

# Food processing machinery — Dishwashing machines with conveyor — Safety and hygiene requirements

The European Standard EN 14957:2006 has the status of a  
British Standard

ICS 67.260; 97.040.40

## National foreword

This British Standard was published by BSI. It is the UK implementation of EN 14957:2006.

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A list of organizations represented on MCE/3/5 can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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## Food processing machinery - Dishwashing machines with conveyor - Safety and hygiene requirements

Machines pour les produits alimentaires - Lave-vaisselle à convoyeur - Prescriptions relatives à la sécurité et à l'hygiène

Nahrungsmittelmaschinen - Geschirrspülmaschinen mit Transporteinrichtung - Sicherheits- und Hygieneanforderungen

This European Standard was approved by CEN on 22 September 2006.

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 Central Secretariat or to any CEN member.

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## Foreword

This European Standard (EN 14957:2006) has been prepared by Technical Committee CEN/TC 153 "Food processing machinery — Safety and hygiene specifications", 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of an identical text or by endorsement, at the latest by May 2007, and conflicting national standards shall be withdrawn at the latest by May 2007.

This European Standard 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 Directives.

For relationship with EU Directives, see informative Annex ZA, which is an integral part of this European Standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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.

## 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 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 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.

## 1 Scope

**1.1** This European Standard applies to multizones dishwashing-machines with passing through motorized belt (flight type) or rack conveyor. In case of flight type, the loading and unloading areas are part of the machine.

The machines covered by this European Standard are intended for washing, rinsing and optionally drying the dishes and the kitchen utensils, used in food and catering premises such as restaurants, hotels etc.

This European Standard applies to dishwashing machines with conveyor with a linear speed less than or equal to 5 m/min for the dishes and kitchen utensils.

NOTE Normally the total power of these machines is less than 200 kW.

This European Standard deals with all significant hazards, hazardous situations and events relevant to dishwashing machines with conveyor, when they are used as intended and under the conditions foreseen by the manufacturer (see Clause 4).

This European Standard deals with the hazards which can arise during commissioning, operation, maintenance and decommissioning of the machine.

When drawing up this European Standard the following assumptions were made:

- only trained adult persons operate the machines;
- the machines are used in adequately illuminated areas.

This European Standard, referring for electrical safety to EN 60204-1 with criteria that can be applied to different designs and variants, is mainly intended for machines manufactured in small series.

**1.2** This European Standard does not apply to:

- separate mechanical loading and unloading conveyors;
- chemical dosing devices which are not incorporated into the machine;
- steam generators;
- gas heating equipment.

**1.3** Noise is not considered to be a significant hazard for these machines. This does not mean that the manufacturer of these machines is absolved from reducing noise and making a noise declaration. Therefore a noise test code is included in Annex A.

**1.4** This European Standard is not applicable to dishwashing-machines with conveyor which are 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.

EN 294:1992, *Safety of machinery — Safety distance to prevent danger zones being reached by the upper limbs*

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 953:1997, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*
- EN 954-1:1996, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*
- EN 1088:1995, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*
- EN 1672-2, *Food processing machinery — Basic concepts — Part 2: Hygiene requirements*
- EN 1760-2, *Safety of machinery — Pressure sensitive protective devices — Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars*
- EN 60204-1, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005 modified)*
- EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*
- 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 61496-2:1997)*
- EN ISO 3744:1995, *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 4871, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*
- EN ISO 11201:1995, *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)*
- 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)*

### 3 Terms, definitions and description

#### 3.1 Terms and definitions

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

##### 3.1.1

##### **conveyor**

drive mechanism to transport the load through the machine

##### 3.1.2

##### **types of conveyor**

##### 3.1.2.1

##### **type 1**

flight type endless peg conveyor where the dishes are loaded directly to the pegs (see Figure 1b)

**3.1.2.2**

**type 2**

conveyor for racks that can be made of one or two endless chains or reciprocating mechanism (see Figures 1a and 1c)

**3.1.3**

**dishes**

pans, containers, plates, cups etc., used in the professional catering and restaurants

**3.1.4**

**inspection door**

door giving access to the processing zones for cleaning and maintenance

**3.1.5**

**access for technical area**

door or panel giving access to technical areas for repair and/or maintenance

**3.1.6**

**multizone machine**

machine where the different functions (e.g. washing, rinsing, drying) are located in different areas of the machine

**3.2 Description**

A dishwashing machine with conveyor is generally composed of:

- a frame;
- doors giving access to the different zones;
- a motorised belt or rack conveyor;
- a water heating device;
- a water circulation device.

The main different zones can be:

- a loading area;
- a washing compartment;
- a rinsing compartment;
- a drying compartment;
- a vapour exhaust device;
- one or several electrical and/or electronic compartments;
- a control panel;
- dosing device, if any;
- an unloading area.

