



SLOVENSKI STANDARD

SIST EN 16474:2015

01-julij-2015

Stroji za predelavo gume in plastike - Stiskalnice za vulkaniziranje - Varnostne zahteve

Plastics and rubber machines - Tyre curing presses - Safety requirements

Kunststoff- und Gummimaschinen - Reifenheizpressen - Sicherheitsanforderungen

Machines pour les matières plastiques et le caoutchouc - Presses à vulcaniser - Prescriptions de sécurité

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Ta slovenski standard je istoveten z: **EN 16474:2015**

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EUROPEAN STANDARD

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Plastics and rubber machines - Tyre curing machines - Safety requirements

Machines pour les matières plastiques et le caoutchouc -
Machines à vulcaniser les pneumatiques - Prescriptions de
sécurité

Kunststoff- und Gummimaschinen -
Reifenvulkanisiermaschinen - Sicherheitsanforderungen

This European Standard was approved by CEN on 10 October 2014.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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EN 16474:2015 (E)**Foreword**

This document (EN 16474:2015) has been prepared by Technical Committee CEN/TC 145 "Plastics and rubber machines", the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by October 2015, and conflicting national standards shall be withdrawn at the latest by October 2015.

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 2006/42/EC, 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

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

The machinery concerned and the extent to which hazards, hazardous situations and hazardous 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 in accordance with the provisions of this type C standard.

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EN 16474:2015 (E)**1 Scope**

This European Standard applies to tyre curing machines having the following configuration.

- crossing flow tyre curing machines, with two cavities with:
 - common curing cycle and common safeguarding; or
 - independent curing cycles and common safeguarding; or
 - independent curing cycles and independent safeguarding;
- tyre curing machines with one cavity;
- tyre curing machines with automatic rear feeding and discharge.

The safety requirements and/or protective measures specified in this European Standard apply to tyre curing machines for passenger vehicle tyres and truck tyres.

This European Standard does not deal with:

- feeding system and discharge system;
- tyre curing machines with manual loading of the green tyre into the mould and manual unloading of the cured tyre from the mould;
- ancillary equipment which is not an integral part of the tyre curing machine, e.g. conveying equipment;
- exhaust systems.

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

It does not deal with hazards associated with falling of parts of the container or mould.

Some tyre curing machines include pressure vessels, which fall under Directive 97/23/EC [1]; this European standard is not intended to support the Directive 97/23/EC.

This European Standard is not applicable to tyre curing machines which are manufactured before the date of its publication as an EN.

2 Normative references

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

EN 619:2002+A1:2010, *Continuous handling equipment and systems - Safety and EMC requirements for equipment for mechanical handling of unit loads*

EN 953:1997+A1:2009, *Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards*

EN ISO 14119:2013, *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection (ISO 14119:2013)*

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

EN 61496-1:2013, *Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests (IEC 61496-1:2012)*

EN 61496-2:2013, *Safety of machinery - Electro-sensitive protective equipment - Part 2: Particular requirements for equipment using active opto-electronic protective devices (AOPDs) (IEC 61496-2:2013)*

EN ISO 4413:2010, *Hydraulic fluid power - General rules and safety requirements for systems and their components (ISO 4413:2010)*

EN ISO 4414:2010, *Pneumatic fluid power - General rules and safety requirements for systems and their components (ISO 4414:2010)*

EN ISO 4871:2009, *Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN 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 11201:2010)*

EN 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)*

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

EN ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13732-1:2008, *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 13849-1:2008, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850:2008, *Safety of machinery - Emergency stop - Principles for design (ISO 13850:2006)*

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

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

EN ISO 13856-3:2013, *Safety of machinery - Pressure-sensitive protective devices - Part 3: General principles for design and testing of pressure-sensitive bumpers, plates, wires and similar devices (ISO 13856-3:2013)*

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

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

EN ISO 14122-2:2001/A1:2010, *Safety of machinery - Permanent means of access to machinery - Part 2: Working platforms and walkways - Amendment 1 (ISO 14122-2:2001/Amd 1:2010)*

