



SLOVENSKI STANDARD

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Pumps and pump units for liquids - Common safety requirements

Pumps and pump units for liquids - Common safety requirements

Pumpen und Pumpenaggregate für Flüssigkeiten - Allgemeine sicherheitstechnische Anforderungen

Pompes et groupes motopompes pour liquides - Prescriptions communes de sécurité

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English version

Pumps and pump units for liquids - Common safety requirements

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Pumpen und Pumpenaggregate für Flüssigkeiten -
Allgemeine sicherheitstechnische Anforderungen

This European Standard was approved by CEN on 7 November 1997.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 197 "Pumps", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by January 1999, and conflicting national standards shall be withdrawn at the latest by January 1999.

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 Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

This Standard has been prepared to be a harmonized standard to provide one means of conformity with the Essential requirements of the Machinery Directive and associated EFTA Regulations.

The extent to which hazards are covered is indicated in clause 4 "List of hazards" of this Standard. In addition, machinery shall comply as appropriate with EN 292 for hazards which are not covered by this Standard.

1 Scope

This standard establishes the technical safety requirements for :

- constructing ;
- assembling ;
- erecting ;
- operating ;
- servicing ;

of a liquid pump or pump unit. It contains a list of significant hazards, which can arise with the use of a liquid pump or pump unit, and establishes the requirements and/or measures which will lead to a reduction of the risks.

Liquid pumps are described as :

- rotodynamic pumps ;
- rotary positive displacement pumps ;
- reciprocating displacement pumps ;

supplied separately without driver.

In general, pumps are defined as being terminated by their inlet and outlet connections as well as by their shaft ends.

Pump units comprise the liquid pump types above together with a driver (electric motor or i.c.-engine) including transmission elements, baseplates, and any auxiliary equipment.

This standard does not deal with the technical safety requirements for the design or manufacture of drivers nor of auxiliary equipment. It does not set down requirements for the risks directly arising from means provided for the portability, transportability, and mobility of pump units during or between periods of their operation, nor the requirements for transmission shafts linking a tractor or other self-propelled machinery to a pump.

This standard does not cover pumps and pump units for applications which are excluded from the scope of EC Directive 89/392/EEC Machinery as follows :

- pumps and pump units whose only power source is directly applied manual effort ;
- pumps and pump units for medical use used in direct contact with the patient ;
- pumps and pump units specially designed or put into service for nuclear purposes which, in the event of failure, may result in an emission of radioactivity ;
- pumps and pump units for use on seagoing vessels or mobile off-shore units ;
- pumps and pump units specially designed for military or police purposes.

Neither does it cover pumps and pump units for hydraulic power transmission.

Specific requirements for particular features of pumps additional to the common requirements set out in this standard can be found in other standards such as prEN 1028, prEN 1151, prEN 1829, and in the European Standards on submersible pump units and for liquid pumps for the use in agrifoodstuff industries.

This Standard is for pumps and pump units which are placed on the market after the publication date of the standard.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 292-1, *Safety of machinery - Basic concepts - General principles for design - Part 1 : Basic terminology – Methodology.*

EN 292-2, *Safety of machinery - Basic concepts - General principles for design - Part 2 : Technical principles and specifications.*

EN 292-2/A1, *Safety of machinery - Basic concepts - General principles for design - Part 2 : Technical principles and specifications.*

EN 294, *Safety of machinery - Safety distances 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 414, *Safety of machinery - Rules for the drafting and presentation of safety standards.*

EN 418, *Safety of machinery - Emergency stop equipment, functional aspects - Principles for design.*

EN 563, *Safety of machinery - Temperatures of touchable surfaces - Ergonomics data to establish temperature limit values for hot surfaces.*

EN 626-1, *Safety of machinery - Reduction of risk to health from hazardous substances emitted by machinery - Part 1 : Principles and specifications for machinery manufacturers*

EN 626-2, *Safety of machinery - Reduction of risk to health from hazardous substances emitted by machinery - Part 2 : Methodology leading to verification procedures.*

EN 894-1, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 1 : Human interactions with displays and control actuators.*
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EN 894-2, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 2 : Displays.*

EN 894-3, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 3 : Control actuators.*¹⁾

EN 953, *Safety of machinery - General requirements for the design and construction of guards (fixed, movable).*

prEN 1028-1, *Fire fighting pumps - Part 1 : Requirements of fire fighting centrifugal pumps with primer.*

¹⁾ In preparation

prEN 1028-2, *Fire fighting pumps - Part 2 : Testing of fire fighting centrifugal pumps with primer.*

prEN 1037, *Safety of machinery - Isolation and energy dissipation - Prevention of unexpected start-up.*