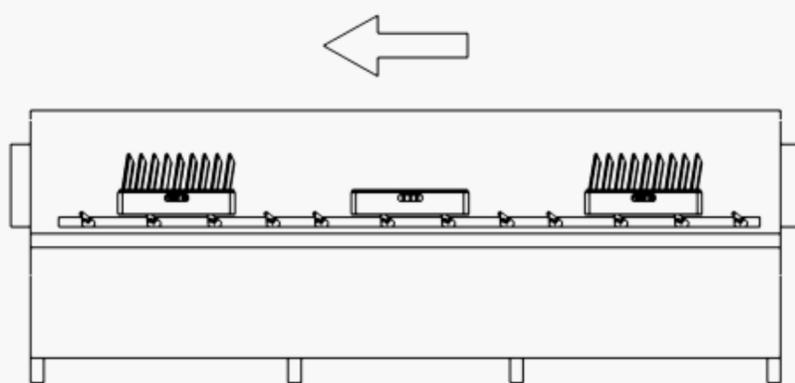


Figure 1a — Racks conveyor type machine

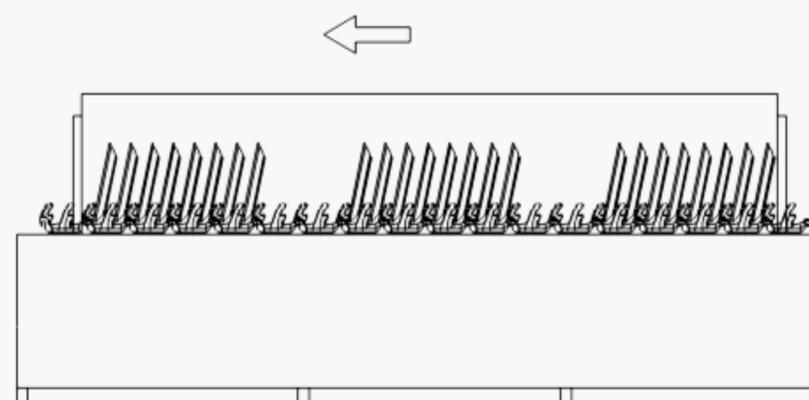


Figure 1b — Flight type machine

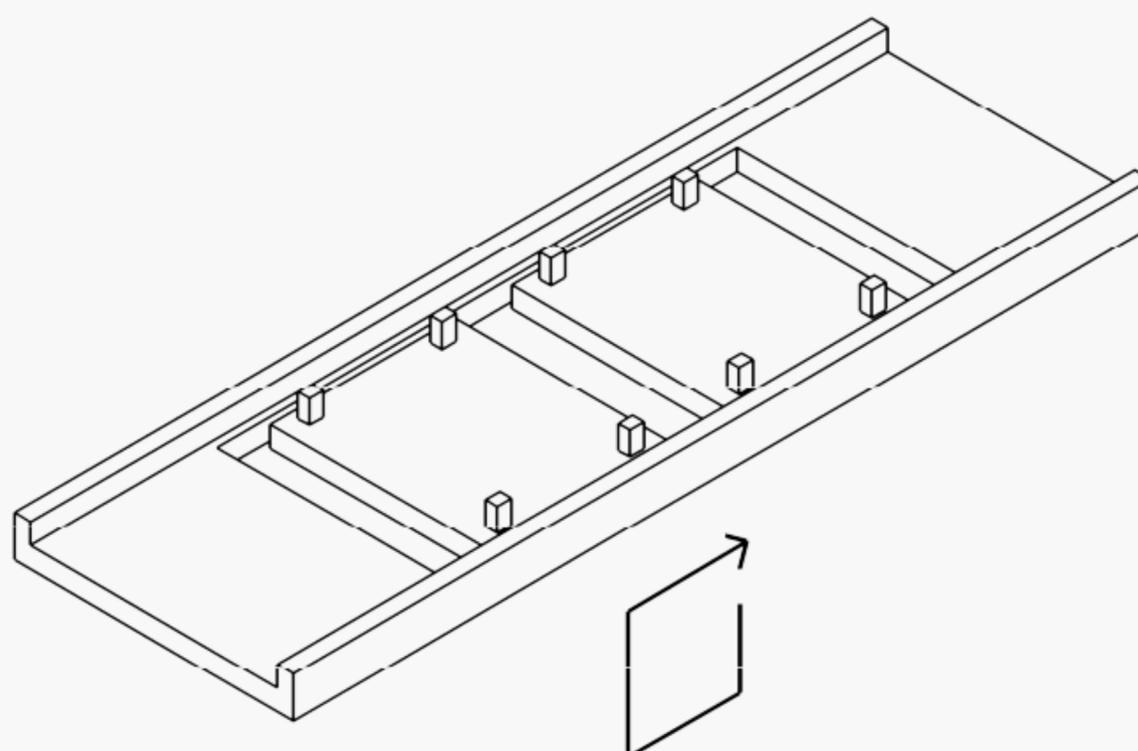


Figure 1c — Reciprocating rack conveyor type device

Figure 1 — Types of dishwashing machines

## 4 List of significant hazards

### 4.1 General

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

### 4.2 Mechanical hazards

The significant mechanical hazards are:

- crushing hazard;
- shearing hazard;
- drawing-in hazard.

