



SLOVENSKI STANDARD
SIST EN 14656:2007+A1:2010
01-junij-2010

Varnost strojev - Varnostne zahteve za stiskalnice za iztiskanje jekla in nekovinskih materialov

Safety of machinery - Safety requirements for extrusion presses for steel and non-ferrous metals

Sicherheit von Maschinen - Sicherheitsanforderungen an Strangpressen für Stahl und NE-Metalle

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Sécurité des machines - Exigences de sécurité pour presses à filer l'acier et les métaux non ferreux

[SIST EN 14656:2007+A1:2010](https://standards.iteh.ai/catalog/standards/sist/83fe4f6-f920-4af7-a6ce-7f8dafa4c8e2/sist-en-14656-2007a1-2010)

[https://standards.iteh.ai/catalog/standards/sist/83fe4f6-f920-4af7-a6ce-](https://standards.iteh.ai/catalog/standards/sist/83fe4f6-f920-4af7-a6ce-7f8dafa4c8e2/sist-en-14656-2007a1-2010)

[7f8dafa4c8e2/sist-en-14656-2007a1-2010](https://standards.iteh.ai/catalog/standards/sist/83fe4f6-f920-4af7-a6ce-7f8dafa4c8e2/sist-en-14656-2007a1-2010)

Ta slovenski standard je istoveten z: EN 14656:2006+A1:2010

ICS:

13.110	Varnost strojev	Safety of machinery
25.120.10	Kovaški stroji. Stiskalnice. Škarje	Forging equipment. Presses. Shears

SIST EN 14656:2007+A1:2010

en,fr

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 14656:2007+A1:2010

<https://standards.iteh.ai/catalog/standards/sist/83fe4f6-f920-4af7-a6ce-7f8dafa4c8e2/sist-en-14656-2007a1-2010>

EUROPEAN STANDARD

EN 14656:2006+A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2010

ICS 25.120.10

Supersedes EN 14656:2006

English Version

Safety of machinery - Safety requirements for extrusion presses for steel and non-ferrous metals

Sécurité des machines - Exigences de sécurité pour
presses à filer l'acier et les métaux non ferreux

Sicherheit von Maschinen - Sicherheitsanforderungen an
Strangpressen für Stahl und NE-Metalle

This European Standard was approved by CEN on 4 September 2006 and includes Amendment 1 approved by CEN on 28 February 2010.

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 Management Centre 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 CEN Management Centre has the same status as the official versions.

iTeh STANDARD PREVIEW

CEN members are the national standards bodies of 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

[SIST EN 14656:2007+A1:2010](https://standards.iteh.ai/catalog/standards/sist/83fe4f6-f920-4af7-a6ce-7f8dafa4c8e2/sist-en-14656-2007a1-2010)

<https://standards.iteh.ai/catalog/standards/sist/83fe4f6-f920-4af7-a6ce-7f8dafa4c8e2/sist-en-14656-2007a1-2010>







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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
Introduction	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	8
4 List of significant hazards	9
5 Safety requirements and/or measures	9
5.1 General.....	9
5.2 List of significant hazards, hazardous situations, safety requirements and/or measures.....	14
5.3 Special safety requirements and/or measures	25
5.4 Noise reduction as a safety requirement	26
6 Verification of the safety requirements and/or measures	26
7 Information for use	27
7.1 General.....	27
7.2 Location and nature of information for use.....	27
7.3 Safety devices, warning signs and labels.....	27
7.4 Marking	28
7.5 Instruction handbook	28
7.6 Maintenance manual	30
Annex A (normative) Safety requirements for hydraulic, pressure water and lubrication systems	32
Annex B (normative)  Safety requirements and/or measures for electrical equipment and control systems for extrusion presses 	38
Annex C (normative) Noise test code	42
Annex D (informative) De-commissioning	47
Annex ZA (informative)  Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC 	48
Bibliography	49
Figures	
Figure A.1 — Detail of the hydraulic diagram for limitation of set-up speed	34
Figure C.1 — Example of measuring points for noise measurement (location of workstations)	45
Tables	
Table B.1 — Emergency functions for extrusion presses	40
Table C.1 — Example of declared dual-number noise values	46

Foreword

This document (EN 14656:2006+A1:2010) has been prepared by Technical Committee CEN/TC 322 "Equipment for making and shaping of metals - Safety requirements", 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 October 2010, and conflicting national standards shall be withdrawn at the latest by October 2010.

