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**Naprave za površinsko čiščenje in predobdelavo industrijskih proizvodov s pomočjo tekočin ali par - 2. del: Varnost naprav, v katerih se uporabljajo čistila, topna v vodi**

Machines for surface cleaning and pre-treatment of industrial items using liquids or vapours - Part 2: Safety of machines using water based cleaning liquids

Maschinen zur Oberflächenreinigung und -vorbehandlung von industriellen Produkten mittels Flüssigkeiten oder Dampfphasen - Teil 2: Anlagen, in denen wässrige Reinigungsmittel verwendet werden

Machines de nettoyage et de pré-traitement de pièces industrielles utilisant des liquides ou des vapeurs - Partie 2: Sécurité des machines utilisant des liquides de nettoyage a base aqueuse

**Ta slovenski standard je istoveten z: EN 12921-2:2005**

**ICS:**

97.080      Aparati za nego tal      Floor treatment appliances

**SIST EN 12921-2:2005**      **en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 12921-2**

May 2005

ICS 25.220.10; 25.220.20

English version

**Machines for surface cleaning and pre-treatment of industrial items using liquids or vapours - Part 2: Safety of machines using water based cleaning liquids**

Machines de nettoyage et de pré-traitement de pièces industrielles utilisant des liquides ou des vapeurs - Partie 2: Sécurité des machines utilisant des liquides de nettoyage aqueux

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This European Standard was approved by CEN on 25 March 2005.

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.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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## Foreword

This document (EN 12921-2:2005) has been prepared by Technical Committee CEN /TC 271, "Surface treatment equipment — 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 November 2005, and conflicting national standards shall be withdrawn at the latest by November 2005.

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 Directives, see informative annex ZA, which is an integral part of this document.

This standard is part of a series of standards in the area of safety for development and construction of machines for surface cleaning and pre-treatment of industrial items using liquids or vapours.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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**EN 12921-2:2005 (E)****Introduction**

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

This European Standard contains additional safety requirements to and/or deviations from EN 12921-1.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this 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 according to the provisions of this type C standard.

The EN 12921 series includes the following parts:

- Part 1: Common safety requirements
- Part 2: Safety of machines using water based cleaning liquids
- Part 3: Safety of machines using flammable cleaning liquids
- Part 4: Safety of machines using halogenated solvents

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## 1 Scope

This European Standard deals only with the significant hazards of machines for surface cleaning and pre-treatment (in the following called "cleaning machines") of industrial items using water based cleaning liquids in the mode of suspension, solution or dispersion of compounds or substances in water applied by immersion and/or spraying in one or more stages.

This European Standard should apply in combination with EN 12921-1. Both parts together cover all significant hazards relevant for cleaning machines for industrial items using liquids or vapours, when they are used as intended and under the conditions foreseen by the manufacturer (see clause 4). The specific requirements specified in this standard take precedence over the respective requirements in EN 12921-1. This standard should be applied together with EN 12921-3 in case of release of flammable vapours from water based cleaning liquids.

This European Standard should be applied together with EN 12921-3 and prEN 12921-4 in case of use of water based cleaning liquids of which evaporating can lead to hazards caused by explosive atmospheres. Water based cleaning liquids containing a quantity of halogenated solvents exceeding 2 % of the volume are considered hazardous with respect to the creation of a potentially explosive atmosphere.

This European Standard does not apply to machinery and related equipment excluded from the scope of EN 12921-1.

This European Standard does not apply to cleaning machines for industrial items using water based cleaning liquids which are manufactured before the publication of this standard by CEN.