The Figure 2 illustrate 5 danger zones of the machine:

Zone 1: Area between moving parts of the conveyor and load and the fixed parts of the machine at loading and unloading areas.

Hazards of crushing, shearing and drawing-in.

Zone 2: Areas between moving parts of the conveyor mechanism and their load at both extremities of the processing zones.

Hazards of drawing-in, shearing and crushing.

Zone 3: Inspection doors giving access to the processing zones or conveyors.

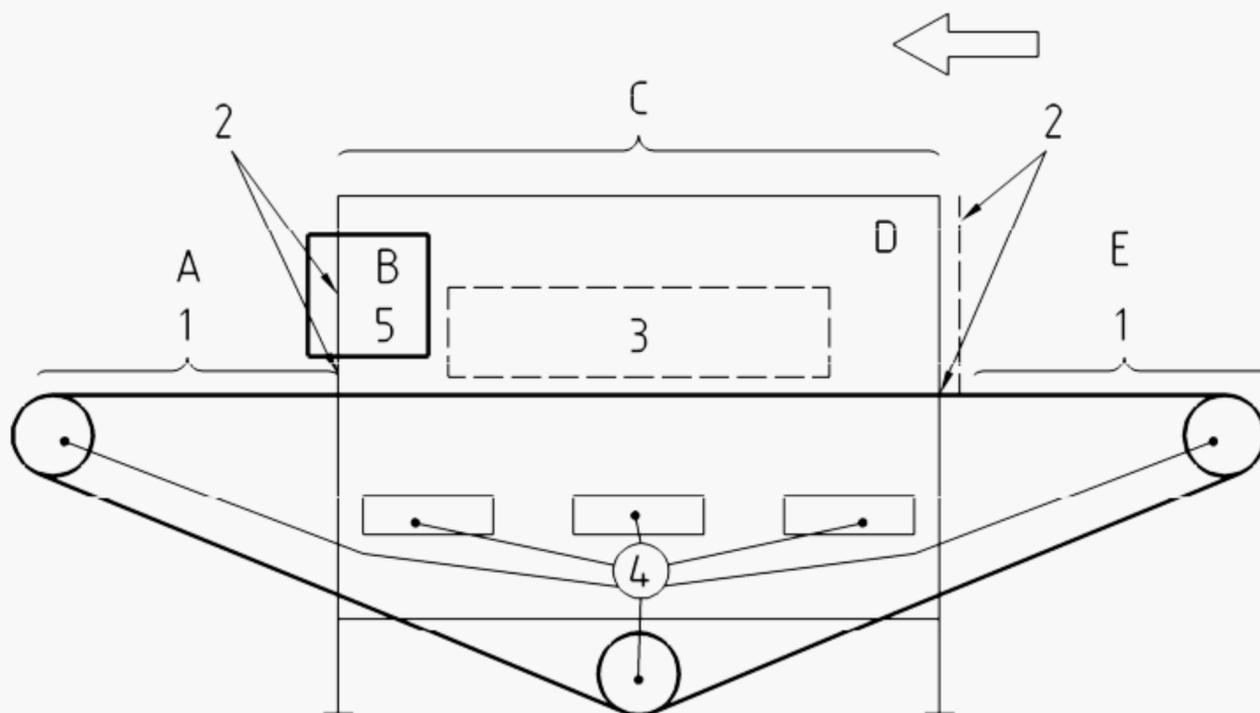
Hazards of crushing, shearing, drawing-in or pressurised fluid spilling.

Zone 4: Area giving access to the driving mechanism and technical movable parts.

Hazards of crushing, shearing and drawing-in.

Zone 5: Drying area.

Hazards of crushing, shearing and drawing-in.



**Key**

- |          |                   |
|----------|-------------------|
| 1 zone 1 | A unloading area  |
| 2 zone 2 | B drying area     |
| 3 zone 3 | C processing area |
| 4 zone 4 | D washing area    |
| 5 zone 5 | E loading area    |

**Figure 2 — Hazards zones**

**4.3 Electrical hazards**

Hazard of electrical shock from direct or indirect contact with live components.

Hazard of external influences on electrical equipment such as the presence of water.

Hazard due to fire and explosion.

#### **4.4 Thermal hazards**

Hazard of burn due to the contact of hands with heating elements or other elements at high temperature.

Hazard of burn due to water splashes while opening the inspection doors.

#### **4.5 Chemical hazards**

Hazard due to contact with or inhalation of detergent and vapours.

#### **4.6 Hazards generated by neglecting hygiene principles in machine design**

The major risk is the accumulation of food soils inside the processing zones of the dishwashing machine, e.g. filters, tanks, which can lead to growth of micro-organisms.

NOTE Hazards of potable water network pollution are dealt with by EN 1717 or EN 61770.

#### **4.7 Hazards generated by neglecting ergonomic principles**

Risk of injury or chronic damage to the body resulting from harmful body postures during operation (loading, unloading), cleaning (racks, filters, access doors) and during the hand loading of dosing devices and dispensers.

#### **4.8 Hazard from loss of stability**

Impact or crushing hazard if the machine topples over.