This document includes Amendment 1, approved by CEN on 2010-02-28.

This document supersedes EN 14656:2006.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 and A1.

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

This document 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).

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

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EN 14656:2006+A1:2010 (E)**Introduction**

This European Standard is a type C standard as stated in EN ISO 12100.

The equipment concerned and the extent to which hazards and hazardous situations and events are covered are indicated in the scope of this European Standard.

When provisions 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 preventative measure is given in the text, 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.

This European Standard assumes that the equipment is operated and maintained by trained personnel.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 14656:2007+A1:2010](https://standards.iteh.ai/catalog/standards/sist/83fe4f6-f920-4af7-a6ce-7f8dafa4c8e2/sist-en-14656-2007a1-2010)

<https://standards.iteh.ai/catalog/standards/sist/83fe4f6-f920-4af7-a6ce-7f8dafa4c8e2/sist-en-14656-2007a1-2010>

1 Scope

This European Standard applies to:

- extrusion presses from the exit side of the heater through associated handling, cooling and quenching equipment including, e.g. the puller, the hot saw, the run-out table, the stretcher, the cold saw, cold saw table and/or coiler when incorporated into the equipment, to a point where the extruded product is passed to associated finishing equipment.

It specifies the health and safety requirements at all stages in the life of the equipment, its design, ordering, construction, use and disposal.

This European Standard specifies requirements to be met by the manufacturer to ensure the health and safety of persons during construction, transport, commissioning, operation, maintenance and de-commissioning, as well as in the event of foreseeable faults as malfunctions which may occur in the equipment.

This European Standard deals with all significant hazards, hazardous situations and events relevant to extrusion presses when they are used as intended and under conditions which are reasonably foreseeable by the manufacturer (see Clause 4).

This European Standard is not applicable to extrusion presses which are manufactured before the date of its publication as EN.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

2 Normative references

The following referenced documents are indispensable for the application 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.

- 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 842, *Safety of machinery — Visual danger signals — General requirements, design and testing*
- EN 894-1, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 1: General principles for human interactions with displays and control actuators*
- EN 894-2, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 2: Displays*
- EN 894-3, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 3: Control actuators*
- EN 953:1997, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*
- EN 981:1996, *Safety of machinery — System of auditory and visual danger and information signals*

EN 14656:2006+A1:2010 (E)

EN 982:1996, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics*

EN 983:1996, *Safety of machinery — Safety requirements for fluid power systems and their components — Pneumatics*

EN 999, *Safety of machinery — The positioning of protective equipment in respect of approach speeds of parts of the human body*

EN 1037:1995, *Safety of machinery — Prevention of unexpected start-up*

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

EN 1299, *Mechanical vibration and shock — Vibration isolation of machines — Information for the application of source isolation*

EN 1591-1, *Flanges and their joints — Design rules for gasketed circular flange connections — Part 1: Calculation method*

EN 1837, *Safety of machinery — Integral lighting of machines*

EN 10204:2004, *Metallic products — Types of inspection documents*

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 13480-1, *Metallic industrial piping — Part 1: General*

EN 13480-2:2002, *Metallic industrial piping — Part 2: Materials*

EN 13480-3:2002, *Metallic industrial piping — Part 3: Design and calculation*

EN 13480-4:2002, *Metallic industrial piping — Part 4: Fabrication and installation*

EN 13480-5:2002, *Metallic industrial piping — Part 5: Inspection and testing*

EN 13861, *Safety of machinery — Guidance for the application of ergonomics standards in the design of machinery*

