5.1 General requirements..... | 10 |
| 5.2 Safety-related parts of control systems for EDM equipment and EDM systems..... | 10 |
| 5.3 Operating modes..... | 11 |
| 5.3.1 Operating mode selection..... | 11 |
| 5.3.2 Protective measures relating to operating modes..... | 11 |
| 5.4 Stop functions..... | 14 |
| 5.4.1 Operational stop..... | 14 |
| 5.4.2 Emergency stop..... | 14 |
| 5.5 Specific requirements..... | 15 |
| 6 Information for use | 23 |
| 6.1 General..... | 23 |
| 6.2 Marking, signs and written warnings..... | 23 |
| 6.3 Instruction handbook..... | 23 |
| 6.3.1 General..... | 23 |
| 6.3.2 Special recommendations for EDM site preparation..... | 24 |
| 6.3.3 Special recommendations for EDM operation..... | 26 |
| 6.3.4 Noise..... | 28 |
| Annex A (informative) Examples and schematic diagrams | 29 |
| Annex B (normative) Noise test code | 38 |
| Annex C (informative) Fire protection codes for special regional cases | 42 |
| Bibliography | 55 |

ISO 28881:2022(E)

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 39, *Machine tools*, Subcommittee SC 10, *Safety*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 143, *Machine tools — Safety*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 28881:2013), which has been technically revised. It also incorporates the Technical Corrigendum ISO 28881:2013/Cor.1:2013.

The main changes are as follows:

- the service mode has been introduced;
- [Annex C](#) has been rewritten.

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.

Introduction

This document is a type-C standard as stated in ISO 12100:2010.

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 organisations, 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:

- 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.

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.

In addition, electrical discharge machining (EDM) equipment and EDM systems are intended to be designed according to the principles of ISO 12100:2010 for hazards which are not dealt with in this document.

The requirements of this document concern designers, manufacturers, suppliers and importers of machines described in the Scope.

This document also includes a list of items intended to be provided by the manufacturer to the user.

Machine tools — Safety — Electrical discharge machines

1 Scope

This document specifies safety requirements and/or protective measures applicable to EDM equipment and EDM systems intended to be adopted by persons undertaking their design, construction, installation and/or supply, such as:

- manually controlled EDM die sinking or EDM drilling machines;
- numerically controlled EDM die sinking or EDM drilling machines; and
- numerically controlled EDM wire cutting machines.

This document also includes information to be provided by the manufacturer to the user.

This document is not applicable to arc eroding and electro-chemical machining equipment.

This document takes account of the precondition of the intended use as well as the reasonably foreseeable misuse, in normal workshop environments and non-explosive atmospheres, including transportation, installation, setting, maintenance, repair and dismantling for removal or disposal of EDM equipment and EDM systems.

This document is also applicable to auxiliary devices essential for EDM processing.

This document deals with all significant hazards, hazardous situations or hazardous events relevant to EDM equipment and EDM systems, where they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see [Clause 4](#)).

This document is intended to apply to machines manufactured after the date of publication of this document.

When requirements of this type-C standard are different from those which are stated in type-A or -B standards, the requirements of this type-C standard take precedence over the requirements of other standards for machines that have been designed and built according to the requirements of this type-C standard.

This document defines required performance level and safety categories of the safety-related parts of the control system for EDM equipment and EDM systems as defined in ISO 13849-1:2015.

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.

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

ISO 28881:2022(E)

ISO 7010:2019/Amd.2:2020, *Graphical symbols — Safety colours and safety signs — Registered safety signs/ — Amendment 2*

ISO 9355-1:1999, *Ergonomic requirements for the design of displays and control actuators — Part 1: Human interactions with displays and control actuators*

ISO 9355-3:2006, *Ergonomic requirements for the design of displays and control actuators — Part 3: Control actuators*

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 11202:2010/Amd.1:2020, *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/ — Amendment 1*

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

ISO 13849-2:2012, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation*

ISO 13850:2015, *Safety of machinery — Emergency stop function — Principles for design*

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 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 14118:2017, *Safety of machinery — Prevention of unexpected start-up*

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*

ISO 14123-1:2015, *Safety of machinery — Reduction of risks to health resulting from hazardous substances emitted by machinery — Part 1: Principles and specifications for machinery manufacturers*

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

IEC 60529:1989/AMD2:2013/COR:2019, *Degrees of protection provided by enclosures (IP Code)*

IEC 60947-5-1:2016, *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices (RLV Redline version)*

IEC 61000-6-2:2016, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments*

IEC 61000-6-4:2018, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments*

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

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

IEC 61558-1:2017, *Safety of power transformers, power supplies, reactors and similar products — Part 1: General requirements and tests*

IEC 61800-5-2:2007, *Adjustable speed electrical power drive systems — Part 5-2: Safety requirements — Functional*

IEC 62226-1:2005, *Exposure to electric or magnetic fields in the low and intermediate frequency range — Methods for calculating the current density and internal electric field induced in the human body — Part 1: General*

IEC 62226-2-1:2005, *Exposure to electric or magnetic fields in the low and intermediate frequency range — Methods for calculating the current density and internal electric field induced in the human body— Part 2-1: Exposure to magnetic fields — 2D models*

IEC 62226-3-1:2007/A1:2017, *Exposure to electric or magnetic fields in the low and intermediate frequency range — Methods for calculating the current density and internal electric field induced in the human body — Part 3-1: Exposure to electric fields — Analytical and 2D numerical models*

IEC 62311:2020, *Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)*

EN 2:1992, *Classification of fires*

EN 54-1:2021, *Fire detection and fire alarm systems — Part 1: Introduction*

EN 614-1:2006+A1:2009, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 614-2:2000+A1:2008, *Safety of machinery — Ergonomic design principles — Part 2: Interactions between the design of machinery and work tasks*

EN 12198-1:2000+A1:2008, *Safety of machinery — Assessment and reduction of risks arising from radiation emitted by machinery — Part 1: General principles*

EN 12198-2:2002+A1:2008, *Safety of machinery — Assessment and reduction of risks arising from radiation emitted by machinery — Part 2: Radiation emission measurement procedures*

EN 12198-3:2002+A1:2008, *Safety of machinery — Assessment and reduction of risks arising from radiation emitted by machinery — Part 3: Reduction of radiation by attenuation or screening*

EN 55011:2016, *Industrial, scientific and medical equipment — Radio-frequency disturbance characteristics — Limits and methods of measurement*

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