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

EN ISO 14122-3:2001/A1:2010, *Safety of machinery - Permanent means of access to machinery - Part 3: Stairs, stepladders and guard-rails - Amendment 1 (ISO 14122-3:2001/Amd 1:2010)*

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

EN ISO 14122-4:2004/A1:2010, *Safety of machinery - Permanent means of access to machinery - Part 4: Fixed ladders - Amendment 1 (ISO 14122-4:2004/Amd 1:2010)*

CLC/TS 61496-3:2008, *Safety of machinery — Electro-sensitive protective equipment — Part 3: Particular requirements for Active Opto-electronic Protective Devices responsive to Diffuse Reflection (AOPDDR) (IEC 61496-3:2008)*

ISO 7010:2011, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and the following apply.

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**3.1
tyre curing machine**
machine used for vulcanisation of tyres usually comprising fixed and movable parts that can be locked together, inside which the green tyre assumes its final shape and characteristics by the use of pressure and heating

Note 1 to entry See Figure 1 and Figure 2.

**3.2
crossing flow**
machine type in which green tyres are fed and loaded from the front and cured tyres are unloaded and discharged from the rear

**3.3
cavity**
part of the machine in which the container and/or the mould and the bladder are installed

**3.4
green tyre**
assembly of rubber parts intended to be cured

**3.5
cured tyre**
tyre in its final form after vulcanisation

3.6**bladder**

inflatable rubber component used to push the green tyre into contact with the mould while being inflated by the curing media

Note 1 to entry: The bladder is connected to the machine by means of the top ring and bottom ring.

3.7**bottom ring**

assembly of the bottom bladder clamping plate

3.8**top ring**

assembly of the top bladder clamping plate

3.9**green tyre stand**

supporting element for the green tyre before loading

3.10**chuck**

device for holding or gripping the green or cured tyre

3.11**movable upper part**

part of the machine that is opened for loading the green tyre and unloading the cured tyre and is closed and locked during curing

3.12**heating platen**

equipment used to heat sidewalls of the mould by contact

3.13**steam dome**

equipment used to heat the complete mould by direct contact with the steam

3.14**container**

exchangeable equipment used to receive and heat the segments of the curing mould

Note 1 to entry: The container is fixed to the tyre curing machine by use of screws or automatic fixation device.

3.15**mould**

exchangeable equipment used to give the external shape to the cured tyre

3.16**dummy mould**

subassembly representative of the mould used in industrial conditions

3.17**mould segment**

movable part of the mould

3.18**semi-closed position**

position of the movable upper part where the still open segments of the mould in the container touch the lower part of the container thus preventing the risk of projection

EN 16474:2015 (E)**3.19****feeding**

manual or automatic operation to feed green tyres to the loading device

3.20**loading device**

device used to pick up the green tyre and insert it into the tyre curing machine

3.21**curing cycle**

period of time in which the curing process is completed, i.e. from full closing, squeezing and locking until the pressure is dropped down

3.22**unloading device**

device used to remove the cured tyre from the tyre curing machine

3.23**discharge**

manual or automatic operation to remove cured tyres from the unloading device

3.24**take-away conveyor**

conveyor that is an integral part of the machine and on which the unloading device deposits the cured tyres for discharge to the rear of the tyre curing machine

3.25**spraying device**

static or dynamic nozzle(s) used to treat the mould and/or the bladder with treatment fluid

3.26**distance guard**

guard which does not completely enclose a danger zone, but which prevents or reduces access by virtue of its dimensions and its distance from the danger zone, e.g. perimeter fence or tunnel guard

[SOURCE: EN 953:1997+A1:2009, 3.2.2]