EN 14253, *Mechanical vibration — Measurement and calculation of occupational exposure to whole-body vibration with reference to health — Practical guidance*

EN 50171, *Central power supply systems*

EN 60073:2002, *Basic and safety principles for man-machine interface, marking and identification — Coding principles for indicators and actuators (IEC 60073:2002)*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 60447, *Basic and safety principles for man-machine interface — Marking and identification — Actuating principles (IEC 60447:2004)*

EN 60825-1, *Safety of laser products — Part 1: Equipment classification and requirements (IEC 60528-1:2007)*

- EN 61310-1, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, auditory and tactile signals (IEC 61310-1:2007)*
- EN 61310-2, *Safety of machinery — Indication, marking and actuation — Part 2: Requirements for marking (IEC 61310-2:2007)*
- EN 61496-1, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2004, modified)*
- EN ISO 3744, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994)*
- EN ISO 3746, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:1995)*
- EN ISO 3747, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Comparison method for use in situ (ISO 3747:2000)*
- EN ISO 4871:1996, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*
- EN ISO 7731, *Ergonomics — Danger signals for public and work areas — Auditory danger signals (ISO 7731:2003)*
- EN ISO 9614-1, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 1: Measurement at discrete points (ISO 9614-1:1993)*
- EN ISO 9614-2, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning (ISO 9614-2:1996)*
- EN ISO 11064-1, *Ergonomic design of control centres — Part 1: Principles for the design of control centres (ISO 11064-1:2000)*
- EN ISO 11202, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Survey method in situ (ISO 11202:1995)*
- EN ISO 11203, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions from the sound power level (ISO 11203:1995)*
- EN ISO 11688-1, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*
- EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*
- EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*
- EN ISO 13732-1, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*
- EN ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*
- EN ISO 13850:2006, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*
- EN ISO 13857, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

EN 14656:2006+A1:2010 (E)

EN ISO 14121-1:2007, *Safety of machinery — Risk assessment — Part 1: Principles (ISO 14121-1:2007)*


EN ISO 14122-1, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of a fixed means of access between two levels (ISO 14122-1:2001)*

EN ISO 14122-2, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2001)*

EN ISO 14122-3, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2001)*

EN ISO 14122-4, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders (ISO 14122-4:2004)*

ISO 3864-1, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs in workplaces and public areas*

ISO 7000, *Graphical symbols for use on equipment — Index and synopsis* 

3 Terms and definitions

For the purpose of this document, the terms and definitions given in EN ISO 12100:2003 and the following apply.

NOTE Definitions used in EN and ISO standards referred to in this European Standard are also valid for this European Standard.

iTech STANDARD PREVIEW
(standards.iteh.ai)

3.1 manufacturer
body responsible for the final installation and commissioning of equipment within the scope of this European Standard and which issues the declaration of conformity

3.2 foreseeable risk
hazardous event which may occur during installation, commissioning, operation, maintenance and de-commissioning of the equipment

3.3 maintenance
maintenance, inspection, servicing, repair, lubrication, adjustment and replacement of the equipment in accordance with the manufacturer's instructions

3.4 equipment
extrusion press, ancillary machinery as well as tools and devices used during the operation, maintenance and other activities associated with the extrusion process

3.5 operators' areas
areas where the operators have to be present to control all activities associated with the extrusion process

3.6 site inspection
any inspection carried out in order to gather information relevant to the design and construction of the equipment

4 List of significant hazards

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

This assessment then formed the basis for determining:

- a) the safety features which shall be incorporated into the equipment and
- b) any special instructions which shall be communicated to the user.

The significant hazards and hazardous situations are defined in 5.2, columns 1 and 2 of Table 1 and Annex A, Table A.1.

In addition it is important for the manufacturer to carry out an individual risk assessment according to EN ISO 14121-1 to identify any other significant hazard of the machine/equipment. Significant hazards identified in this individual risk assessment but not dealt with in this European Standard shall be reduced by applying the principles of EN ISO 12100-2.