### **5 Safety and hygiene requirements and/or protective measures**

#### **5.1 General**

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 12100-2 for relevant but not significant hazards, which are not dealt with by this document.

For hazards which are to be reduced by the application of the type B-standards such as EN 294, EN 349, EN ISO 13732-1, EN 614-1, EN 953, EN 954-1, EN 1088, EN 1760-2, EN 60204-1, EN 60529, CLC/TS 61496-2, EN ISO 3744, EN ISO 4871 and EN ISO 11201, the manufacturer shall carry out a risk assessment to establish the requirements of the type B-standard. This specific risk assessment shall be part of the general risk assessment of the machine.

When interlocking devices are referred to in Clause 5, they should preferably be position detectors with positive opening contact complying with the recommendations of standard EN 1088:1995, 4.2.1 (interlocking without guard locking) and Clauses 5 and 6. However, due to practical reasons (e.g. cleaning), magnetic switches (reed switches) in accordance with EN 1088, are allowed. The related parts of the control system shall be not less than category 1 in accordance with EN 954-1:1996.

Guards shall comply with EN 953:1997, especially Clauses 6 and 7.

Except where otherwise provided, interlocking shall be control interlocking as defined in EN 1088:1995, 4.1.1. Manually operated control devices of the dishwashing machines shall be located out of the hazardous zones.

## 5.2 Mechanical hazards

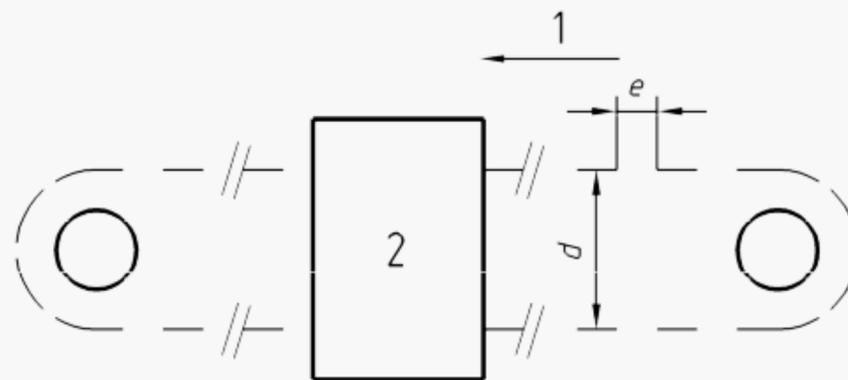
### 5.2.1 Zone 1

#### 5.2.1.1 Flight type machine

At both sides of the belt, unintentional access to the edge of the belt in the loading and unloading areas shall be prevented by fixed elements (e.g. machine enclosure elements).

The risks due to drawing-in at the openings in the upper part of the belt ("e" in Figure 3) and/or touching the parts beneath (the lower part of the belt, or fixed intermediate elements) shall be reduced as much as possible by one or more of the following measures:

- reduction of the openings in the belt while achieving as much as possible compliance with Table 4 of EN 294:1992;
- an appropriate shape of the belt elements, in particular at the inside;
- the design of the intermediate elements (smooth surface, size and shaping of the openings etc.);
- the distance between the upper belt element and the lower element, or between the upper belt element and the intermediate element ("d" in Figure 3). For opening widths "e" of maximum 80 mm in the belt, the distance "d" should be more than 150 mm.



#### Key

- 1 processing direction
- e opening
- d distance between fixed and/or mobile parts

**Figure 3 — Flight type machine – Zone 1**

At the beginning of the loading area, crushing between the belt and the carrying elements shall be prevented by fixed guard.

At the end of the unloading area, crushing between the belt and the tensioning and/or driving element shall be prevented by the following means:

