
**Machine tools — Safety — Electro-
discharge machines**

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 28881:2013](https://standards.iteh.ai/catalog/standards/sist/6c2bd6ad-ae3b-4a1a-b37c-8ca530e8f2e1/iso-28881-2013)

<https://standards.iteh.ai/catalog/standards/sist/6c2bd6ad-ae3b-4a1a-b37c-8ca530e8f2e1/iso-28881-2013>



iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 28881:2013

<https://standards.iteh.ai/catalog/standards/sist/6c2bd6ad-ae3b-4a1a-b37c-8ca530e8f2e1/iso-28881-2013>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2013

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

	Page
Foreword.....	iv
Introduction.....	v
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	3
4 List of significant hazards.....	7
5 Safety requirements and/or protective measures.....	9
5.1 General requirements.....	9
5.2 Safety-related parts of control systems for EDM equipment and EDM systems.....	10
5.3 Operating modes.....	11
5.4 Stop functions.....	13
5.5 Specific requirements.....	14
6 Information for use.....	22
6.1 General.....	22
6.2 Marking, signs and written warnings.....	22
6.3 Instruction handbook.....	22
Annex A (informative) Examples and schematic diagrams.....	28
Annex B (normative) Noise emission measurements.....	37
Annex C (informative) Fire protection codes for special regional cases.....	38
Annex D (informative) Guidelines for risk assessment on EDM equipment and EDM systems to identify the required performance level and, if necessary, category.....	48
Bibliography.....	51

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 28881 was prepared by Technical Committee ISO/TC 39, *Machine tools*, Subcommittee SC 10, *Safety*.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 28881:2013](https://standards.iteh.ai/catalog/standards/sist/6c2bd6ad-ae3b-4a1a-b37c-8ca530e8f2e1/iso-28881-2013)

<https://standards.iteh.ai/catalog/standards/sist/6c2bd6ad-ae3b-4a1a-b37c-8ca530e8f2e1/iso-28881-2013>

Introduction

This International Standard has been prepared to be a Harmonized Standard to provide one means of conforming to the Essential Safety Requirements of the Machinery Directive of the European Union and associated EFTA regulations.

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

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the Scope of this International Standard. In addition, electro-discharge machining (EDM) equipment and EDM systems are intended to be designed according to the principles of ISO 12100 for hazards which are not dealt with in this International Standard.

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 International Standard defines performance level and safety categories of the safety-related parts of the control system for EDM equipment and EDM systems as defined in ISO 13849-1:2006.

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

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

iteh STANDARD PREVIEW
(standards.iteh.ai)
ISO 28881:2013
<https://standards.iteh.ai/catalog/standards/sist/6c2bd6ad-ae3b-4a1a-b37c-8ca530e8f2e1/iso-28881-2013>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 28881:2013](#)

<https://standards.iteh.ai/catalog/standards/sist/6c2bd6ad-ae3b-4a1a-b37c-8ca530e8f2e1/iso-28881-2013>

Machine tools — Safety — Electro-discharge machines

1 Scope

This International Standard specifies safety requirements and/or protective measures, applicable to EDM equipment and EDM systems, 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

intended to be adopted by persons undertaking the design, construction, installation and/or supply of such equipment. This International Standard also includes information to be provided by the manufacturer to the user.

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

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

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

2 Normative references

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

ISO 3746, *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, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

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

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

ISO 11202, *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/TR 11688-1, *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 28881:2013(E)

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

ISO 13849-2:2003, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation*

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

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

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

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

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

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

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

IEC 60204-1:2009, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

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

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

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

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

IEC 61558-1, *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*

EN 2, *Classification of fires*

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

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

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

EN 953:2009, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 1037:2008, *Safety of machinery — Prevention of unexpected start-up*

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

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

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

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

EN 62226-1, *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*

EN 62226-2-1, *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*

EN 62226-3-1, *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*

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

CISPR 11, *Industrial, scientific and medical equipment — Radio-frequency disturbance characteristics — Limits and methods of measurement*

(standards.iteh.ai)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100:2010 and ISO 13849-1:2006 and the following apply.

3.1

control circuit

<machine> circuit used for the control, including monitoring, of the machine

Note 1 to entry: For electrical equipment, see IEC 60204-1:2009, 3.8.