3.27**enclosing guard**

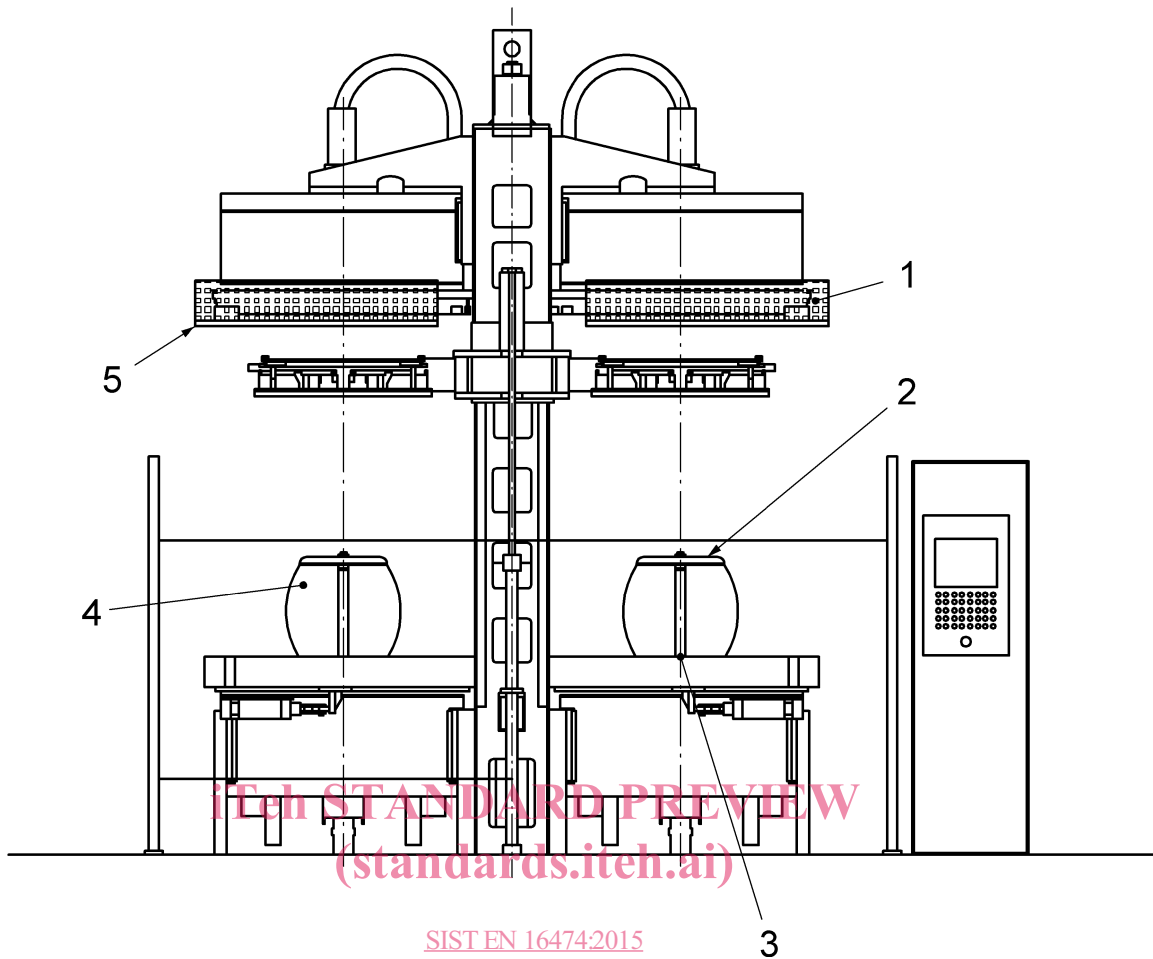
guard which prevents access to the danger zone from all sides

[SOURCE: EN 953:1997+A1:2009, 3.2.1]