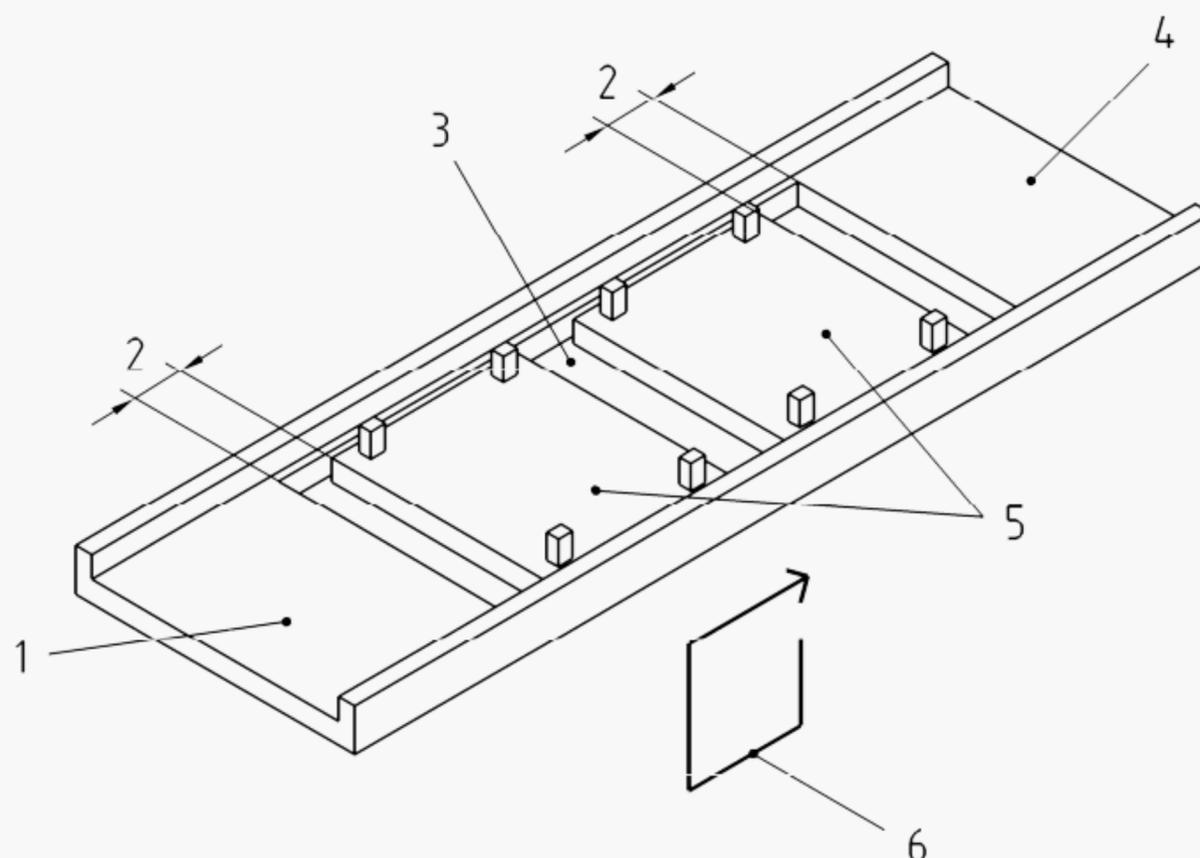
- a fixed or movable interlocking guard protecting access to the in-running nips;
- a trip device stopping the movement of the belt when part of the body enters the danger zone (taking account of the stopping distance):
  - either a mechanical trip device in accordance with EN 1760-2;
  - or an active optoelectronic protective device in accordance with CLC/TS 61496-2.

**NOTE** For operational reasons, a complementary trip device can be present for detecting, for example, dishes at the end of the unloading area. Different from the safety trip device, it is acceptable that disengagement of this device restarts the belt.

Pegs shall not have sharp edges.

### 5.2.1.2 Reciprocating rack conveyor type machine

Crushing points between accessible conveying elements and fixed parts shall be eliminated by minimum distance of 25 mm in accordance with EN 349. An example of reciprocating rack conveyor device is given in Figure 4.



#### Key

- 1 loading area
- 2 minimum distances between fixed parts and mobile reciprocating device
- 3 processing area
- 4 unloading area
- 5 reciprocating device
- 6 description of the reciprocating device movement

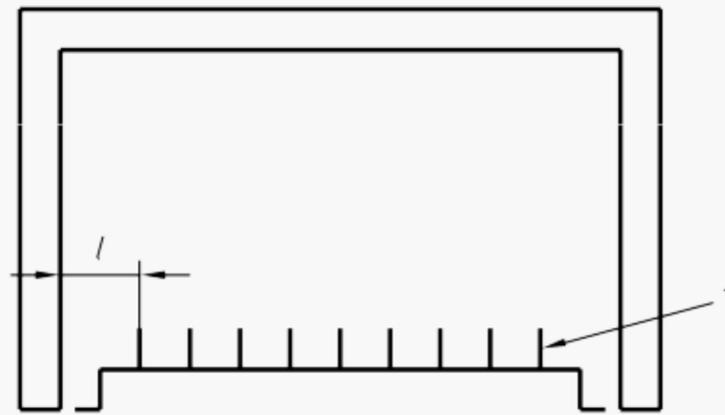
**Figure 4 — Reciprocating rack conveyor device**

### 5.2.1.3 Endless chain rack conveyor type machine

Crushing points shall be safeguarded in a similar way as in paragraphs 3 and 4 of 5.2.1.1.

## 5.2.2 Zone 2

**5.2.2.1** For flight type machines, the distance  $l$  between the external peg and the internal wall shall be at least 50 mm (see Figure 5).

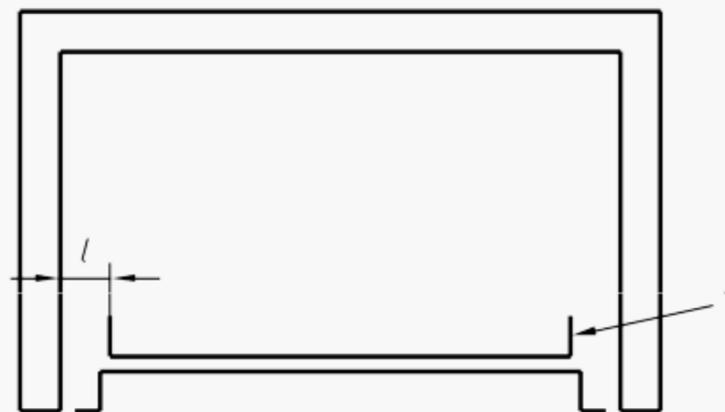


**Key**

- 1 pegs
- l* distance between the external peg and the internal wall:  $\geq 50$  mm

**Figure 5 — Safety distance for a flight type machine**

**5.2.2.2** For rack conveyor type machines, the distance *l* at the entrance of the processing area between the rack side (for the racks as intended), and the internal wall shall be at least 25 mm (see Figure 6).