3.2

machine control system

system that responds to input signals from parts of machine elements, operators, external control equipment or any combination of these, and generates output signals causing a machine to behave in the intended manner, as specified in ISO 13849-1:2006, 3.1.32

3.3

dielectric fluid

<EDM process> non-conductive medium to improve the discharge effect, evacuate debris and cool the workpiece/electrode

3.4

dielectric fluid container

tank system to keep the dielectric fluid in a condition suitable for EDM

EXAMPLE Filtering and cooling.

3.5

EDM equipment

machine tool that includes all the necessary units for the process of electro-discharge machining

EXAMPLE Generator, control circuits and dielectric fluid container.

3.6

EDM system

assembly of EDM equipment and other machines or devices, which are arranged, linked and controlled to function as an integrated whole

3.7

electrode changer

<EDM equipment> mechanism integrated with the machine to supply a previously loaded electrode in exchange for another electrode

Note 1 to entry: The changing device is expected to enable an operator to load/unload electrodes from outside of the work area.

3.8

electro-discharge machining

EDM

any machining process based on spark erosion

Note 1 to entry: Electro-discharge machining is generally abbreviated as “EDM”.

3.9

electro-magnetic compatibility

ability of EDM equipment and EDM systems to function satisfactorily in their electro-magnetic environment without introducing intolerable electro-magnetic disturbances to anything in that environment

Note 1 to entry: Electro-magnetic compatibility is generally abbreviated as “EMC”

3.10

electronic handwheel

manually operated control device that initiates and maintains an axis movement by pulse generation input to the numerical control during its rotation

ISO 28881:2013
<https://standards.iteh.ai/catalog/standards/sist/6c2bd6ad-ae3b-4a1a-b37c-8ca530e8f2e1/iso-28881-2013>

3.11

enabling device

additional manually operated device used in conjunction with a start control and which, where continuously actuated, allows a machine to function

[SOURCE: ISO 12100:2010, 3.28.2 — modified.]

3.12

flammable dielectric fluid

dielectric fluid used in EDM, characterized by its relative ease of ignition and relative ability to sustain combustion

3.13

flash point

minimum temperature at which the dielectric fluid used in die sinking electro-discharge machining gives off sufficient combustible gas or vapour to ignite and sustain combustion

3.14

generator

unit to convert the electrical power supplied to the EDM equipment and EDM system for the purpose of being used for spark erosion processing

3.15

hazardous electric discharge power

electrical energy used to perform machining by electro-thermal material removal, which exceeds a permitted level of voltage for contact with persons

3.16**hold-to-run control device**

control device that initiates and maintains hazardous machine functions only as long as the manual control (actuator) is actuated

[SOURCE: ISO 12100:2010, 3.28.3 — modified.]

3.17**electric machining power**

electrical power supplied to the EDM equipment and EDM system transformed by the generator in specific electric energy, supplied as a tool to the sinker/wire electrode and the workpiece, to perform machining by electro-thermal material removal

3.18**mean time to dangerous failure****MTTF_d**

expectation of the mean time to dangerous failure

[SOURCE: ISO 13849-1:2006, 3.1.25 — modified.]

3.19**numerical control****NC****computerized numerical control****CNC**

automatic control of a process performed by a device, which makes use of numerical data introduced while the operation is in progress

[SOURCE: ISO/IEC 2806:1994, definition 2.1.1 — modified.]

3.20

operating mode <https://standards.iteh.ai/catalog/standards/sist/6c2bd6ad-ae3b-4a1a-b37c-8ca530e8f2e1/iso-28881-2013>
possible mode for use of the machine

3.20.1**automatic mode**

mode for use under numerical control to achieve programmed sequential operation with the guards closed, until stopped by a program or an operator

Note 1 to entry: This term is equivalent to machining mode.

Note 2 to entry: For machinery having automatic setting programs, such operations are considered automatic mode.

3.20.2**setting mode**

mode for use without electric machining power, for operations in which adjustments for the subsequent machining are performed by the operator

Note 1 to entry: Measuring cycles (e.g. touching of the workpiece with a probe or electrode), checking the movement of the workpiece and/or electrode using the electrode and/or workpiece changer, checking/optimizing the injection or suction flushing, a dry run for checking the NC program, etc. are procedures forming part of the setting mode (see [5.3.2.2](#)).

3.20.3**discharge alignment mode**

mode for the use for specific alignment with the discharge power on and with the guards of EDM equipment temporarily open and alternative safety measures activated

EXAMPLE Exhaust air extraction adjustment, e.g. vertical wire alignment, dielectric flushing adjustment and visual machining inspection.

3.21
performance level
PL

discrete level to specify the ability of safety-related parts of control systems to perform a safety function under reasonably foreseeable conditions

[SOURCE: ISO 13849-1:2006, 3.1.23 — modified.]