The manufacturer shall establish at the contract stage all hazards which may arise from any foreseeable cause in which the equipment may be used, and the appropriate preventative measures.

The repeated reference to "operating/maintenance instruction" in Table 1 is an instruction to the manufacturer to give details of the information that shall be included in the information for use manual (see 7.5) which shall be supplied with the equipment and which shall be available at all times to the operator(s) and maintenance personnel of the equipment.

(standards.iteh.ai)

5 Safety requirements and/or measures

<https://standards.iteh.ai/catalog/standards/sist/83fe4f6-f920-4af7-a6ce-7f8dafa4c8e2/sist-en-14656-2007a1-2010>

5.1 General

5.1.1 Introduction

Extrusion presses for steel and non-ferrous metals shall comply with the safety requirements and/or measures of Clause 5.

This clause specifies and explains the preventative measures given in Table 1 and it also describes additional safety features, procedures and techniques which shall be considered by the designer and the manufacturer of the equipment.

5.1.2 Site inspections

The manufacturer shall undertake sufficient site inspections to establish all safety requirements of the equipment design with regard to

- a) accessibility, according to the requirements of 5.1.10 and EN ISO 14122-2,
- b) maintenance and clearance gaps for cleaning, according to the requirements of EN ISO 13857, EN 349, EN 953 and EN 1088,
- c) movement of machinery and materials, according to the requirements of EN 999,
- d) safe operation, according to the requirements of 5.2,
- e) health and safety at the workplace, according to the requirements of EN ISO 13857, EN 953 and

EN 14656:2006+A1:2010 (E)

f) prevention of emissions hazardous to health at the workplace (e.g. noise, vibration, pollution).

5.1.3 Structural assembly

The manufacturer shall undertake and record design calculations to show that the structural assembly of the equipment, e.g. materials, auxiliaries, services and potential foundation block ground loadings, are adequate for safety functions under intended use.

NOTE It remains the responsibility of the user to ensure the grounding is suitable to withstand the forces generated by the equipment based on the information supplied by the manufacturer.

5.1.4 Safety layout

A1 The manufacturer shall prepare a safety layout document of the extrusion press. The aim of the safety layout is to give information (normally by means of one or more drawings) about the physical position of safety related elements like, e.g.:

- a) isolators according to EN 60204-1;
- b) emergency stop buttons, according to the requirements of EN ISO 13850;
- c) escape routes (if necessary, e.g. for large plants);
- d) other safety-related safety marking, according to the requirements of EN ISO 7731 and EN 842;
- e) segregating devices (guards, fences, trip devices etc.) intended to prevent access to danger areas of the plant according to the requirements of EN ISO 13857, EN 953 and EN ISO 14122-2;
- f) doors and other points of access to the plant (where required with related locking and/or interlocking devices);
- g) warning devices and safety signs (warning signs for, e.g. forbidden access, X-rays);
- h) fire precautions.

The safety layout shall be included into the manufacturer's instructions for use. **A1**

5.1.5 Safety devices

Safety devices which require regular monitoring, e.g., fixed guards, interlocked guards, light beams, proximity devices and emergency stops, shall be accessible for inspection and maintenance and protected against damage under foreseeable conditions. In particular, they shall be selected, constructed and be sufficiently robust to operate reliably.

5.1.6 **A1 Guard-rails **A1****

A1 Guard-rails shall conform to EN ISO 14122-3.

Guard-rails are to be considered as means to deter or impede access to hazardous areas, i.e. a physical obstacle which only reduces the probability of access (but not totally prevents it), offering an obstruction to free access (see 3.27 of EN ISO 12100-1:2003). Guard-rails can be used as a measure to prevent unintentional access of unauthorised persons to zones where residual risks exist.

Therefore, guard-rails are not permitted as the sole measure of safeguarding hazardous areas in case of significant risks (e.g. from moving machinery or processed material). Guard-rails shall be used for cases where the hazards of slips, trips and falls are involved.