**Key**

- 1 rack
- l* distance between the rack side and the internal wall:  $\geq 25$  mm

**Figure 6 — Safety distance for a rack conveyor type machine**

**5.2.3 Zone 3**

The opening of the inspection doors shall:

- stop the drive mechanism;
- stop washing and rinsing.

The stopping time shall be maximum 1 s.

The restarting of the machine after closing the inspection doors shall be made by a voluntary action on the ON switch.

If the inspection doors are of the vertically sliding type, measures shall be taken against the crushing hazards of the doors accidentally falling down. The following measures are considered acceptable, separately or combined, depending on the opening height and/or the mass of the door:

- avoiding a knife effect by the width of the lower edge of the door;

- counterbalancing if not depending on one single element (see also 5.7). In this case, a failure in one of the counterbalancing elements shall not allow a closing force higher than 50 N (unless this solution is combined with one of the other solutions);
- an automatically engaging restraint device keeping the door in the open position, if necessary combined with elements from the other solutions.

#### 5.2.4 Zone 4

For both type of machines, access to the mechanical parts shall be prevented by movable interlocking or by fixed guards. The opening of movable guards shall stop the mechanical parts while fixed guards shall be able to be removed only with the use of tools.

#### 5.2.5 Zone 5

Accessible mobile parts of the fans shall be protected by a grid designed as a fixed guard and complying with EN 294:1992, Table 4.

### 5.3 Electrical hazards

#### 5.3.1 General

The electrical equipment shall comply with EN 60204-1 and with the following requirements.

#### 5.3.2 Safety requirements related to electromagnetic phenomena

The machines shall have sufficient immunity to electromagnetic disturbances to enable them to operate safely as intended and not fail to danger when exposed to the levels and types of disturbances intended by the manufacturer.

The manufacturer of the machine shall design, install and wire the equipment and sub-assemblies taking into account the recommendations of the suppliers of these sub-assemblies.

#### 5.3.3 Protection against water ingress

The machine shall be designed considering the possibility of water ingress (e.g. overflowing, condensation) that can affect electrical safety. All the electrical components shall have a degree of protection IPX5 as defined in EN 60529:1991.

#### 5.3.4 Disconnecting device (see EN 60204-1)

A disconnecting device shall be fitted for separation of the energy source, according to EN 60204-1.

If it is not supplied and/or installed by the manufacturer, the instruction handbook shall precise its specifications and conditions of installation.

#### 5.3.5 Protection against electric shocks

Protection against direct and indirect contact shall be ensured in compliance with EN 60204-1.

Operator interface control devices shall have a degree of protection IPX5, as defined in EN 60529:1991.

#### 5.3.6 Emergency stop (see EN 60204-1)

Machines shall be fitted with one or more emergency stop devices, as far as the risk assessment of the manufacturer does not establish that such a device would not lessen the risk, either because it would not reduce the stopping time or because it would not enable the special measures required to deal with the risk to be taken.

## EN 14957:2006 (E)

If the risk assessment by the manufacturer allows him to conclude that no emergency stopping device is required, then a supply disconnecting device in accordance with EN 60204-1 shall be provided. It shall stop all the operations of the machine.

### 5.3.7 Motor enclosures (see EN 60204-1)

Motors with a degree of protection lower than IP23 shall be mounted inside an enclosure that guarantees a minimum degree of protection IP23.

## 5.4 Thermal hazards

5.4.1 The opening of the inspection doors shall stop the water jets.

5.4.2 Direct access to heating elements shall be prevented (e.g. by a grid designed as a fixed guard and with openings in accordance with Table 4 of EN 294:1992).

5.4.3 The temperature of the external parts of the machine that can generally come into contact with the operator for no longer than 3 s, shall not exceed the limit temperature of 65°C for non-coated metal (according to EN ISO 13732-1).

5.4.4 The over-heating of heating elements shall be prevented by a device complementary to the regulating system, e.g. by a temperature limiting device or a pressure switch.

## 5.5 Chemical hazards

The chemicals dosing system shall be designed and constructed for reducing as much as possible the risks related to contact with or inhalation of chemicals and vapours. The manufacturer shall design the machine in order to reduce the quantity of steam coming out of the machine, e.g. by curtains. If necessary, the manufacturer shall consider provisions for the extraction of vapours. The manufacturer shall include in the information for use instructions for the installation (see Clause 7).

If the system of distribution for the cleaning, the rinsing and disinfecting products is not made by the manufacturer of the dishwashing machine with conveyor, the machine manufacturer shall make provisions for the integration of the system in the machine. The manufacturer shall include in the information for use instructions for the integration (see Clause 7).

