



SLOVENSKI STANDARD
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High pressure water jet machines - Safety requirements - Part 1: Machines

Hochdruck - Wasserstrahlmaschinen - Sicherheitsanforderungen - Teil 1: Maschinen

Machines à jet d'eau à haute pression - Exigences de sécurité - Partie 1: Machines

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97.080 Aparati za nego tal Floor treatment appliances

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EUROPEAN STANDARD
NORME EUROPÉENNE
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EN 1829-1

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English Version

High pressure water jet machines - Safety requirements - Part 1: Machines

Machines à jet d'eau à haute pression - Exigences de
sécurité - Partie 1: Machines

Hochdruck-Wasserstrahlmaschinen -
Sicherheitsanforderungen - Teil 1: Maschinen

This European Standard was approved by CEN on 18 December 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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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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EN 1829-1:2010 (E)**Foreword**

This document (EN 1829-1:2010) 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of an identical text or by endorsement, at the latest by July 2010, and conflicting national standards shall be withdrawn at the latest by July 2010.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 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 document.

EN 1829, *High-pressure water jet machines — Safety requirements*, consists of the following parts:

— *Part 1: Machines*

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— *Part 2: Hoses, hose lines and connectors*

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Compliance with the clauses of Part 1 together with those of Part 2 of EN 1829 provides one means of conforming with the essential health and safety requirements of the Directive concerned.

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 the United Kingdom.

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 hazardous events are covered, are indicated in the scope of this document.

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.

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EN 1829-1:2010 (E)**1 Scope**

This European Standard contains safety-related requirements for high pressure water jet machines with drives of all kinds (e.g. electric motor, internal combustion engine, air and hydraulic) in which pumps are used to generate pressure. This document deals with all significant hazards, hazardous situations and events arising during assembly, erection, operation and servicing relevant to high pressure water jet machines, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4). All references to high pressure water jet machines within this document includes machines for one or more of the following industrial applications:

- cleaning;
- surface preparation;
- material removal;
- readjustment of concrete;
- cutting.

This document applies to mobile and fixed high pressure water jet machines, in which the water pressure is generated by a pressure generator/pump and in which the maximum allowable working pressure is more than the upper limit fixed in the scope of EN 60335-2-79.

NOTE 1 35 MPa (350 bar) is currently the upper limit for machines covered by EN 60335-2-79.

NOTE 2 In general the machines in the scope will not be in the scope of the Pressure Equipment Directive 97/23/EC. In some cases, specific parts may be in the scope of that directive, but their application is not dealt with in this document.

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This document does not apply to high pressure cleaners which are dealt with in EN 60335-2-54 and EN 60335-2-79.

NOTE 3 EN 60335-2-54 applies to steam cleaners for household use. EN 60335-2-79 applies to high pressure cleaners having a rated pressure not less than 2,5 MPa and not exceeding 35 MPa, as well as steam cleaners and those parts of hot water high pressure cleaners incorporating a steam stage which have a capacity not exceeding 100 l, a rated pressure not exceeding 2,5 MPa and a product of capacity and rated pressure not exceeding 5 MPa.l.

This document does not cover additional hazards due to the incorporation of high pressure water jet machines into other process-technology machines.

This document does not cover specific hazards associated with explosive atmospheres, use on ships or ambient temperatures outside the range 5 °C to 40 °C.

This document does not cover hazards associated with the drives or specific hazards due to any heat generation function. However the hazards due to high temperatures of touchable surfaces are dealt with.

Any hazard due to the nature of liquids used for jetting, other than that due to pressure, is excluded from the scope of this European Standard.

This document is not applicable to high pressure water jet machines which are manufactured before the date of its publication as EN.

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 614-1, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 809, *Pumps and pump units for liquids — Common safety requirements*

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

EN 981, *Safety of machinery — System of auditory and visual danger and information signals*

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

EN 1829-2, *High-pressure water jet machines — Safety requirements — Part 2: Hoses, hose lines and connectors*

EN 12162, *Liquid pumps — Safety requirements — Procedure for hydrostatic testing*

EN 12723:2000, *Liquid pumps — General terms for pumps and installations — Definitions, quantities, letter symbols and units*

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

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

EN 61310-2, *Safety of machinery — Indication, marking and actuation — Part 2: Requirements for marking (IEC 61310-2:2007)*

EN 60335-2-79:2004, *Household and similar electrical appliances — Safety — Part 2-79: Particular requirements for high pressure cleaners and steam cleaners (IEC 60335-2-79:2002, modified)*

EN ISO 3743-1, *Acoustics — Determination of sound power levels of noise sources — Engineering method for small, movable sources in reverberant fields - Part 1: Comparison method for hard-walled test rooms (ISO 3743-1:1994)*

EN ISO 3744, *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 11203:1995, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions from the sound power level (ISO 11203:1995)*

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)*

EN ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

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EN ISO 13857, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

ISO 7010:2003, *Graphical symbols — Safety colours and safety signs — Safety signs used in workplaces and public areas*

3 Terms and definitions

For the purposes of this document, the definitions given in EN ISO 12100-1:2003, EN 12723:2000 and the following apply.

3.1**high pressure water jet machine**

machine with nozzle or other variable opening which allows water at high pressure together with any additive (chemical and/or abrasive) to emerge as a free jet

NOTE In general, high pressure water jet machines consist of a drive, a pressure generator, pipelines, hose lines, spraying devices, safety devices, control and measurement devices.

3.2**program controlled high pressure water jet machine**

machine characterised by spatial separation of the installation site of the pressure generator and the workplace, by permanently installed high pressure lines between the installation site and one or more workplaces having spraying devices incorporating start-up/shut-down of the system by means of external switching mechanisms not activated by the operator of a spraying device

NOTE In this context, the activation device of the spraying device is not considered to be a switching mechanism.

3.3**drive**

power unit consisting of electric motors, combustion engines, hydraulic motors, or air motors depending on the application

3.4**pressure generator**

unit to generate operating pressure and supply cleaning agent to the spraying device (e.g. pump, intensifier)

3.5**high pressure line**

pipeline or hose line in which the high pressure water is fed to the point of use

3.6**pipeline**

pipe which is permanently fixed and operationally connected to pipe fittings or valves

3.7**hose**

flexible, tubular semi-finished product consisting of several layers and inserts

NOTE Hoses and hose lines are covered within part 2 of EN 1829.

3.8**hose line**

hose mounted with appropriate fittings

NOTE Hoses and hose lines are covered within part 2 of EN 1829.

3.9 spraying device

3.9.1 general

spraying device consisting of the activation devices, the spraying pipe, extension pipe or nozzle pipe as well as the nozzle.

NOTE This also includes foot switches, foot valves with hose lines and spraying lances, spraying heads and nozzle mounts

3.9.2 hand-held spraying device

spraying device of which the recoil force is to be absorbed by the person activating the spraying device

NOTE The activation mechanism can be separated from the spraying device for operating reasons in the form of a foot switch (e.g. for spraying lances).

3.9.3 mechanically operated spraying device

spraying device of which the recoil force is absorbed by a mechanical restraint

3.10 activation device

3.10.1 dry shut-off device

device for hand-held spraying devices by which the feed of liquid to the high pressure nozzle is actuated by opening or shutting a valve

NOTE When shut no liquid exits the nozzle.
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 https://standards.itih.at/catalog/standards/sist/41a84c1b-bff4-4eb7-aa2b-53d686350401/sist-en-1829-1-2010](https://standards.itih.at/catalog/standards/sist/41a84c1b-bff4-4eb7-aa2b-53d686350401/sist-en-1829-1-2010)

3.10.2 dump device

device for hand-held spraying devices where by opening or shutting of a valve the feed of liquid is directed to a bypass pipe by which the generated pressure is limited by the means of the larger bypass nozzle while the pipe to the high pressure nozzle is kept open

3.10.3 dump gun

hand-held spraying device in which the dump device is incorporated

3.11 safety device

device that automatically prevents any relevant critical parameter such as pressure or temperature being exceeded

3.12 rated outlet pressure

pressure that occurs at the pressure generator for the volume flow and nozzle size specified by the manufacturer

3.13 maximum allowable working pressure

pressure up to which the machine is functional and at which the machine may safely be run

3.14 operating temperature of the liquid

temperature of the liquid at any specified point

EN 1829-1:2010 (E)**3.15****retooling**

modification of the machines performance by using alternative components (e.g. replacement inserts and alternative nozzles)

3.16**replacement inserts**

changeable installation to a pressure generator, with pistons/plungers/seals/safety valves for different diameters resulting in different displacements and pressures

3.17**pulsation damper**

device to diminish the amplitude of pressure pulsations

3.18**test pressure**

gauge pressure to which a part, component or pump is subjected for the purpose of strength or leak testing

3.19**cleaning agent**

water with or without the addition of gaseous, soluble or miscible detergent or solid abrasive

4 List of significant hazards

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4.1 General

This clause contains all the significant hazards, hazardous situations and events within the scope of this European Standard, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk.

4.2 Hazards from the intended exit of water under high pressure

The jet of water leaving the nozzle of a high pressure water jet machine is a hazard; by the abrasive cutting effect, by intruding into objects or by swinging or deflecting the high pressure water jet nozzle and hose.

4.3 Mechanical hazards**4.3.1 General**

The components of a high pressure water jet machine together constitute a system under internal pressure. Mechanical hazards can arise, for example, from uncontrolled escape of pressurised water – except from the nozzle – due to pressure exceeding the working values or due to defects to pressure-retaining parts.

4.3.2 Spraying devices**4.3.2.1 Hazards from hand-held spraying devices**

In particular, there is a mechanical hazard associated with hand-held spraying devices due to the recoil forces caused by the emerging water jet. Unintended or high frequency activation of the mechanism may cause other hazards.