EN 1050, *Safety of machinery - Risk assessment.*

prEN 1151, *Pumps - Rotodynamic pumps - Circulation pumps having an electrical effect not exceeding 200 W for heating installations and domestic hot water installations - Requirements, testing, marking.*

prEN 1829, *High pressure cleaners - High pressure water jet machines - Safety requirements.*

prEN 12162, *Liquid pumps - Hydrostatic testing.*

prEN 12639, *Liquid pumps and pump units - Noise test code - Grade 2 and 3 of accuracy.*

EN 25199, *Technical specifications for centrifugal pumps - Class II.*

EN 50081-1, *Electromagnetic compatibility (EMC) - Generic emission standard - Part 1 : Residential, commercial and light industry.*

EN 50081-2, *Electromagnetic compatibility (EMC) - Generic emission standard - Part 2 : Industrial, environment.*

EN 50082-1, *Electromagnetic compatibility (EMC) - Generic immunity standard - Part 1 : Residential, commercial and light industry.*

EN 50082-2, *Electromagnetic compatibility (EMC) - Generic immunity standard - Part 2 : Industrial, environment.*

EN 60204-1, *Safety of machinery - Electrical equipment of machines - Part 1 : General requirements.*

EN 60529, *Degrees of protection provided by enclosures (IP code) [IEC 529:1989].*

ENV 61000-2-2, *Electromagnetic compatibility (EMC) - Part 2 : Environment ; Section 2 : Compatibility levels for low frequency conducted disturbances and signalling in public low-voltage power supply systems (IEC 1000-2-2:1990, modified).*

EN 61000-2-4, *Electromagnetic compatibility (EMC) - Part 2 : Environment - Section 4 : Compatibility levels in industrial plants for low frequency conducted disturbances (IEC 1000-2-4:1994 + Corrigendum 1994).*

EN 61000-3-2, *Electromagnetic compatibility (EMC) - Part 3 : Limits - Section 2 : Limits for harmonic current emissions (equipment input current ≤ 16 A per phase) (IEC 1000-3-2:1995).*

EN 61000-3-3, *Electromagnetic compatibility (EMC) - Part 3 : Limits - Section 3 : Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤ 16 A (IEC 1000-3-3:1994).*

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EN 61000-4-1, *Electromagnetic compatibility (EMC) - Part 4 : Testing and measurement techniques - Section 1 : Overview of immunity tests - Basic EMC publication (IEC 1000-4-1:1992).*

EN 61000-4-2, *Electromagnetic compatibility (EMC) - Part 4 : Testing and measurement techniques - Section 2 : Electrostatic discharge immunity test - Basic EMC publication (IEC 1000-4-2:1995).*

EN 61000-4-4, *Electromagnetic compatibility (EMC) - Part 4 : Testing and measurement techniques - Section 4 : Electrical fast transient/burst immunity test - Basic EMC publication (IEC 1000-4-4:1995).*

EN 61000-4-5, *Electromagnetic compatibility (EMC) - Part 4 : Testing and measurement techniques - Section 5 : Surge immunity test (IEC 1000-4-5:1995).*

EN 61000-4-7, *Electromagnetic compatibility (EMC) - Part 4 : Testing and measurement techniques - Section 7 : General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto (IEC 1000-4-7:1991).*

EN 61000-4-8, *Electromagnetic compatibility (EMC) - Part 4 : Testing and measurement techniques - Section 8 : Power frequency magnetic field immunity test - Basic EMC publication (IEC 1000-4-8:1993).*

EN 61000-4-9, *Electromagnetic compatibility (EMC) - Part 4 : Testing and measurement techniques - Section 9 : Pulse magnetic field immunity test - Basic EMC publication (IEC 1000-4-9:1993).*

EN 61000-4-10, *Electromagnetic compatibility (EMC) - Part 4 : Testing and measurement techniques - Section 10 : Damped oscillatory magnetic field immunity test - Basic EMC publication (IEC 1000-4-10:1993).*

EN 61000-4-11, *Electromagnetic compatibility (EMC) - Part 4 : Testing and measurement techniques - Section 11 : Voltage dips, short interruptions and voltage variations immunity tests (IEC 1000-4-11:1994).*

EN 61000-4-12, *Electromagnetic compatibility (EMC) - Part 4 : Testing and measurement techniques - Section 12 : Oscillatory waves immunity tests - Basic EMC publication (IEC 1000-4-12:1995).*

prEN 12723, *Liquid pumps - General terms for pumps and installations - Definitions, quantities, letter symbols and units.*

prEN ISO 14847, *Rotary positive displacement pumps - General requirements (ISO/DIS 14847 :1995).*

ISO 3864, *Safety colours and safety signs.*

ISO 9905, *Technical specifications for centrifugal pumps - Class I.*

ISO 9908, *Technical specifications for centrifugal pumps - Class III.*

3 Definitions

For the purposes of this Standard, the definitions contained in prEN 12723 "Liquid pumps - General terms for pumps and installations - Definitions, quantities, letter symbols and units shall apply.