## 5.6 Hygiene

Even if the machine does not have food and splash areas, the design of the dishwashing machine with conveyor shall be in accordance with the splash area requirements of EN 1672-2 for the parts where accumulation of food soils can occur (e.g. filters, tanks, racks, pegs). Elements that need to be removed for cleaning shall be easily accessible and removable.

The manufacturer shall include the recommendations and the method for cleaning in the instruction handbook.

## 5.7 Ergonomics

Regard shall be given to the principles set out in 4.8 of EN ISO 12100-2:2003 and EN 614-1. Any information necessary to achieve the ergonomic objectives which the user needs to follow shall be included in the instruction handbook.

## 5.8 Hazard from loss of stability

Dishwashing machines with conveyor shall be designed not to tilt or fall over under intended operating conditions. The instruction handbook shall give information on the foundation load and the type of floor fixing or, for non-fixed machines, the floor load and recommended flooring surfaces.

## 6 Verifications of safety and hygiene requirements and/or protective measures

This clause contains the methods for verification of the conformity of the machine with the requirements of Clauses 5 and 7. Criteria for acceptance are contained in Clauses 5 and 7, or can be found in this clause.

Verification of the requirements can be made by means of inspection, design verification, visual inspection, measurement, calculation or testing. These shall be applied to a machine in a fully commissioned condition but partial dismantling may be necessary for the purpose of some checks. Such partial dismantling shall not invalid the result of verification.

Methods of verification are given in Table 1.

**Table 1 — Methods of verifications**

Clause/subclause	Methods of verification
5.2.1	Design verification, visual inspection and measurement (type verification) Functional verification (individual verification)
5.2.2	Design verification and measurement (type verification)
5.2.3	Design verification and measurement (type verification) Functional verification (individual verification)
5.2.4	Design verification (type verification) Functional verification (type verification)
5.2.5	Design verification and measurement (type verification)
5.3	General design verification, visual inspection and test in compliance with the relevant paragraphs of EN 60204-1 (type verification) Electrical test in accordance with EN 60204-1(individual verification) Design verification and verification of the instruction handbook regarding the EMC requirements (type verification)
5.4.1	Functional verification (individual verification)
5.4.2	Visual inspection and measurement (type verification)
5.4.3	Functional verification and measurement (type verification)
5.4.4	Functional verification (type verification)
5.5	Design verification and verification of the instruction handbook (type verification)
5.6	Design verification, visual inspection and measurement (type verification)
5.7	Visual inspection and verification of the instruction handbook (type verification)
5.8	Design verification and verification of the instruction handbook (type verification)

## 7 Instruction for use

### 7.1 General

Information for use shall be provided according to Clause 6 of EN ISO 12100-2:2003 and with additional information as required in the present clause. An instruction handbook shall be provided.

### 7.2 Instruction handbook

The instruction handbook shall meet the requirements and advice of 6.5 of EN ISO 12100-2:2003. It shall include at least the following information:

## EN 14957:2006 (E)

- a) information relating to transport, handling and storage:
  - dimensions of any transportation arrangement;
  - weight, dimensions;
- b) information relating to installation and commissioning in particular:
  - the indications to the user relating to commissioning, in particular assembly and mounting conditions;
  - ergonomic considerations: sufficient space for loading and unloading, and access for maintenance;
  - mechanical/connecting (If the machine is fixed on the floor, the manufacturer shall give the value of the fixing point);
  - chemical dosing system: if it is not installed by the manufacturer, this one shall indicate the condition of installation;
  - water connection: maximum water pressure, flow rate and dimension;
  - any special installation requirements, in particular specifications and condition of installation of the connecting device;
  - assembly and mounting conditions;
  - information about prevention measures which have to be taken by the user about the appropriate vapour extraction;
  - information about prevention measures which have to be taken by the user including warning to use suitable flooring to prevent slipping;
  - information about prevention measures which have to be taken by the user about noise reduction;
- c) information to the equipment itself:
  - declared noise emission values, following the requirements of Annex A;
  - data about electrical equipment and electrical wiring diagram;
  - location of the equipotential earth bonding;
- d) information relating to the normal operation condition:
  - foreseeable misuse;
  - choice of the suitable rack/basket depending on the type of machine and dishes;
  - limit of use: maximum dimension of the dishes;
  - method of cleaning and disinfecting the machine, including information about the removal parts;
  - information about suitable use of recommended chemical products according to the supplier's instructions;
  - the element of training to be provided to the operator for the safe operation of the machine;
  - any ergonomics considerations which the user may take mainly loading and unloading conditions in order to prevent overloading of the rack/basket, in relation with manual loading;

- e) information relating to maintenance.

The maintenance manual can be a different part of the instruction handbook. It shall include:

- list of faults finding and resolutions;
- the measures to take before interventions on the machine (disconnection, locking, neutralisation of residual energy, verification of "zero energy state");
- list and identification of spare parts.