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## 2 Normative references

SIST EN 12921-2:2005

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 746-1, *Industrial thermoprocessing equipment — Part 1: Common safety requirements for industrial thermoprocessing equipment*

EN 746-2, *Industrial thermoprocessing equipment — Part 2: Safety requirements for combustion and fuel handling systems*

EN 1127-1, *Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology*

EN 1717, *Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow*

EN 12921-1:2004, *Machines for surface cleaning and pre-treatment of industrial items using liquids or vapours — Part 1: common safety requirements*

EN 12921-3:2004, *Machines for surface cleaning and pre-treatment of industrial items using liquids or vapours — Part 3: safety of machines using flammable cleaning liquids*

EN 60204-1:1997, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:1997)*

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

EN ISO 12100-1:2003; *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

**EN 12921-2:2005 (E)**

EN ISO 12100-2; *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

**3 Terms and definitions**

For the purposes of this European Standard, the terms and definitions given in EN ISO 12100-1:2003, EN 12921-1:2004 and the following apply.

**3.1****alkaline**

any water based solution having a pH value above 7,5

**3.2****dispersion**

water based mixture containing a liquid or solid which is not dissolved

**3.3****strong alkaline solution**

water based solution having a pH value above 12

**3.4****strong acidic solution**

water based solution having pH value below 4

**3.5****suspension**

water based mixture containing solid particles in stable or unstable form

**3.6****emulsion**

class of colloidal dispersions containing two or more immiscible liquids such as oil in water

NOTE Emulsions can be stable or unstable.

**3.7****stable emulsion**

emulsion containing an emulsifying agent to prevent the separation of its components

**3.8****unstable emulsion**

emulsion which will separate into its components

**3.9****neutral solution**

any water based solution having a pH value between 6.5 and 7.5

**4 List of significant hazards**

**Table 1 — List of significant hazards associated with machines for surface cleaning and pre-treatment using water based cleaning liquids**

Clause/sub-clause of this standard	Hazard	Clause/sub-clause of EN 12921-1:2004
4.1	<p><b>General</b></p> <p>This clause contains significant hazards, hazardous situations and events, as far as they are dealt with in this standard, identified by risk assessment as significant for this type of machinery using water-based cleaning liquids and which require action to eliminate or reduce the risk.</p>	4.1



Clause/sub-clause of this standard	Hazard	Clause/sub-clause of EN 12921-1:2004
4.2	<b>Mechanical hazards</b>	4.2
4.2.1	<b>Crushing, shearing, cutting, entanglement, drawing-in, impact</b>	4.2.1
4.2.2	<b>High pressure fluid ejection</b>	4.2.2
4.2.3	<b>Ejection of parts of the cleaning machine and/or items</b>	4.2.3
4.2.4	<b>Loss of stability (of cleaning machine and cleaning machine parts)</b>	4.2.4
4.2.5	<b>Personnel's slip, trip and fall hazards</b>	4.2.5
4.3.	<p><b>Electrical hazards</b></p> <p>These hazards can be increased by the presence of vapour, moisture, mist and/or liquid water.</p> <p>Areas from which vapours or liquid can escape are e. g.:</p> <ul style="list-style-type: none"> <li>— internal chambers of cleaning machines, including dead zones;</li> <li>— tanks and spaces over liquid surfaces;</li> <li>— exhaust and ducts chambers and enclosures;</li> <li>— areas surrounding doors, covers and lids;</li> <li>— areas where parts can transit during load/unload operation.</li> </ul>	4.3
4.4	<b>Thermal hazards</b>	4.4
4.5	<b>Hazards generated by noise</b>	4.5
4.6	<b>Hazards generated by materials and substances processed, used or emitted by the cleaning machine</b>	4.6
4.6.1	<b>General</b>	4.6.1
	NOTE Information on the method of risk analysis is given in EN 1050.	

