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Stroji za predelavo gume in plastike - Drobilni stroji - 4. del: Varnostne zahteve za aglomeratorje

Plastics and rubber machines - Size reduction machines - Part 4: Safety requirements for agglomerators

Kunststoff- und Gummimaschinen - Zerkleinerungsmaschinen - Teil 4: Sicherheitsanforderungen für Agglomeratoren

Machines pour les matières plastiques et le caoutchouc - Machines à fragmenter - Partie 4: Prescriptions de sécurité relatives aux agglomérateurs

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 12012-4:2019) 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of an identical text or by endorsement, at the latest by December 2019, and conflicting national standards shall be withdrawn at the latest by December 2019.

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 12012-4:2006+A1:2008.

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.

The main changes compared to the EN 12012-4:2006+A1:2008 are:

— the revision of type-A and type-B standards have been considered;

— the list of significant hazards has been moved to an informative annex;

— the performance levels/safety integrity levels of safety related parts of control systems have been specified in accordance with EN ISO 13849-1:2015 / EN 62061:2005, EN 62061:2005/A1:2013, EN 62061:2005/A2:2015;

— the hazards related to the ejection of parts or materials from the agglomerator chamber have been removed because reliable and well-designed chambers represent now the state of the art (no projections and no broken chamber have been reported for a long time);

— feed openings of big dimensions are considered;

— requirements for moving parts of discharge systems are added;

— the annex for noise measurement has been revised.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document is a type-C standard as stated in EN 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 organizations, 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.

1 Scope

This document deals with all significant hazards, hazardous situations and events relevant to agglomerators for the modification of plastic scraps in its form, size and flow characteristics, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Annex A). The hazards have been identified taking into account all phases of the machine life cycle according to EN ISO 12100:2010, 5.4.

Machines considered in this document begin at the outer edge of the feed opening and end at the outer edge of the discharge opening.

This document does not deal with:

— hazards due to emissions by processing materials that could be hazardous to health;

— hazards caused by ignition of flammable residues in material to be processed;

— requirements for exhaust ventilation systems.

This document is not applicable to agglomerators manufactured before the date of its publication.

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.

EN ISO 14118:2018, *Safety of machinery — Prevention of unexpected start-up (ISO 14118:2017)*

EN 60204-1:2018, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2016, modified)*

EN 62061:2005, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005)*

EN 62061:2005/A1:2013, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005/AMD1:2012)*

EN 62061:2005/A2:2015, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005/AMD2:2015)*

EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN 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 3746:2010)*

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

EN ISO 9614-2:1996, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning (ISO 9614-2:1996)*

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 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

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

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

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)*

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

EN ISO 14120:2015, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards (ISO 14120:2015)*

EN 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 14122-1:2016)*

EN ISO 14122-2:2016, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2016)*

EN ISO 14122-3:2016, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2016)*

EN ISO 14122-4:2016, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders (ISO 14122-4:2016)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
agglomerator
machine (sometimes called densifier) for modifying the form, size and flow characteristics of thermoplastic scrap in a chamber

Note 1 to entry: The material is cut, kneaded, mixed, or heated by friction to increase the flow of the material.

3.2
agglomerating tool
tool, secured on a rotating structure (e.g. disc) which can be combined with a stationary counter tool, to modify the material being processed in form, size and flow characteristics

3.3
feeding equipment
hopper, that is an integral part of the machine, used to feed the material to be processed

3.4
discharge system
equipment that is an integral part of the machine such as power rotating screw etc. used to discharge the material from the agglomerator

4 Safety requirements and/or protective/risk reduction measures

4.1 General

Machinery shall comply with the safety requirements and/or protective/risk reduction measures of this clause. In addition, the machine shall be designed according to the principles of EN ISO 12100:2010 for relevant but not significant hazards that are not dealt with by this document.

The safety related parts of the control system shall be in accordance with EN ISO 13849-1:2015 or EN 62061:2005, EN 62061:2005/A1:2013, EN 62061:2005/A2:2015. The required performance levels (PL_r) or Safety Integrity Levels (SIL) are given in the relevant subclauses.

4.2 Mechanical hazards

4.2.1 Access through openings in the agglomerator chamber

In the agglomerator there are openings designed and constructed for feeding the material, discharging the material, inspecting the process inside the agglomerator chamber and changing or maintaining the agglomerating tools.

Access to agglomerating tools and their rotating support elements in the agglomerator chamber through openings shall be prevented by one or more of the following:

— fixed guards in accordance with EN ISO 14120:2015, that may be distance guards as defined in EN ISO 14120:2015, 3.2.2;

— interlocking guards with guard locking in accordance with EN ISO 14120:2015 and EN ISO 14119:2013, such that the guards remain closed and locked until all motions of the agglomerating tools have ceased; safety related parts of the control system shall be according to:

  — PL_r = d or SIL = 2 for the interlocking function and

  — PL_r = c or SIL = 1 for the locking function.

Safety distances preventing access to agglomerating tools and their rotating support element, if any, shall be in accordance with EN ISO 13857:2008, Table 2, Table 3, Table 4 and/or Table 6.

If the feeding equipment, or its part or the discharge system act as a guard and is capable of being moved out of position without the use of a tool and the resulting access to the agglomerator does not comply with the above safety distances of EN ISO 13857:2008, then it shall act as an interlocking guard with guard locking in accordance with EN ISO 14119:2013, such that it remains locked in position until all motions of the agglomerating tool have ceased; safety related parts of the control system shall be according to:

— PL_r = d or SIL = 2 for the interlocking function and

— PL_r = c or SIL = 1 for the locking function.

If the dimensions of the opening are greater than 500 mm × 400 mm, so that whole body access is possible, falling through the feed opening shall be prevented by positioning the lower edge of the opening at a minimum height of 1,20 m from the working level.

If, for operational reasons, it is necessary to move agglomerating tools and their support when interlocking guards are open, e.g. to change or to adjust the agglomerating tools, the rotating support shall be designed to allow its manual movement and preventing any contact with the agglomerating tools (e.g. fitting removable handles). See 6.2.3.

If the manual rotation is not possible (e.g. for large machines due to the mass of the rotating support) a specific operational mode shall be allowed which permits the powered rotation of the agglomerating tools and their support when the interlocking guards are open. This specific operational mode shall:

— be activated by a selector switch in accordance with EN ISO 12100:2010, 6.2.11.10, that can be locked in all positions by a removable or coded key or other means that prevent unauthorised selection and

— enable the rotation of the agglomerating tools and their support by a hold-to-run control device in combination with a maximum peripherical rotating speed of 2 m/min, in accordance with EN ISO 12100:2010, 6.2.11.9 and with EN 60204-1:2018, 9.2.3 and 9.2.4.