



**SLOVENSKI STANDARD**  
**SIST EN 13035-5:2007+A1:2010**  
**01-februar-2010**

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**Stroji in obrati za proizvodnjo, obdelavo in predelavo ravnega stekla - Varnostne zahteve - 5. del: Stroji in naprave za zlaganje in razlaganje**

Machines and plants for the manufacture, treatment and processing of flat glass - Safety requirements - Part 5: Machines and installations for stacking and de-stacking

Maschinen und Anlagen für die Herstellung, Be- und Verarbeitung von Flachglas - Sicherheitsanforderungen - Teil 5: Maschinen und Einrichtungen zum Stapeln und Abstapeln

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Machines et installations pour la production, le façonnage et la transformation du verre plat - Exigences de sécurité - Partie 5: Machines et installations à empiler et dépiler

**Ta slovenski standard je istoveten z: EN 13035-5:2006+A1:2009**

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 \^!æ ã} [ /æ å •cæ Equipment for the glass and ceramics industries

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
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**EN 13035-5:2006+A1**

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**Machines and plants for the manufacture, treatment and  
processing of flat glass - Safety requirements - Part 5: Machines  
and installations for stacking and de-stacking**

Machines et installations pour la production, le façonnage  
et la transformation du verre plat - Exigences de sécurité -  
Partie 5: Machines et installations à empiler et dépiler

Maschinen und Anlagen für die Herstellung, Be- und  
Verarbeitung von Flachglas - Sicherheitsanforderungen -  
Teil 5: Maschinen und Einrichtungen zum Stapeln und  
Abstapeln

This European Standard was approved by CEN on 24 May 2006 and includes Amendment 1 approved by CEN on 8 November 2009.

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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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## Foreword

This document (EN 13035-5:2006+A1:2009) 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 June 2010, and conflicting national standards shall be withdrawn at the latest by June 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 2009-11-08.

This document supersedes EN 13035-5:2006.

The start and finish of text introduced or altered by amendment is indicated in the text by tags  $\boxed{A_1}$   $\boxed{A_1}$ .

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).

$\boxed{A_1}$  For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document.  $\boxed{A_1}$

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

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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, 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 13035-5:2006+A1:2009 (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.

Machinery for stacking and de-stacking flat glass is used within the manufacture and further processing of flat glass in connection with a great variety of operations, e.g.:

- at the end of the production line for stacking flat glass with float dimensions;
- for loading cutting lines;
- for unloading and stacking flat glass after cutting and break-out;
- for loading lines for the production of insulating glass.

Therefore, the specific safety measures are laid down in an independent standard to make them available for the use of all kinds of applications. These principles are also suited for application if loading systems are an integral part of other machinery of the EN 13035 series, e.g. tilting tables (see Figure A.5 of Annex A).

When compiling this European Standard, it was assumed that the existing ad-hoc standards for components are applied, e.g. EN 619, <sup>A1</sup> EN 13035-1 <sup>A1</sup>, EN 13035-4 when conveyors, stillages, tiltable parts are integrated.

## 1 Scope

**1.1** This European Standard applies for machines and installations for stacking and de-stacking that are specifically designed for building-up or taking down upright stacks of flat glass sheet by sheet including unloading and loading of single sheets of flat glass from or onto machines or transport devices (conveyors).

NOTE For sketches with examples of typical constructions, see Annex A (informative), Figures A.1 to A.9.

**1.2** <sup>A1</sup> This European Standard deals with the significant hazards, hazardous situations and events relevant to machines and installations for stacking and de-stacking flat glass when they are used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4). <sup>A1</sup> Those hazards which are dealt with in the ad-hoc standard EN 619 for conveyors are excepted. <sup>A1</sup> This European Standard specifies the appropriate technical measures to eliminate or reduce risks arising from the significant hazards during commissioning, operation and maintenance. <sup>A1</sup>

**1.3** This European Standard is not applicable to the significant hazards of conveyors and other machines for the manufacture, treatment and processing of flat glass, e.g. tilting tables, equipment for storage of flat glass, such as stillages. If there are specific hazards which arise by the co-operation of this machinery and equipment with machines and installations for stacking and de-stacking, appropriate measures are specified.

**1.4** This European Standard is not applicable to building up or taking down stacks by means of cranes that are temporarily equipped via hook with load-lifting attachments with suction cups to lift flat glass.

**1.5** When compiling this European Standard, it was assumed that lifting movements are only used as part of full automatic machines and that the related hazards are not significant.

**1.6** This European Standard is not applicable to machines and installations for stacking and de-stacking which are manufactured before the date of publication of this European Standard by CEN.