3.22
shielding

mechanical barrier or enclosure of conductive material intended to attenuate the emission/penetration of a varying electro-magnetic field into an assigned region

3.23
EDM process

removal of material in a dielectric fluid by electro-discharges, which are separated in time and randomly distributed in space, between two electrically conductive electrodes, and where the energy in the discharge is controlled

Note 1 to entry: The two electrically conductive electrodes are the tool electrode and the workpiece electrode.

3.24
EDM die sinking

removal of material by spark erosion to produce various shapes in the workpiece

Note 1 to entry: Shapes in the workpiece may be concave, convex and prismatic holes.

3.25
EDM drilling

removal of material by spark erosion with a tubular electrode to produce straight holes in the workpiece

3.26
EDM wire cutting

removal of material by spark erosion with a wire electrode to produce prismatic shapes in the workpiece

3.27
work area

<EDM equipment> space within the envelope of the machine where the EDM process can take place

3.28
workpiece changer

<EDM equipment> mechanism forming part of the machine to load a workpiece or pallet in exchange for another workpiece or palette previously unloaded

Note 1 to entry: The workpiece changer/palette changer is designed to enable an operator to load/unload the workpiece or palette from outside of the work area.

3.29
work tank

<EDM equipment> unit surrounding the work area to contain the dielectric fluid for EDM processes

ITEH STANDARD PREVIEW
(standards.iteh.ai)

[ISO 28881:2013](https://standards.iteh.ai/catalog/standards/sist/6c2bd6ad-ae3b-4a1a-b37c-8ca530e8f2e1/iso-28881-2013)

<https://standards.iteh.ai/catalog/standards/sist/6c2bd6ad-ae3b-4a1a-b37c-8ca530e8f2e1/iso-28881-2013>

4 List of significant hazards

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

NOTE 1 The purpose of risk assessment is to identify hazards and estimate and evaluate risk to be reduced and to transfer the remaining risk to the user (see [Clause 6](#)). There are many methods and tools available for this purpose and several are described in this International Standard. The method or tool chosen is largely a matter of industry, company or personal preference. The choice of a specific method or tool is less important than the process itself. The benefits of risk assessment come from the discipline of the process rather than the precision of the results: as long as a systematic approach is taken to get from hazard identification to risk reduction, all the elements of risk are considered (see ISO/TR 14121-2).

The list of hazards given in [Table 1](#) is the result of a risk assessment carried out for all EDM equipment covered by this International Standard. The technical measures and information for use in [Clauses 5](#) and [6](#) are based on the risk assessment and deal with the identified hazards by either eliminating them or reducing the effects of the risks they generate.

NOTE 2 The designer's attention is focused on hazards which can occur during the life of the machine. The risk assessment assumes risks to both the operator(s) and other person(s) who can have access to the hazard zone(s) for conditions of intended use, including reasonably foreseeable misuse of the machine (see ISO 12100:2010, 3.22 and 3.23) for both spark erosion with automatic mode and operations requiring intervention (e.g. setting, maintenance and repair).

The significant hazards covered by this International Standard are listed in [Table 1](#).

Particular attention is paid to hazards dealing with:

- electrical hazards (electrode voltage);
- flammable dielectric fluid (level, temperature, fire detection);
- hazardous substances (waste disposal; filters, used dielectric fluid, electrodes and sludges);
- electro-magnetic emissions (radiated and conducted); see IEC 61000-6-2 EMC for immunity and IEC 61000-6-4 EMC for emission.

Table 1 — List of significant hazards and major sources of these hazards associated with electro-discharge machines

No. ^a	Hazard type	Hazardous situation action	Activity	Danger zone	Reference to Table 3
1	Mechanical hazards:				
1.1	Acceleration, deceleration (kinetic energy of elements in controlled or uncontrolled motion): being run over, impact	Movements of machine elements, failure of the control circuit	Setting, machining and maintenance	At and near the machine	A3 to A5

Table 1 (continued)