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Table 2 (continued)

Clause/sub-clause of this standard	Hazard	Clause/sub-clause of EN 12921-1:2004
4.6.2	<p><b>Hazards resulting from contact with/or inhalation of dangerous liquids, gases, aerosol, fumes and dusts</b></p> <p>An assessment shall be carried out considering the characteristics of the water based cleaning liquid for which the cleaning machine is designed, the material(s) to be processed, the properties of the contaminants to be removed and their interaction with the characteristics of the cleaning machine.</p> <p>The level of risk depends on the dangerous properties of the substances used or processed, their compatibility with the characteristics and material of construction of the cleaning machine, the likelihood that exposure will occur and the degree of exposure.</p> <p>The hazards generated by contact with/or inhalation of dangerous fluids, gases, mists, fumes and dust can be caused by e. g.:</p> <ul style="list-style-type: none"> <li>— contact with irritant or corrosive chemicals (e. g. by pickling, passivating);</li> <li>— inhalation of vapours, powder or mist (e. g. during preparation of solutions for chromating and phosphating);</li> <li>— backflow of water based cleaning liquid into the public water supply.</li> </ul> <p>The above mentioned hazards can occur in the following situations and can be caused by:</p> <ul style="list-style-type: none"> <li>— handling of the cleaning products (due to the necessity of mixing and/or the reaction with water) during the filling and refilling of the cleaning machine;</li> <li>— normal operation;</li> <li>— chemical reaction caused by the contaminant(s) during the cleaning process;</li> <li>— chemical reaction caused by mixing not compatible products;</li> <li>— modification of the chemical characteristics of the water based cleaning liquid which may occur during the process;</li> <li>— cleaning machine failure or breakdown due to the not compatibility of material of construction with the water based cleaning liquid or the chemical reactions generated during the cleaning process;</li> <li>— maintenance.</li> </ul>	4.6.2
4.6.3	<p><b>Fire and explosion hazard</b></p> <p>See 4.6.3.1 and 4.6.3.2 of EN 12921-1:2004.</p> <p>These hazards may be caused by:</p> <ul style="list-style-type: none"> <li>— the forming of hydrogen caused by chemical reaction of acid or alkaline cleaning liquid with metal (e. g. particularly with aluminium, magnesium or other alloys), in particular fines, small chips and swarf, and/or contaminants;</li> <li>— the water based liquid to be used in the cleaning machine (e. g. emulsion);</li> <li>— change in composition of the water based liquid due to drag out or flammable residues being removed from items being cleaned;</li> <li>— deflagration in oil or gas direct fired heating system.</li> </ul>	4.6.3
4.7	<b>Hazards combinations</b>	4.7
4.8	<b>Hazards caused by failure of energy supply</b>	4.8
4.9	<b>Hazards related to failure of control system</b>	4.9

## 5 Safety requirements and/or measures

### 5.1 General

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

In addition, the cleaning 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 standard (e. g. sharp edges).

The common safety requirements or measures for cleaning machines using cleaning liquids or vapours in 5.1 of EN 12921-1:2004 shall also be considered.

The intended use shall be determined and explained/defined in the instruction handbook and, when necessary, by other additional means (plate, sign, labelling, etc.) in accordance with the properties of the water based cleaning liquids indicated in the safety data sheet.

### 5.2 Mechanical hazards

See 5.1 and 5.2 of EN 12921-1:2004.

#### 5.2.1 Safeguarding of danger points

See 5.2.1 of EN 12921-1:2004.

##### 5.2.1.1 Safety measures against crushing, shearing, cutting, entanglement, drawing-in, impact

See 5.2.1.2 of EN 12921-1:2004.

##### 5.2.1.2 Guards and interlocks

See 5.2.1.3 of EN 12921-1:2004.

##### 5.2.1.3 Moving parts of the cleaning machine

See 5.2.1.4 of EN 12921-1:2004.

##### 5.2.1.4 Location of controls

See 5.2.1.5 of EN 12921-1:2004.

##### 5.2.1.5 Prevention of unexpected close or fall of covers, lids and doors

See 5.2.1.6 of EN 12921-1:2004.

##### 5.2.1.6 Devices for setting-up, make-ready, cleaning and trouble-shooting during the work process

See 5.2.1.7 of EN 12921-1:2004.

### 5.2.2 Safety measures against high pressure fluid ejection

See 5.2.2 of EN 12921-1:2004.

#### 5.2.2.1 Safety measures against overpressure

See 5.2.2.2 of EN 12921-1:2004.

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