<sup>A1</sup> **1.7** Noise is not a significant hazard for this type of machinery. The A-weighted emission sound pressure level at workstations does not exceed 70 dB(A). <sup>A1</sup>

## 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.

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

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

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

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 999:1998, *Safety of machinery — The positioning of protective equipment in respect of approach speeds of parts of the human body*

<sup>A1</sup> EN 1037 <sup>A1</sup>, *Safety of machinery — Prevention of unexpected start-up*

**EN 13035-5:2006+A1:2009 (E)**

**A1** deleted text **A1**

EN 1525:1997, *Safety of industrial trucks — Driverless trucks and their systems*

EN 13367:2005, *Ceramic machines — Safety — Transfer platforms and cars*

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

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

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

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

**A1** deleted text **A1**

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)*

**A1** 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, *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)* **A1**

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### 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

##### **stack**

pack of upright sheets of flat glass held slightly inclined off the perpendicular position

#### 3.2

##### **stillage**

construction (rack), fixed or movable, to take up and hold stacks in upright position slightly inclined off from the perpendicular

#### 3.3

##### **stacker**

mechanism to take single sheets of flat glass to build up stacks

#### 3.4

##### **de-stacker**

mechanism to take single sheets of flat glass from stacks

#### 3.5

##### **loader**

mechanism to take single sheets of flat glass from stacks on to machines or transport devices

#### 3.6

##### **un-loader**

mechanism to take single sheets of flat glass from machines or transport devices to stacks on stillages

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#### 3.7

##### **machinery**

all machines and installations defined in 3.3 to 3.6

#### 3.8

##### **travelling movement**

change of position of machinery for stacking and de-stacking (movable type) between stillages, stacks and transport devices (conveyors) or other machines of the EN 13035 series such as cutting tables (see Figures A.7 to A.9)

### 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 machines and installations for stacking and de-stacking and which require action to eliminate or reduce the risk.

Before using this European Standard, it is important to carry out a general risk assessment of the machine in question.

Table 1 — List of significant hazards

A1

| Hazards    |   | Danger zone/dangerous items  | Preventive measures:<br>see clause                         |
|------------|---|--|--|
| <b>4.1</b> | <b>Mechanical</b>   |  |  |
| 4.1.1      | Crushing and impact                                       | Machinery, fixed type:<br>between moving loading and stacking mechanism with or without flat glass and fixed part of the machinery itself or other machines or transport devices, e.g. conveyors, stillages. Risk of impact only for cycles of less than 20 s. | 5.2 to 5.5   |
| 4.1.2      | Crushing and impact                                       | Machinery, fixed type:<br>by the back and forth movement and the rotation of platforms for stillages with or without stillage (loaden or unloaden)   | 5.2 to 5.5   |
| 4.1.3      | Crushing and impact                                       | Machinery, movable type:<br>the same risks as for 4.1.1 and 4.1.2 apply.   | 5.2 to 5.4   |
| 4.1.4      | Crushing and impact                                       | Machinery, movable type, in addition:<br>by the travelling movement of machinery and between the travelling machinery and fixed parts of the surroundings, e.g. parts of other machines, stillages (loaden or unloaden)  | 5.2 to 5.4;<br>5.15  |
| 4.1.5      | Cutting   | by glass being transported   | 5.2 to 5.5;<br>5.8 to 5.10;<br>7.2.3                       |
| <b>4.2</b> | <b>Electrical</b>   | direct or indirect contact   | 5.16; 5.22   |
| <b>4.3</b> | <b>Neglecting ergonomic principles</b>                    |  |  |
| 4.3.1      | Neglected use of personal protection equipment            | sharp glass  | 7.2.3  |
| 4.3.2      | Human error   | all dangerous movements  | 5.17; 7.2.5  |
| 4.4        | Unexpected start-up, malfunction from:                    |  |  |
| 4.4.1      | Failure of the control system                             | all dangerous movements  | 5.3; 5.6   |
| 4.4.2      | Restoration of energy supply                              | all dangerous movements  | 5.20   |
| 4.4.3      | Destruction of piping, hoses and power cables             | all dangerous movements  | 5.13   |
| 4.4.4      | Gravity fall  | lifted loading or stacking mechanism   | 5.6; 5.13;<br>5.21.1                                       |
| 4.4.5      | Errors in the software                                    | all dangerous movements  | 5.19   |
| 4.5        | Impossibility of stopping in the best possible conditions | all dangerous movements  | 5.6; 5.17;<br>5.18; 5.21.1;<br>5.22; 5.23;<br>7.2.7; 7.2.8 |
| 4.6        | Failure of vacuum system                                  | suckers  | 5.12   |
| 4.7        | Break-up  | pipe or hose   | 5.21.2; 7.2.4  |
| 4.8        | Falling and ejected items                                 | monolithic flat glass  | 5.7 to 5.14;<br>7.2.6                                      |

A1

## 5 Safety requirements and/or protective measures

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

In addition, the machine shall be designed according to the principles of EN ISO 12100 for hazards relevant but not significant which are not dealt with by this European Standard (e.g. sharp edges).