The evaluation of the degree of risk associated to a specific hazardous situation shall be performed during individual risk assessment by the manufacturer in compliance with Clause 8 of EN ISO 14121-1:2007. However, guard-rails, are not to be considered as sufficient measures of safeguarding to address hazardous situations included in Table 1, where only significant hazards are dealt with.

In addition, the manufacturer shall give information in the instructions for use (see Clause 7) about the foreseen restrictions for access to the areas surrounded by the guard-rails and about the nature of the existing residual risks. ^{A1}

5.1.7 Discharge of fluids

The manufacturer shall give instructions for discharge of fluids in case of maintenance of the fluid systems or due to a leakage. These instructions shall include information for sealed surfaces (e.g. foundation), drains and the fluid that will be discharged.

5.1.8 Personal protective equipment (PPE)

The manufacturer shall give information in the instruction handbook (see 7.5) on the required type of personal protective equipment needed to safeguard personnel from any risks remaining after applying the safety measures.

5.1.9 Warning devices and safety signs

Warning devices and safety signs are additions to the design requirements to reduce hazards. Warning devices and safety signs according to EN 61310-1 and EN 61310-2 shall be used.

^{A1} Graphical symbols shall be in accordance with ISO 3864-1 and/or ISO 7000. ^{A1}

Danger signals shall be in accordance with EN ISO 7731 and/or EN 842 and/or EN 981.

Warning signs shall be affixed so that they are visible from outside the danger zone.

The manufacturer shall not rely upon warning devices and safety signs alone to reduce hazards in case of significant risks.

^{A1} Warning signs about non-ionising radiation for persons with implanted medical devices shall be fixed where applicable.

If an audible warning device is required (e.g. horn), the A-weighted sound pressure level measured according to EN ISO 7731 shall be 10 dB higher than the environmental noise of the operating extrusion presses, measured at 7 m distance from the audible warning device.

NOTE The manufacturer should not rely upon warning signs alone to reduce hazards in the case of significant risks being present. ^{A1}

5.1.10 Access

The manufacturer shall take account of the following:

- a) access to the plant shall be controlled in such a way that unintentional entry into any danger zone shall not be possible, considering EN ISO 12100-2 and EN 953;
- b) access to control desks, pulpits, underground areas, inspection and service floors shall be protected against heat radiation, jets of high pressure fluids and designed to withstand moving materials and tools (if any), according ^{A1} EN ISO 13857 ^{A1}, EN ISO 14122-1, EN ISO 14122-2, EN ISO 14122-3 and EN ISO 14122-4;
- c) surfaces for walking or standing shall be so designed, that risks of slipping caused by scale, oil and/or lubricant are minimised;

EN 14656:2006+A1:2010 (E)

- d) the relevant category for controls for access to equipment during operation or maintenance shall be selected from B.2 and consider the requirements of EN 1037;
- e) areas of the equipment which are entered regularly due to maintenance reasons shall be easily accessible and considering a).

5.1.11 Electrical equipment

A1 Electrical equipment shall conform to EN 60204-1 and withstand the hazards identified in the risk assessment required at the design stage and taking into account the requirement set out in Annex B.

Safety devices shall be protected against damages. In particular they shall be robust to withstand damages while continuous operation in the respective area. **A1**

5.1.12 Safety control system

Each safety control shall be selected in accordance with the severity of the risk as described in **A1** EN ISO 13849-1 **A1**. The function of each safety control shall be considered in combination with other elements of the safety control system and shall be selected so as it does not reduce the safety level of any other component of the control system.

For the hazards listed in Table 1 where an electrical control system is involved a risk assessment shall be carried out according to **A1** EN ISO 13849-1 **A1**.

5.1.13 Guards**iTeh STANDARD PREVIEW**

Guards shall be provided to prevent access to a danger zone. They shall be selected as appropriate for the degree and frequency of access to be permitted, e.g. an enclosing guard or distance guard, fixed or movable with interlock. This selection shall be made according to EN 953. Interlock systems shall meet the requirements of EN 1088.