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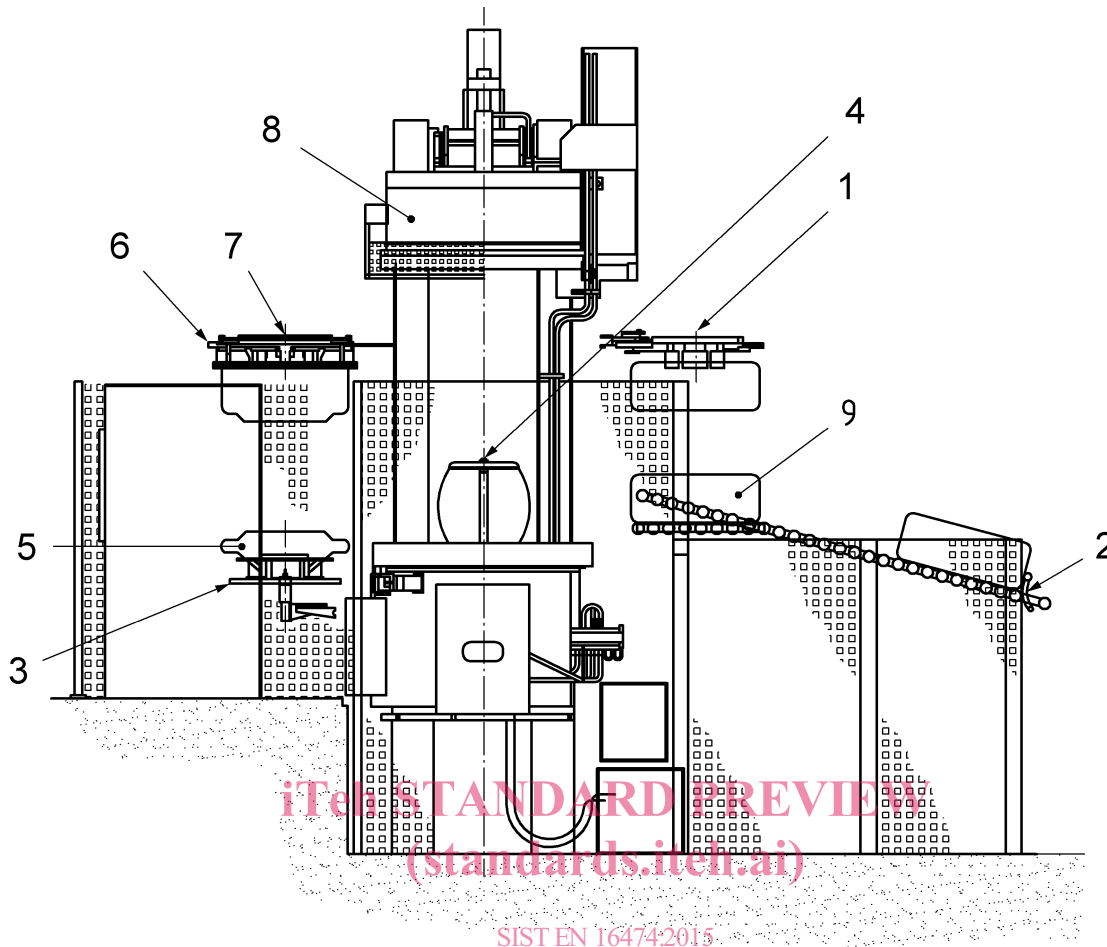
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Key

- 1 container
- 2 top ring
- 3 bottom ring
- 4 bladder
- 5 heating platen

Figure 1 — Main parts of tyre curing machines (front view)



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Key

- 1 unloading device
- 2 take-away conveyor
- 3 green tyre stand
- 4 top ring
- 5 green tyre
- 6 loading device
- 7 chuck
- 8 movable upper part
- 9 cured tyre

Figure 2 — Main parts of tyre curing machines (side view)

4 List of significant hazards

4.1 General

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

For the location of hazards on crossing flow tyre curing machines, see Figure 3, Figure 4 and Figure 5.

For the location of hazards on tyre curing machines with automatic rear feeding and discharge, see Figure 6, Figure 7 and Figure 8.

The numbering of hazards on Figure 3 to Figure 8 and in 4.3 corresponds to the numbering of hazards in Table 1.