No. ^a	Hazard type	Hazardous situation action	Activity	Danger zone	Reference to Table 3
1.2	Cutting parts, sharp edges: crushing and shearing	1.2.1 Workpiece clamping	Loading/unloading, reorienting	Between clamps and workpiece	A1, A2, A3
		1.2.2 Automatic workpiece/electrode changing	Power-operated, workpiece/electrode change	Envelope of workpiece/electrode motion	A1, A2, A3
		1.2.3 Moving parts (e.g. axes, rolling elements), failure of the control circuit	Manual operation/workpiece/electrode change	Between workpiece/electrode and machine parts	A1, A2, A3, B4
1.3	Moving and/or rotating elements: entanglement	Manual or automatic workpiece/electrode changing, spindle rotation and wire rollers rotation, failure of the control circuit	Manual or power-operated workpiece/electrode changing and spindle rotation	Between workpiece/electrode and machine parts	A1, A2, A3, B4
1.4	High-pressure: fluid injection or ejection	Hydraulic/pneumatic systems ejection, leakage, flushing and residual pressure	Setting, machining and maintenance	At and near the machine	A4
1.5	Rough, slippery surface: slipping, tripping and falling of persons (related to machinery)	Ejection or spillage of fluids and lubricants; trailing floor-mounted or loose connection cables	During and after machining and maintenance	Work tanks where whole-body access is possible, slippery floor and high working positions; area surrounding the machine	A6
1.6	Loss of stability: — unbalanced machine or parts — inappropriately fixed part of machine — lifted machine or parts by crane — transportation with overload	Impact, trapping and/or crushing by inclination and/or falling of machine	Machine assembly, transportation, installation and commissioning	At and near the machine	A9
2	Electrical hazards:				
2.1	Live parts (direct contact): electrical shocks to persons, effect on medical implants, shock	Contact with workpiece/electrode, wire/wire-path and contact with unprotected circuits	Process control, setting and maintenance	Workpiece, electrode, tooling fixture	B1, B2
2.2	Parts that become live under fault conditions (indirect contact): electrocution of persons, effect on medical implants, shock	Contact with parts of the machine which are not live during normal operation	Maintenance and service on the generator and/or the machine	At and near the machine, insulation of electrical cables and equipment	B1, B3
3	Thermal hazards (not relevant to EDM):				
4	Noise hazards:				
4.1	Manufacturing process (fluid pumps, moving and/or rotating parts, whistling pneumatics): hearing damage loss or other physiological disturbances	Emission of hazardous noise from the EDM equipment or its auxiliary devices	During operation, setting, cleaning, maintenance and repair activities	At and in the vicinity of the machine or the auxiliary devices	C1

Table 1 (continued)

No. ^a	Hazard type	Hazardous situation action	Activity	Danger zone	Reference to Table 3
5	Vibration hazards (not relevant to EDM):				
6	Radiation hazards:				
6.1	Electro-magnetic radiation: effect on failure of safety-related parts of the control circuit and medical implants	Hazardous radiation immediately near the work area	During operation of machine and setting	In the vicinity of the machine or the auxiliary devices	B4, B5, B6
7	Materials/substances hazards:				
7.1	Contact with or inhalation of harmful fluids, gases, mists and dust	Conditions near the machine caused by ejection of dielectric fluid, droplets or evaporation, mists, etc.	During the EDM process, setting, maintenance and disposal of the machine	At and near the machine	D1 to D4
7.2	Fire or explosion	Fire hazard originated by flammable gas bubbles or mist generation, long-lasting arcing condition, loss of dielectric fluid, fault of electrical or hydraulic power supply, failure of the control circuit, etc.	During the EDM process	In the work tank, the work area and near the machine	D4 to D12
8	Ergonomic hazards:				
8.1	Specific requirements resulting from neglect of ergonomic principles	Unhealthy posture or excessive effort including the design of machines in accordance with ergonomic principles	During loading and unloading of electrode or work-piece on the EDM equipment and EDM system	At operator's position	EN 614-1 EN 614-2
9	Hazards associated with the environment in which the machine is used:				
9.1	Electro-magnetic disturbances: external influences on electrical equipment	Malfunction of the machine itself or electrical equipment due to electro-magnetic disturbances, failure of the control circuit	Machine in operation, setting and maintenance	At and in the vicinity of the machine	B4
10	Combination of hazards:				
10.1	Failure of the external power supply and restoration of the energy supply after an interruption	Malfunction resulting from power loss on the machine itself and/or electrical/pneumatic equipment, powered clamping failures and machine elements moving and/or rotating under residual forces (e.g. inertia, gravity)	All activities at the machine	At the machine and all moving elements of the machine	E1, E2, E3
^a	This list is derived from ISO 12100:2010, Table B.1.				

5 Safety requirements and/or protective measures

5.1 General requirements

EDM equipment and EDM systems shall comply with the safety requirements and/or protective measures and be verified in accordance with this clause. In addition, the equipment and systems shall be designed