[https://standards.iteh.ai/catalog/standards/sist/83fe4f6-f920-4af7-a6ce-](https://standards.iteh.ai/catalog/standards/sist/83fe4f6-f920-4af7-a6ce-78def4c2/sist-en-14656-2007-a1-2010)

A1 The requirements for guards shall conform to Clause 5 of EN 953:1997, EN ISO 13857 and EN 349.

At zones, where risks due to potentially dangerous movements of equipment exist, operation of manual modes shall be made by means of hold-to-run devices from control stands with full overview of the driving elements. **A1**

5.1.14 **A1 Surface temperatures and heat radiation **A1****

A1 Surfaces which are accessible and could be touched shall have temperatures not exceeding the burn threshold for contact time and material specified in EN ISO 13732-1. Where these limits can not be kept, additional technical measures shall be applied, e.g. isolation, distance guard. These measures shall be supplemented by warning instructions and wearing of PPE, if necessary.

Where the risk of heat radiation at permanent workplaces is given, protection walls/shields with isolating material shall be provided. EN 12198-3 shall be considered. **A1**

5.1.15 Operators' visibility

A good operators' visibility to the operating process shall be provided. Where it is not possible to prevent access to hazardous areas which are not naturally visible from the operator's position, e.g. the die during break-through of the profile, devices shall be provided

- to prevent the operation of the equipment while a person is present in the area and/or
- to give the operator a clear view of the hazardous area, e.g. suitably placed mirrors or closed circuit television (CCTV).

5.1.16 Hydraulic, pneumatic, cooling and lubrication systems

Hydraulic, pneumatic, cooling and lubrication systems shall be designed to reduce risks from hazardous substances, fire, explosion, vibration and noise.

Sufficient ventilation and/or other means shall be provided for cooling/lubrication systems to minimize hazardous effects.

Hazards associated with pressure, temperature, ignition sources, and proximity to adjacent personnel shall be taken into account. In no case shall the system be designed to safety requirements lower than those described in EN 982 or EN 983 and shall take account of Annex A.

5.1.17 Ergonomics

EN 13861 shall be used as a guideline for considering ergonomic aspects in the design of extrusion presses. Particular consideration shall be given to EN 614-1, EN 614-2, EN 894-1, EN 894-2, EN 894-3, EN 60447 and EN ISO 11064-1.

Particular attention shall be paid to the following:

- a) dedicated lifting aids or anchoring points for common lifting devices shall be provided whenever frequent lifting or heavy tooling of machines is required;
- b) eyebolts or similar aids shall be considered to lift heavy components; if necessary, they shall also be fitted with handles, hand-holds or grips with a slip-resistant (e.g. knurled) surface;
- c) work areas used for manual handling of components shall be so designed that they are free of obstructions so that the operator is not hindered in his movements; the work area shall be sufficiently spacious to handle manual loads close to the body;
- d) supporting structures provided to enable machinery parts to be assembled on site and shall be designed and fabricated to ensure stability, and thereby minimise manual handling;
- e) machine parts, such as electric motors, should be located on top of structural supports and shelves rather than suspended;
- f) the positioning of electric junctions, fluid power and electrical connections and similar, can adversely affect a workers posture during installation and subsequent maintenance. The location of such items shall ideally be between 400 mm and 1 600 mm above the workers standing level and within the reach of the upper limbs according to EN ISO 13857;
- g) the ideal placement for handwheels, levers etc. shall be between 700 mm and 1 600 mm above the workers standing level to minimise physical effort;
- h) foot pedals can place an asymmetrical strain on the operators back, and other controls are preferable. Where a seated operator shall use foot pedals and hand levers, the seat and the levers shall be individually adjustable to ensure good posture. EN ISO 6682 can be used as a guidance for placement of foot and hand operated controls;
- i) where components require periodical maintenance, access shall be provided, according 5.1.10;
- j) slip-resistant surfaces, according 5.1.10 c);
- k) vibration protection, according 5.1.18;
- l) heat protection, according 5.1.14;
- m) lighting of the working areas shall be in accordance with EN 1837 or local regulations. 