### 7.3 Marking

The minimum marking shall include:

- name and address of the manufacturer;
- mandatory marking<sup>1)</sup>;
- year of construction;
- designation of series or type, if any;
- serial of identification number, if any;
- rating information (mandatory for electro-technical products: voltage, frequency, power etc.).

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1) For machines and their related products intended to be put on the market in the EEA, CE marking as defined in the applicable European directive(s), e.g. Machinery.

## Annex A (normative)

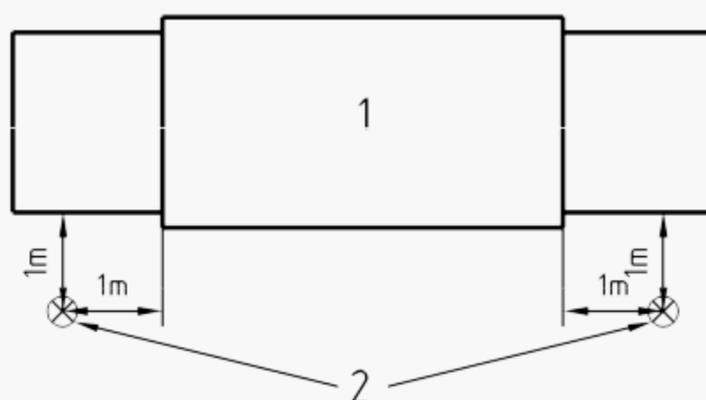
### Noise test code for dishwashing machines with conveyor (Grade 2)

#### A.1 Emission sound pressure level determination

EN ISO 11201 shall be used for the determination of the emission sound pressure level.

The measurement shall be made at the microphone position located at a distance of 1 m from the machine (see Figure A.1) and at a height of  $1,50\text{ m} \pm 0,075\text{ m}$  above the ground plane. The microphone shall be orientated towards the machine.

The measurement shall be made at loading side and at unloading side. The highest determined value for the emission sound pressure level shall finally be used for the noise emission declaration according to A.8.



#### Key

- 1 dishwashing machine
- 2 microphone

Figure A.1 — Microphone positions

#### A.2 Installation and mounting conditions

The test environment shall comply with Clause 6 of EN ISO 11201:1995. It shall be qualified according to the Annex A of EN ISO 3744:1995.

NOTE For tests in open site, it is assumed that the environmental correction  $K_2$  is less than or equal to 0,5 dB and is therefore negligible.

Dishwashing machines with conveyor shall be placed on a flat sound reflecting floor when carrying through the test. The machine shall be located at a sufficient distance from any reflecting wall or ceiling or any reflecting object.

#### A.3 Operating conditions

The dishwashing machine with conveyor shall be running without dishes: all functions shall be activated (washing, drying and rinsing if any).

## A.4 Measurement

The time average emission sound pressure level  $L_{pA}$  shall be measured at the specified position.

- tests shall be repeated to obtain the required grade of accuracy, and until three consecutive results give values which differ of not more than 2 dB;
- $L_{pA}$  is the arithmetical average of the three values.

The measuring time shall be at least 15 s, the stopping time being excluded.

## A.5 Measurement uncertainties

A standard deviation of reproducibility of 0,5 dB to 2,5 dB is expected for the A-weighted emission sound pressure level determined according to EN ISO 11201.

## A.6 Information to be recorded

Information shall comply with Clause 12 of EN ISO 11201:1995.

Any deviations from this noise test code and from EN ISO 11201 shall be recorded together with the technical justification for such deviations.

## A.7 Information to be reported

The information to be reported shall comply with Clause 13 of EN ISO 11201:1995.

The information shall include at least:

- reference to EN ISO 11201:1995;
- description of the mounting and operating conditions used;
- location of the microphone position for the determination of the emission sound pressure level at the work station;
- the noise emission value obtained;
- declaration that all requirements of the noise test code have been fulfilled or if this is not the case, any unfulfilled requirements shall be identified;

The deviations from the requirements shall be stated and technical justification for the deviations shall be given.

## A.8 Declaration and verification of noise emission values

The declaration of the noise emission value shall be made as a dual-number noise emission declaration according to EN ISO 4871.

It shall declare the emission sound pressure level  $L_{pA}$  and the uncertainty  $K_{pA}$ .

The uncertainty  $K_{pA}$  is expected to have a value of 2,5 dB.

## EN 14957:2006 (E)

The noise declaration shall state that the noise emission value has been obtained according to this test code and to the basic standard EN ISO 11201. If this statement is not true, the noise declaration shall indicate clearly what the deviations are from this noise test code and/or from the basic standards.

If undertaken, verification shall be done according to EN ISO 4871 by using the same mounting, installation and operating conditions as those used for the initial determination of the noise emission values.

## Annex ZA (informative)

### Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive Machinery 98/37/EC, amended by 98/79/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

**WARNING** — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

## Bibliography

- [1] EN 1050:1996, *Safety of machinery — Principles for risk assessment*
- [2] EN 1717:2000, *Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow*
- [3] EN 61770:1999, *Electric appliances connected to the water mains — Avoidance of backsiphonage and failure of hose-sets (IEC 61770:1998)*