For applications of a B-level standard such as  $\text{A}_1$  EN ISO 13850  $\text{A}_1$ , EN 953,  $\text{A}_1$  EN ISO 13849-1  $\text{A}_1$ , EN 982, EN 983, EN 1037 and EN 60204-1, the manufacturer shall carry out an adequate risk assessment for the requirements thereof where choice is necessary. This specific risk assessment is part of the general risk assessment relating to the hazards not covered by this European Standard.

Where the means of reducing the risk is by the arrangement of the installed machine or by a safe system of work, the manufacturer shall include in the information for use a reference to the reduction means to be provided, including training, and to any limiting value of the requirement and if appropriate to the means of verification.

**5.2** The danger zones caused by the movement of loading and stacking mechanisms with or without flat glass, moving and rotating platforms for stillages and the travelling movement of the machinery shall be safeguarded by:

**5.2.1** Perimeter fencing with a height not less than 1,4 m mounted in a horizontal distance to the danger zone according to  $\text{A}_1$  EN ISO 13857:2008, Table 1  $\text{A}_1$  but not less than 0,5 m with an interlocking access gate with or without guard locking – guard locking shall be applied if access to the danger zone is possible within the stopping time or if the design of the control demands that stopping shall be realised at reference points so as to allow to restart easily. Using guard locking, the opening of the guard shall only be possible after standstill, or

**5.2.2**  $\text{A}_1$  electro-sensitive protective equipment employing active opto-electronic protective devices, detecting intrusion of the whole body in the danger zone. These devices shall be in accordance with EN 61496-1:2004, type 4, and CLC/TS 61496-2 with two separate beams in accordance with EN 999:1998, 6.1.4, positioned at a minimum safety distance  $S = 1\ 600 \times T + 850$  mm. The beams shall be mounted at a height of 0,4 m and 0,9 m above floor level. A device with one single horizontal beam can be used if a risk assessment concludes, after taking account of the risk level in the danger zone, the possibility for bypassing a single beam and the possible reasons for such bypassing, the risk is low. The single beam shall be mounted at a height of 0,75 m above floor level and at a minimum safety distance  $S = 1\ 600 \times T + 1\ 200$  mm in accordance with EN 999:1998, 6.1.5, or  $\text{A}_1$

**5.2.3**  $\text{A}_1$  a fixed distance guard (see EN 953:1997, 3.2.2) closer to the machinery with a height not less than 1,4 m with a movable interlocking guard for access with or without guard locking according to EN 953:1997, 3.3, 3.5 and 3.6, and with minimum safety distances according to EN ISO 13857:2008, Table 1, where there is no free space (room) to use methods of 5.2.1 or 5.2.2.  $\text{A}_1$  Guard locking shall be applied if access to the danger zone is possible within the stopping time or if the design of the control demands that stopping shall be realised at reference points so as to allow to restart easily. Using guard locking opening of the guard shall only be possible after standstill.

NOTE 1 Risks by glass falling out laterally or ejected glass see 5.10.

NOTE 2 Combinations of 5.2.1 or 5.2.3 with 5.2.2 also are possible.

**5.2.4** Perimeter fencing in accordance with 5.2.1 and fixed distance guards in accordance with 5.2.3 shall be drawn to the floor. There may be a gap of maximum 0,15 m between guard and floor for the purpose of cleaning.

**5.3**  $\text{A}_1$  The parts of the control system related to guard interlocking shall as a minimum comply with performance level d in accordance with EN ISO 13849-1:2008 (see also examples in informative Annexes B and C). Where fixed guards are used, their fixing systems shall remain attached to the guards or to the machinery when the guards are removed.  $\text{A}_1$

**5.4** After a stop caused by an interlocking guard or a trip device, a re-closing of the guard or leaving of the light beam shall not initiate a restart but restarting shall require actuation of a switch (reset) at a place with a good view of the danger zone. This switch shall be mounted in such a way that it is not operable by a person who is within the danger zone (safeguarded area).