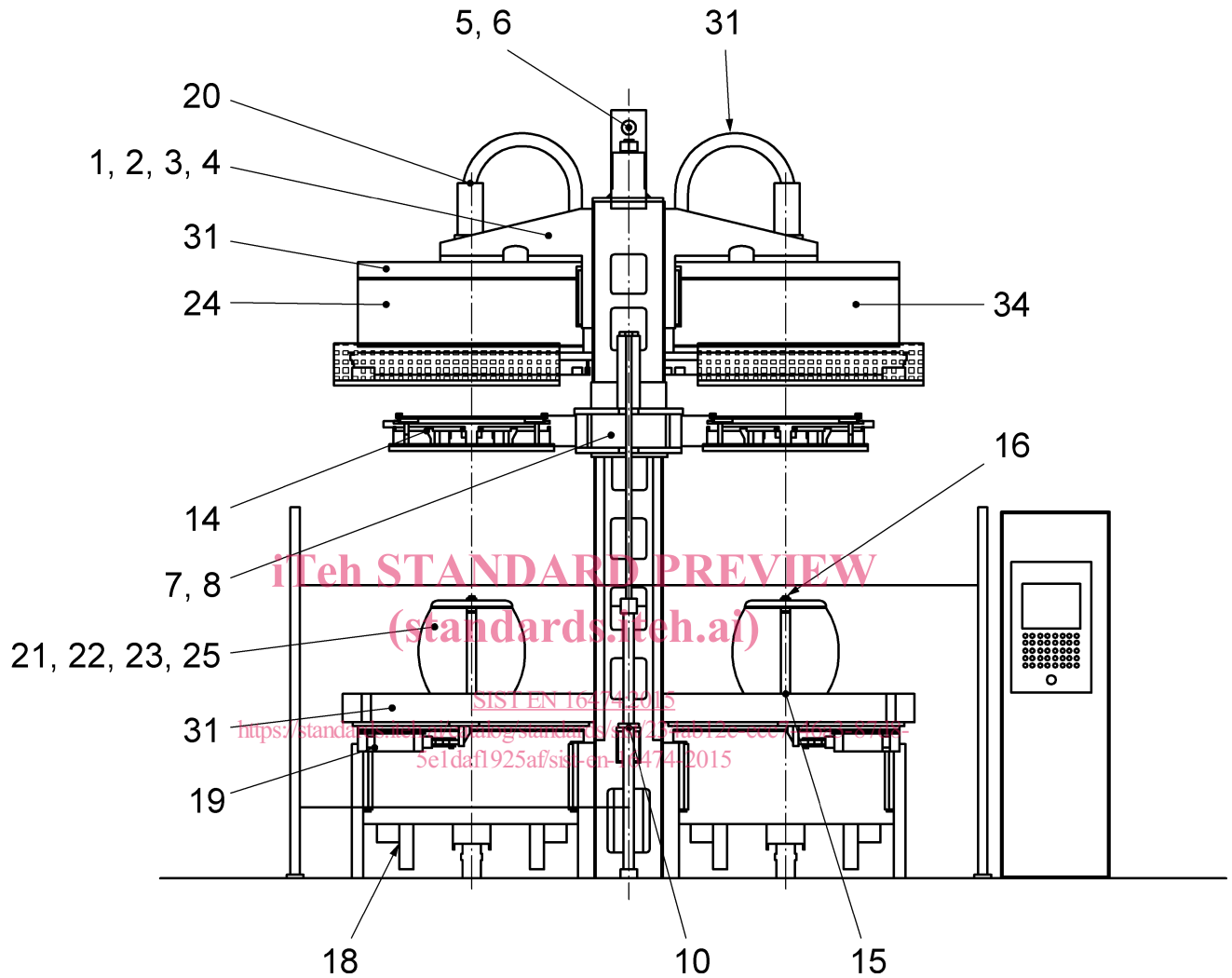


Figure 3 — Location of hazards on crossing flow tyre curing machines (front view)