SLOVENSKI STANDARD
SIST EN 15268:2009

01-marec-2009

Bencinske črpalke - Varnostne zahteve za konstruiranje sklopov potopnih črpalk

Petrol filling stations - Safety requirements for the construction of submersible pump assemblies

Tankstellen - Sicherheitstechnische Anforderungen an die Bauweise von Tauchpumpen-Baugruppen

Stations-service - Prescriptions de sécurité pour la construction des assemblages de pompes immergées

Ta slovenski standard je istoveten z: **EN 15268:2008**

ICS:

23.080	Črpalke	Pumps
75.200	Oprema za skladiščenje nafte, naftnih proizvodov in zemeljskega plina	Petroleum products and natural gas handling equipment

SIST EN 15268:2009 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15268

September 2008

ICS 75.200

English Version

Petrol filling stations - Safety requirements for the construction of submersible pump assemblies

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Ref. No. EN 15268:2008: E

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Foreword

This document (EN 15268:2008) has been prepared by Technical Committee CEN/TC 221 “Shop fabricated metallic tanks and equipment for storage tanks and for stations”, 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of an identical text or by endorsement, at the latest by March 2009, and conflicting national standards shall be withdrawn at the latest by March 2009.

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Introduction

This document is a type C standard as stated in EN ISO 12100-1.

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 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 the type C standard.

1 Scope

This European Standard applies to submersible pump assemblies intended for use with dispensers installed at petrol filling stations and used to dispense liquid fuels in accordance with EN 228 and EN 590 into tanks of motor vehicles, light aircrafts, boats and portable containers. The submersible pump assemblies are intended for use and storage at ambient temperatures between –20 °C and +40 °C.

Additional measures can be required for use and storage at temperatures outside this range and are subject to negotiation between the manufacturer and purchaser.

This European Standard specifies requirements for equipment with a maximum working pressure not exceeding 350 kPa (3,5 bar), power consumption not exceeding 7 KW and a maximum power supply voltage of 500 V.

This European Standard specifies requirements for submersible pump assemblies of classes IIA T3 (explosion group IIA and temperature class T3) and IIB T4 (explosion group IIB and temperature class T4) using liquid fuels.

This European Standard deals with all significant hazards, hazardous situations and events relevant to submersible pump assemblies, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4).

This European Standard specifies safety requirements for design, installation, commissioning, use and maintenance.

Noise is not considered a significant hazard for the equipment in the scope of this European Standard.

This European Standard does not cover requirements for mobile equipment.

NOTE 1 For other fuels than those in accordance with EN 228 and EN 590 a manufacturer should consider the need for extra measures (dealing with possible additional or different hazards).

NOTE 2 This European Standard does not include any requirements for metering performance such as may be specified for the EU under the Measuring Instruments Directive nor those specified under the Electromagnetic Compatibility Directive.

NOTE 3 Liquified Petroleum Gas (LPG) is not a liquid in the sense of this document.

This European Standard is not applicable to submersible pump assemblies that 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 228, *Automotive fuels — Unleaded petrol — Requirements and test methods*

EN 590, *Automotive fuels — Diesel — Requirements and test methods*

EN 13463-1:2001, *Non-electrical equipment for potentially explosive atmospheres — Part 1: Basic method and requirements*

EN 13463-6, *Non-electrical equipment for use in potentially explosive atmospheres — Part 6: Protection by control of ignition source "b"*

EN 13617-1:2004, *Petrol filling stations — Part 1: Safety requirements for construction and performance of metering pumps, dispensers and remote pumping units*

prEN 50495:2006-08, *Safety devices required for the safe functioning of equipment with respect to explosion risks*

EN 60034-1, *Rotating electrical machines — Part 1: Rating and performance (IEC 60034-1:2004)*

EN 60079-0, *Electrical apparatus for explosive gas atmospheres — Part 0: General requirements (IEC 60079-0:2004, modified)*

