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

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

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 197.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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Contents

European foreword

This document (prEN 1829-1:2018) has been prepared by Technical Committee CEN/TC 197 "Pumps", the secretariat of which is held by AFNOR.

This document is currently submitted to the enquiry.

This document will supersede EN 1829-1:2010.

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*

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

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.

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 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.

1 Scope

This document 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 2014/68/EU. In some cases, specific parts may be in the scope of that directive, but their application is not dealt with in this document.

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 document.

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

Tests according to this standard are type tests.

NOTE 4 Routine tests are described in Annex D.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 614-1:2006, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 809:1998+A1:2009, *Pumps and pump units for liquids - Common safety requirements*

EN 953:1997+A1:2009, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 981:1996+A1, *2008*Safety of machinery — System of auditory and visual danger and information signals

EN 1088:1995+A2:2008, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN 12162:2001+A1:2009, *Liquid pumps - Safety requirements - Procedure for hydrostatic testing*

EN 60204-1:2006, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code)*

EN ISO 3743-1:2010, *Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for small movable sources in reverberant fields - Part 1: Comparison method for a hard-walled test room (ISO 3743-1:2010)*

EN ISO 3744:2010, *Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 4871:2009, *Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

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

EN ISO 11203:2009, *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 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13732-1:2008, *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 13849-1:2015, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2015)*

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

3 Terms and definitions

For the purposes of this document, the definitions given in EN ISO 12100, EN 12723 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

• IEC Electropedia: available at http://www.electropedia.org/

• ISO Online browsing platform: available at http://www.iso.org/obp

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 1 to entry: 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 1 to entry: 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 1 to entry: Hoses and hose lines are covered within part 2 of EN 1829.

3.8
hose line
hose mounted with appropriate fittings

Note 1 to entry: 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 1 to entry: 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 1 to entry: 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 1 to entry: When shut no liquid exits the nozzle.

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
maximum allowable working pressure
pressure without consideration of the pressure peaks in the system up to which the machine is functional and at which the machine may safely be run

3.13
operating temperature of the liquid
temperature of the liquid at any specified point

3.14
retooling
modification of the machines performance by using alternative components (e.g. replacement inserts and alternative nozzles)

3.15
replacement inserts
changeable installation to a pressure generator, with pistons/plungers/seals/safety valves for different diameters resulting in different displacements and pressures

3.16
pulsation damper
device to diminish the amplitude of pressure pulsations

3.17
test pressure
gauge pressure to which a part, component or pump is subjected for the purpose of strength or leak testing

3.18
cleaning agent
water with or without the addition of gaseous, soluble or miscible detergent or solid abrasive

3.19
two hand device
device requiring at least simultaneous operation by both hands in order to activate and use the high-pressure operation of the machine

3.20
safety pressure
pressure at which the safety device of the system must activate

4 List of significant hazards

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.