Further the following definition applies :

3.1

Auxiliary equipment

Components or sub-assemblies mounted as part of the pump unit and necessary for the operation of the pump or pump unit, for example, seal flush system, lubrication system, cooling system, etc..

4 List of hazards

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The significant hazards are set out in the following listing based on EN 292 Part 1 and EN 292 Part 2 as well as Annex 'A' of EN 292 Part 2 and on the basis of EN 1050. Also shown are the sections references in this standard in which the safety requirements and/or measures or rules are described for showing the conformity to the safety requirements. The arrangement of significant hazards which are treated in the standard correspond to EN 414 Annex 'A'.

Table 1 -

EN 414 Annex A reference	Significant hazards	EN 809	
		Safety measures	Verification
1	Mechanical hazards	5.2.1	6.2.1
1.1 ; 1.3 ; 1.4 ; 1.5 ; 1.8	Crushing, cutting and severing, entanglement or enwrapment, drawing in or trapping, friction or abrasion	5.2.1.1	6.2.1 6.2.6
1.9	High pressure fluid ejection	5.2.1.2 5.2.1.2.2	6.2.1 6.2.2 6.2.3 6.2.4
1.10	Ejection of parts	5.2.1.3	6.2.1 6.2.2
1.11	Loss of stability	5.2.1.4	6.2.7
2	Electrical hazards	5.2.2	6.2.2
2.1	Electrical contact	5.2.2.1	6.2.2
2.2	Electrostatic phenomenon	5.2.2.2	6.2.1
2.3	External influences on electrical equipment	5.2.2.3	6.2.2
3	Thermal hazards	5.2.3	6.2.2 6.2.8
4	Hazards generated by noise	5.2.4 5.2.4.1	6.2.2 6.2.5
5	Hazards generated by vibrations	5.2.4.2	6.2.2
7	Hazards generated by materials	5.2.5	6.2.2
7.1	Contact with or inhalation of harmful fluids, gases, mists, steam	5.2.5.1	6.2.1
7.2	Fire and explosion hazards	5.2.5.3	6.2.1 6.2.2 6.2.8
8	Hazards from neglecting ergonomic principles in machine design	5.2.6	6.2.1 6.2.2
10	Hazards caused by failure of energy supply, breaking down of machinery parts and other functional disorders	5.2.7	6.2.1
10.3	Failure, malfunction of control system	5.2.7.2 5.2.7.3 5.2.7.5	6.2.1 6.2.2
10.4	Errors of fitting	5.2.7.1 5.2.7.4	6.2.1
11	Hazards caused by missing and/or incorrectly positioned safety related measures/means	5.2.8	6.2.1
11.1	All kinds of guards	5.2.8.1	6.2.1 6.2.6
11.2	All kinds of safety related protection devices	5.2.8.1 5.2.8.5	6.2.1 6.2.6
11.5	All kinds of information or warning devices	5.2.8.2	6.2.1
11.7	Emergency devices	5.2.8.3	6.2.2
11.9	Essential equipment and accessories for safe adjusting and/or maintenance	5.2.8.4	6.2.2

5 Safety requirements and/or measures

5.1 General requirements

The operating conditions and features required of every pump and/or pump unit falling within the scope of this standard shall be defined in a specification. This may be in the form of a manufacturer's description, or as a published national or international standard or in a data sheet within a contract. In the event of essential data not being provided by the purchaser, the manufacturer shall advise the purchaser of the data being adopted for the design and being incorporated into the specification. The supplier shall assess the risks arising from the machine together with its operating conditions and the equipment shall be designed to reduce them to an acceptable level giving full regard to the requirements set out in this standard.

NOTE The technical specifications will vary with the application, and some technical specifications are already stated in EN or ISO-Standards, such as :

- EN 25199 ;
- prEN ISO 14847 ;
- ISO 9905 ;
- ISO 9908.

Further safety information from the manufacturer/supplier for :

- planning ;
- installation ;
- operation ;
- maintenance.

shall be contained in the information/instruction for use, including personnel protection equipment required and warning notices.

5.1.1 Environmental and working conditions

In constructing the specification for the pump or pump unit particular attention shall be given to any special environmental and/or working conditions. Examples of such special conditions are, amongst others :

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