EN 60079-7, *Explosive atmospheres - Part 7: Equipment protection by increased safety "e" (IEC 60079-7:2006)*

EN 60079-14, *Electrical apparatus for explosive gas atmospheres — Part 14: Electrical installations in hazardous areas (other than mines) (IEC 60079-14:2002)*

EN 60079-15:2005, *Electrical apparatus for explosive gas atmospheres — Part 15: Construction, test and marking of type of protection "n" electrical apparatus (IEC 60079-15:2005)*

EN 60079-26, *Explosive atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga (IEC 60079-26:2006)*

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

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)*

ISO 1817, *Rubber, vulcanized — Determination of the effect of liquids*

HD 21.13 S1, *Polyvinyl chloride insulated cables of rated voltage up to and including 450/750V — Part 13: Oil resistant PVC sheathed cables with two or more conductors*

HD 22.4 S4, *Cables of rated voltages up to and including 450/750 V and having crosslinked insulation — Part 4: Cords and flexible cables*

3 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
submersible pump assembly
comprises the manifold assembly, the fixed or adjustable column pipe assembly and the submersible pumping unit

3.2
column pipe assembly
means by which the manifold assembly is connected to the submersible pumping unit and which consists of product pipe and electrical conduit

3.3
adjustable length column pipe assembly
means by which the manifold assembly is connected to the submersible pumping unit and which consists of product pipe and electrical conduit with telescopic coupling

3.4
manifold assembly
subsystem that provides for external mechanical, hydraulic and electrical connections

3.5
submersible pumping unit
subsystem including motor and hydraulic system whose inlet is designed to be submerged beneath the fuel level in a storage tank and supply the pumping pressure

3.6
liquid exposure
where the internal spaces of the submersible pumping unit and column pipe assembly of both electrical and non-electrical components have no explosive atmosphere as these spaces are filled with fuel

3.7
liquid cover (immersion depth)
height of the liquid level above the inlet of the submersible pump assembly

4 List of significant hazards

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 this type of machinery and which require action to eliminate or reduce the risk.

Table 1 — List of significant hazards

Hazards according to EN 1050:1996, Annex A		Significant hazards, danger zones, hazardous situations or events, associated with the covered machinery	Safety requirement
No.	**Type of hazard**	**–**	**Clause no.**
1	**Mechanical hazards** due to: — machine parts or work pieces, e.g.: c) mass and stability (potential energy of elements which may move under the effect of gravity); e) inadequacy of mechanical strength.	Pump falling into the tank	5.4; 5.5
2	**Electrical hazards** due to:	–	–
2.1	contact of persons with live parts (direct contact)	Electrical components, e.g. motors, solenoid valves, control systems, lighting	5.1.2; 5.3
2.2	contact of persons with parts which have become live under faulty conditions (indirect contact)	Electrical components, e.g. motors, solenoid valves, control systems, lighting	5.1.2; 5.3
2.4	electrostatic phenomena	Ignition of vapour	5.2.1; 5.3.2; 5.3.3
3	**Thermal hazards,** resulting in:	–	–
3.1	burns and other injuries by possible explosions	Ignition of possible explosive atmosphere by electrical or non-electrical parts or electrical charge	5.3.1; 5.3.2; 5.3.4; 5.3.5; 5.6

