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**Stroji in obrati za proizvodnjo, obdelavo in predelavo ravnega stekla - Varnostne zahteve - 9. del: Naprave za pranje**

Machines and plants for the manufacture, treatment and processing of flat glass - Safety requirements - Part 9: Washing installations

Maschinen und Anlagen zur Herstellung, Be- und Verarbeitung von Flachglas - Sicherheitsanforderungen - Teil 9: Waschmaschinen

Machines et installations pour la production, le façonnage et la transformation du verre plat - Exigences de sécurité - Partie 9 : Machines à laver le verre

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NORME EUROPÉENNE  
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**Machines and plants for the manufacture, treatment and  
processing of flat glass - Safety requirements - Part 9: Washing  
installations**

Machines et installations pour la production, le façonnage  
et la transformation du verre plat - Exigences de sécurité -  
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Maschinen und Anlagen zur Herstellung, Be- und  
Verarbeitung von Flachglas - Sicherheitsanforderungen -  
Teil 9: Waschmaschinen

This European Standard was approved by CEN on 24 May 2006 and includes Amendment 1 approved by CEN on 24 January 2010.

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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.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (EN 13035-9:2006+A1:2010) has been prepared by Technical Committee CEN/TC 151 “Construction equipment and building material machines — Safety”, 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of an identical text or by endorsement, at the latest by September 2010, and conflicting national standards shall be withdrawn at the latest by September 2010.

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 includes Amendment 1, approved by CEN on 2010-01-24.

This document supersedes EN 13035-9:2006.

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

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).

**A1** For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. **A1**

It is one of a series concerning machinery for the treatment and processing of flat glass (see Bibliography).

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 13035-9:2006+A1:2010 (E)****Introduction**

This European Standard is a type C standard as stated in EN ISO 12100-1.

The machinery concerned and the extent to which hazards, 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 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.

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## 1 Scope

**1.1** This European Standard contains the safety requirements for the design and installation of stationary glass washing installations as shown as typical in Annex A.

Glass washing installations are designed to perform the following functions: feeding of flat glass to the cleaning and drying unit and transport (delivery) to the estimation equipment and to the take-off position of the flat glass sheet. None of the processing phases requires direct manual intervention.

**1.2** A1 This European Standard deals with the significant hazards, hazardous situations and events with the exception of those by interfaces with other machines used in a process line relevant to glass washing installations, when they are used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4). A1 This European Standard specifies the appropriate technical measures to eliminate or reduce risks which can arise from these significant hazards during commissioning, the operation and maintenance. A1 Safety requirements and/or protective measures are given in Clause 5. When references are made to B level standards such as EN 953, EN 1037, EN 1088, EN 60204-1, EN ISO 13850 and EN ISO 13857, the manufacturer should carry out an adequate risk assessment for the requirements thereof where choice is necessary. A1

**1.3** This European Standard is not applicable to machines for loading and unloading of glass (see EN 13035-5) and to conveyors (see EN 619) and fans. If there are specific risks that arise by their use as an integral part of flat glass washing installations, appropriate measures are specified.

**1.4** This European Standard is not applicable to glass washing installations for automotive and bent glass.

**1.5** This European Standard is not applicable to water preparation and disposal of waste washing liquid.

**1.6** This European Standard is not applicable to machinery manufactured before the date of publication of this European Standard by CEN.

## 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.

A1 *deleted text* A1

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

A1 *deleted text* A1

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

A1 *deleted text* A1

EN 1088:1995, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN 1760-2:2001, *Safety of machinery — Pressure sensitive protective devices — Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars*

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EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)* <sup>A1</sup>

EN 60529:1991, *Degrees of protection provided by enclosures (IP-Code) (IEC 60529:1989)*

EN 61310-1:2008, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals (IEC 61310-1:2007)* <sup>A1</sup>

EN 61496-1:2004, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2004, modified)*

<sup>A1</sup> deleted text <sup>A1</sup>

EN ISO 3744:2009 <sup>A1</sup>, *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 3746:2009, *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, including Cor 1:1995)* <sup>A1</sup>

EN ISO 3747:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Comparison method in situ (ISO 3747:2000)*

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

EN ISO 11201:2009, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plane (ISO 11201:1995, including Cor 1:1997)*

EN ISO 11202:2009, *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)* <sup>A1</sup>

EN ISO 11204:2009, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Method requiring environmental corrections (ISO 11204:1995, including Cor 1:1997)* <sup>A1</sup>

EN ISO 11688-1:2009 <sup>A1</sup>, *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 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 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

CLC/TS 61496-2:2006, *Safety of machinery — Electro-sensitive protective equipment — Part 2: Particular requirements for equipment using active opto-electronic protective devices (AOPDs) (IEC 61496-2:2006)* <sup>A1</sup>



### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

#### 3.1

installations consist of the following parts:

- inlet site;
- scrubbing unit;
- washing unit;
- drying unit;
- outlet site.

It is pointed out that a washing machine can be composed of more than one scrubbing or washing unit

#### 3.1.1

##### inlet site and/or outlet site

##### 3.1.1.1

in the case of horizontal washing installations, these sites are composed of rotating rollers or beltings

##### 3.1.1.2

in the case of vertical washing installations, the glass sheets are transported by moving them on their edge with rollers or beltings while leaning stable against a support with rolls

#### 3.1.2

##### washing

##### 3.1.2.1

##### scrubbing unit

machine composed of a horizontal or vertical beam on which brushes are mounted with the rotation axis perpendicular to the surface of the sheet.

**NOTE** The brushes, integral with the beam, move along vertically with respect to the thickness of the glass sheet. Special clamping rollers lead and hold the glass sheet when being scrubbed (see Annex A, Figures A.1 and A.2)

##### 3.1.2.2

##### washing unit

machines that wash and rinse glass.

**NOTE 1** These machines are basically composed of rotating brushes with an axis located transversely to the feeding direction of the glass sheet. These brushes can be positioned either on the upper or lower surface of the glass or on both sides. The brush is made of a shaft, preferably of metal, provided with plastic bristles, the location of which varies from one machine to another. The washing operation is performed by the rotating brush. In addition, tubes are also provided with nozzles which spray water with detergents or (pure) water for rinsing on to the glass sheet.

**NOTE 2** The height of the brushes is adjustable according to the thickness of the glass. Rollers clamping the glass sheets while being washed are located both downstream and upstream from the brushes (see Annex A, Figures A.3 and A.4)

#### 3.1.3

##### drying unit

machines consisting of one or several pairs of blowers providing air flows which remove water from the surface of the glass sheet.

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NOTE      Blowers are linked with fans (see Annex A, Figure A.5)

**4 List of significant hazards**

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

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Table 1 — List of significant hazards

Hazards	Danger zone/dangerous items	Preventive measures: see clause
4.1 Mechanical hazards		
4.1.1 Crushing and drawing-in hazard	Reaching of the clamping rollers located at the entrance to scrubbing or washing units by hand	5.3; 5.13
	Moving parts inside the washing and drying unit	5.2; 5.12; 5.13
4.1.2 Crushing and shearing hazard	Vertical washing installation: moving glass on the inlet and outlet conveyor/support with rolls	5.4; 5.13
	Moving glass inside the scrubbing, washing and drying unit	5.2; 5.12; 5.13
4.1.3 Cutting hazard	Moving glass inside the washing and drying unit	5.2; 5.12; 5.13
4.1.4 Entanglement hazard	Rolls of horizontal inlet and/or outlet conveyors	5.5
4.2 Electrical hazards	Direct or indirect contact	5.8; 5.10; 7.2.3; 7.2.4
4.3 Hazards by noise may result in hearing damage, tinnitus, stress, in accidents due to interference with speech communication and with the perception of acoustic signals	Fan and blowers of drying unit	5.9; 7.2.1
4.4 Hazards generated by neglecting ergonomic principles		
4.4.1 Neglected use of personal protection equipment	Sharp glass	7.2.2
4.4.2 Human behaviour	Dangerous movements with neutralised safety measure	5.11
4.5 Unexpected start-up	Whole machine or parts of it	5.10; 5.11; 5.12; 7.2.4; 7.2.5
4.6 Impossibility of stopping the machine in the best possible conditions	Whole machine or parts of it	5.10; 5.12; 7.2.4
4.7 Falling objects	Glass transported on conveyors of vertical washing machines	5.6; 5.7



## 5 Safety requirements and/or protective measures

**5.1** Machinery shall comply with the safety requirements and/or protective measures of this clause.