Table 1 *(continued)*

Hazards according to EN 1050:1996, Annex A		Significant hazards, danger zones, hazardous situations or events, associated with the covered machinery	Safety requirement
No.	**Type of hazard**	**–**	**Clause no.**
7	**Hazards generated by materials and substances** (and their constituent elements) processed or used by the machinery	–	–
7.1	Hazards from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts	Exposure to fuel	5.1.3; 5.2.1; 5.2.2; 5.2.3; 5.7
7.2	Fire or explosion hazard	Electrical and non-electrical parts	5.1; 5.3; 5.6; 5.7
10	**Unexpected start-up, unexpected overrun/overspeed** (or any similar malfunction) from:	–	–
10.1	Failure/disorder of the control system	Unexpected liquid flow	5.1.2
10.2	Restoration of energy supply after an interruption	Unexpected liquid flow	5.1.2
10.3	External influences on electrical equipment	Unexpected liquid flow	5.1.2
10.6	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities)	Unexpected liquid flow	5.1.2; 7.2; 7.3
11	**Impossibility of stopping the machine in the best possible conditions**	Unexpected liquid flow	5.1.2; 7.2
13	**Failure of the power supply**	Unexpected liquid flow	5.1.2
14	**Failure of the control circuit**	Unexpected liquid flow	5.1.2
15	**Errors of fitting**	Leakage	7.2; 7.3
16	**Break-up during operation**	Leakage	5.2; 5.4; 5.7

5 Safety requirements and/or protective measures

5.1 General

5.1.1 Submersible pump assemblies and components 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 12100-1 and -2 for hazards relevant but not significant, which are not dealt with by this European Standard (e.g. sharp edges).

NOTE For hazards which are to be reduced by the application of a B-level standard or analogous standards such as EN 13463-1, EN 60730-2-10, EN 60529 and EN 60204-1, the manufacturer should carry out a risk assessment to establish the requirements of the B-standard. This specific risk assessment is part of the general risk assessment of the machine.

5.1.2 Electrical equipment of submersible pump assemblies shall conform to EN 60204-1. The electrical motor shall conform to the requirements of EN 60034-1. The earth bonding of connecting parts shall be mounted in such a way that there is no dangerous electric potential difference. If necessary, connectors for earth bonding shall be foreseen.

NOTE Additional information on the application of converter-fed motors can be found in CLC/TS 60034-17. Major concerns include over-temperature high frequency and overvoltage effects as well as bearing currents. The expression "electrically in contact" does not necessarily involve the use of a conductor.

Aspects to be considered during installation are listed in Clause 7.

5.1.3 The submersible pump assembly shall be designed and constructed to ensure that there is no leakage during normal operating conditions.

5.2 Components

5.2.1 All parts exposed to the effects of the fuel or fuel vapour shall be constructed of materials compatible with the fuel they are intended to pump. They shall be chemically and dimensionally stable and resistant to attack by vapour and liquid fuel.

5.2.2 Submersible pump assemblies connected to pressurised piping shall have a pressure relief device that limits the maximum pressure to 350 kPa (3,5 bar).

5.2.3 All pressurized parts of submersible pump assemblies shall be designed and constructed for the maximum working pressure for which they are intended.

5.3 Requirements for explosion prevention and protection of equipment and components

5.3.1 In accordance with EN 13463-1:2001, 5.2, the submersible pump assembly and all parts of it shall be subjected to a formal documented hazard analysis that identifies and lists all of the potential sources of ignition by the submersible pump assembly and the measures to be applied to prevent them from becoming effective.

5.3.2 Capacitors used in the submersible pump assembly shall be designed to be discharged to an energy level of 0,2 mJ or below within a maximum of 10 s after disconnection of the submersible pump assembly.

5.3.3 Parts of the equipment exposed to a potentially explosive atmosphere and susceptible to electrostatic charge shall comply with EN 13463-1:2001, 7.4.

NOTE Further guidance on this topic is given in CLC/TR 50404.

5.3.4 The external junction box shall meet requirements for equipment category 2.

5.3.5 Plugs and sockets and similar connectors for internal connections in ignition capable circuits shall be deemed to be normally sparking unless they require a separating force of at least 15 N or they are prevented by mechanical means from loosening or separating (EN 60079-15:2005, 20.3).

Terminals shall be so designed that after proper connection of the conductors, the creepage distances and the clearances comply with the requirements of EN 60079-7.

Connection facilities shall accommodate at least the size of conductor appropriate to the rated current of the apparatus. Connections within electrical apparatus and forming an integral part of that apparatus shall not be subject to undue mechanical stress. Only the following means for the connection of conductors are permitted: