



# SLOVENSKI STANDARD

## oSIST prEN 17451:2022

01-december-2022

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**Vgrajene naprave za gašenje - Avtomatski sprinklerski sistemi - Projektiranje, montaža, vgradnja in preverjanje črpalk**

Fixed firefighting systems — Automatic sprinkler systems — Design, assembly, installation and commissioning of pump sets

Ortsfeste Brandbekämpfungsanlagen - Automatische Sprinkleranlagen - Projektierung, Zusammenstellung, Montage und Inbetriebnahme von Pumpenaggregaten

Installations fixes de lutte contre l'incendie - Systèmes d'extinction automatique de type sprinkleur - Conception, assemblage, installation et mise en service des groupes motopompes

**Ta slovenski standard je istoveten z: prEN 17451**

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**ICS:**

13.220.10      Gašenje požara      Fire-fighting

**oSIST prEN 17451:2022**      **en,fr,de**



EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 17451**

October 2022

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ICS 13.220.20

English Version

## Fixed firefighting systems - Automatic sprinkler systems - Design, assembly, installation and commissioning of pump sets

Installations fixes de lutte contre l'incendie - Systèmes  
d'extinction automatique de type sprinkleur -  
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Ortsfeste Brandbekämpfungsanlagen - Automatische  
Sprinkleranlagen - Projektierung, Zusammenstellung,  
Montage und Inbetriebnahme von Pumpenaggregaten

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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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**prEN 17451:2022 (E)****European foreword**

This document (prEN 17451:2022) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document is related to the following European standards:

CEN/TS 14816, *Fixed firefighting systems - Water spray systems - Design, installation and maintenance*;

CEN/TS 17551, *Fixed firefighting systems — Automatic sprinkler systems — Guidance for earthquake bracing*;

EN 671 (all parts), *Fixed firefighting systems - Hose systems*;

EN 12094 (all parts), *Fixed firefighting systems - Components for gas extinguishing systems*;

EN 12101 (all parts), *Smoke and heat control systems*;

EN 12259 (all parts), *Fixed firefighting systems - Components for sprinkler and water spray systems*;

EN 12416 (all parts), *Fixed firefighting systems - Powder systems*;

EN 12845 (all parts), *Fixed firefighting systems — Automatic sprinkler systems*;

EN 13565 (all parts), *Fixed firefighting systems - Foam systems*;

EN 14972 (all parts), *Fixed firefighting systems - Water mist systems*;

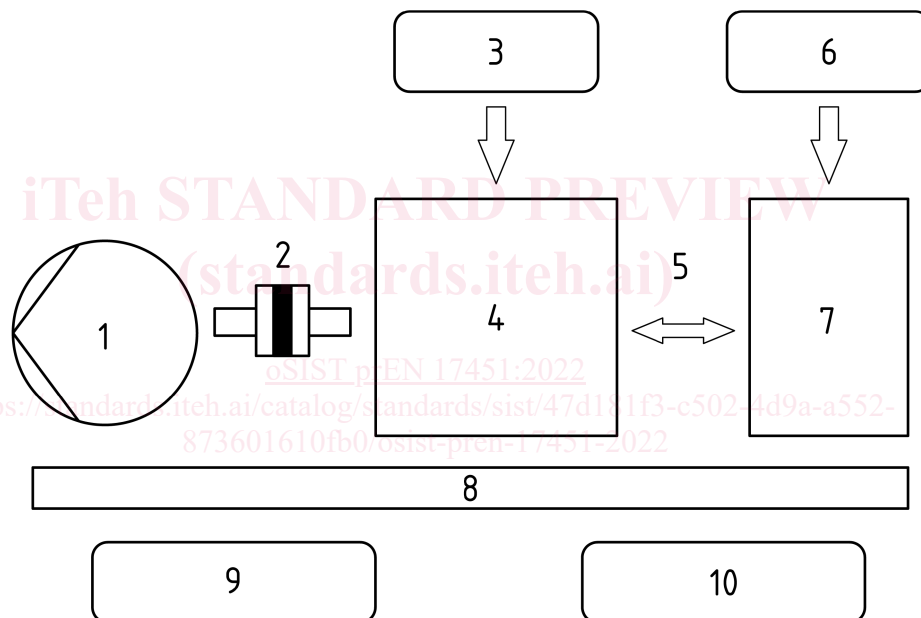
<https://standards.iteh.ai/catalog/standards/sist/47d181f3-c502-4d9a-a552-873601610fb0/osist-pren-17451-2022>

## Introduction

This document covers:

- the design and assembly of the pump set in accordance to the requirements of EN 12845 (all parts);
- identification of essential pump set components;
- the performance characteristics for components used within a pump set;
- performance testing requirements for diesel and electric driven pump sets;
- site testing, commissioning and handover;
- documentation.

Figure 1 identifies the typical pump set components covered by this standard.



### Key

- |   |                 |    |  |
|---|-----------------|----|--|
| 1 | pump            | 6  | pressure loss detection                    |
| 2 | coupling        | 7  | pump set control panel                     |
| 3 | fuel for diesel | 8  | frame                                      |
| 4 | driver          | 9  | test system                                |
| 5 | wiring          | 10 | auxiliary items : exhaust and cooling pipe |

**Figure 1 — Example of a typical pump set assembly for a diesel driven unit**

**prEN 17451:2022 (E)****1 Scope**

This document specifies design, assembly, installation and commissioning requirements for pump sets for use in sprinkler systems conforming to EN 12845 (all parts).

Where applicable, this standard can also be used for pump sets for other water based fixed firefighting systems.

**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 12259-5:2002, *Fixed firefighting systems - Components for sprinkler and water spray systems - Part 5: Water flow detectors*

prEN 12259-12:—,<sup>1</sup> *Fixed firefighting systems — Components for sprinkler and water spray systems — Part 12: Pumps*

prEN 12845 (all parts), *Fixed firefighting systems — Automatic sprinkler systems*

EN 50342-1, *Lead-acid starter batteries - Part 1: General requirements and methods of test*

EN 50342-2, *Lead-acid starter batteries — Part 2: Dimensions of batteries and marking of terminals*

EN 60529:1992+A2:2013, *Degrees of protection provided by enclosures (IP Code)*

EN 60623, *Secondary cells and batteries containing alkaline or other non-acid electrolytes - Vented nickel-cadmium prismatic rechargeable single cells*

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

EN IEC 60947-1, *Low-voltage switchgear and controlgear - Part 1: General rules*

EN IEC 60947-3, *Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

EN IEC 60947-4-1:2019, *Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters*

ISO 281, *Rolling bearings — Dynamic load ratings and rating life*

ISO 3046-1, *Reciprocating internal combustion engines — Performance — Part 1: Declarations of power, fuel and lubricating oil consumptions, and test methods — Additional requirements for engines for general use*

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<sup>1</sup> Under preparation. Stage at the time of publication: prEN 12259-12:2022



### 3 Terms, definitions, symbols and abbreviated terms

#### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 12845 (all parts) and the following apply.

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

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

##### 3.1.1

##### **assembly**

design, production and testing of the pump set

##### 3.1.2

##### **installation**

mounting and commissioning of the pump set in accordance with the pump set manufacturer's installation manual and procedures

##### 3.1.3

##### **maintenance**

work performed to keep pump sets operable including repairs where required

##### 3.1.4

##### **pump set**

assembled machine which is intended to supply water to automatic sprinkler, water spray and wet riser systems, comprising at least a pump, electric motor or diesel engine, control panel, partial wiring loom, drive coupling, mounting frame, baseplate and where required fuel tank

##### 3.1.5

##### **pump set installer**

entity who is responsible for integrating the fire pump set into the sprinkler system in accordance with the pump set manufacturer installation manual and procedures

##### 3.1.6

##### **pump set manufacturer**

entity responsible for the design, assembly and build of the pump set

##### 3.1.7

##### **fail-safe elastomeric coupling**

claw coupling

flexible coupling

integrated unit which provides power transmission, damping and flexibility from the driver to the pump, designed so that the wear or failure of the elastomeric components of the coupling does not interrupt the transmission of full torque from the driver to the pump

##### 3.1.8

##### **universal drive shaft**

gimbal coupling

integrated unit which provides power transmission and flexibility from diesel engines or electric motors to fire pumps that supply water to fire protection systems

**prEN 17451:2022 (E)****3.1.9****rigid coupling**

component without flexibility which provides power transmission from diesel engines or electric motors to fire pumps that supply water to fire protection systems

**3.1.10****all elastomeric coupling****plastic coupling**

coupling that relies solely on an elastomeric material for power transmission

**3.1.11****electric motor service factor**

design margin to account for higher torque loadings which can be encountered under certain operating conditions

**3.1.12****coupling safety factor**

safety margin specified by coupling manufacturers to address uncertainties in design

NOTE 1 to entry: See 5.2.

NOTE 2 to entry: The abbreviation for coupling safety factor is *SF<sub>k</sub>*.

**3.1.13****authority**

organizations responsible in the jurisdiction of use for accepting fire protection systems, equipment and procedures

EXAMPLE Fire and building control authorities, fire insurers, local water authority or other appropriate public authorities.

**3.1.14****coupling**

device to transmit torque and power from the driver to the pump

**3.1.15****pressure sensor**

element which generates an electrical signal that is transmitted to the pump set control panel according to the pressure at the point where it is hydraulically connected

**3.1.16****spacer coupling**

cylindrical shaped piece introduced between the pump shaft coupling hub and motor shaft coupling hub, giving enough space to remove the pump mechanical seal when doing maintenance, without moving either the pump body or the driver

### 3.2 Symbols and abbreviated terms

For the purposes of this document, the following symbols and abbreviated terms apply.

$L_{10}$	basic rating life	time by which ten percent of a population of a product will have failed (see ISO 281 rolling bearings)
ECM		electronic fuel management control
EMC		electromagnetic compatibility
EMF		electromagnetic fields
FLC		full load current
FLT		full load torque
IFN		numerical value of the fuel stop power taken as the maximum IFN value in accordance to ISO 3046-1 for the driver, expressed in kilowatt
LRC		locked rotor current
NPSHr		net positive suction head required
NPSHa		net positive suction head available
Pdm		power distribution module
<i>SFk</i>		coupling safety factor
VFD		variable frequency drive
IP		ingress protection, degree of protection rating as per EN 60529 classifications

## 4 Performance of pump set

### 4.1 General design principles

The design details covered in this clause address the general principles which shall be considered for all pump set designs covered by this document. The design of pump set shall be based on the following information provided to the pump set manufacturer:

- pressure-flow demand characteristics (including any required design margins);
- maximum possible suction pressure at pump suction flange;
- NPSHa at low water level in the water storage tank measured at the pump suction flange at the maximum possible demand flow including 1 m safety margin;
- duration of operation (e.g. for fuel tank sizing; see 4.4);
- driver type (electric or diesel);
- applicable fixed firefighting system design specification: EN 12845 (all parts);
- hazard classification according to EN 12845 (all parts);
- water quality (potable, sea or filtered) description as defined in EN 12845 (all parts);
- voltage available;

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- current available;
- starting method;
- type of earthing system;
- altitude of the installation;
- climatic zone with temperature and humidity;
- earthquake classification area.

**4.2 Components****4.2.1 Connections**

All service interface connection requirements (e.g. water, air, power or signal) shall be provided as part of the installation instructions to enable the correct installation of the pump set on-site. The connections shall be easily accessible and located in accordance with EN 12845 (all parts).

Pipes shall be supported independently of the pump.

**4.2.2 Pumps and pump driver sizing**

Pumps shall be in accordance with EN 12259-12 and shall be driven either by electric motors or diesel engines, capable of providing at least the power required to comply with the following, plus the safety margin as described for electrical motors and diesel engines respectively in Clause 8 and 9:

- a) for pumps with non-overloading power characteristic curves, the maximum power required at the peak of the power curve; or,
- b) for pumps with rising power characteristic curves, the maximum power for any conditions of pump load, from zero flow to a flow corresponding to a pump NPSHr equal to 16 m or maximum suction static head plus 11 m, whichever is greater.

NOTE 16 m was derived from atmospheric pressure (9,98 m atmospheric) plus 6 m (equals 16 m NPSHa), ignoring frictional losses. Typical tank height, at the time the requirement was written, was considered to be 6 m. The 11 m was later added to cater for higher suction pressure scenarios (e.g. 5 bar inlet pressure) to ensure the drive was also sized correctly in that scenario.

**4.3 Cooling and by-pass flow**

Arrangements, such as by-pass flows, shall be made to ensure a continuous flow of water through the pump sufficient to prevent overheating when it is operating against a closed valve (this minimum required flow rate is determined by requirements of prEN 12259-12:2022, 4.2).

The by-pass system can also be required to maintain the operational temperature of the diesel drivers. Any additional flow requirements above that required by EN 12259-12, shall be specified by the pump set manufacturer and shall also be included in the total cooling flow requirement.

Any cooling system pressure regulating devices shall be provided by the pump set manufacturer.

The by-pass flow shall be taken into account in the fixed firefighting system hydraulic calculation and pump selection. This additional flow shall be provided in addition to the fixed firefighting system flow figures.

Cooling water shall be taken from the sprinkler system water supply. The complete by-pass system may or may not be supplied as a component of the pump set, as parts of the by-pass system may be part of the wider system pipework installation in a manner similar to the supply of electrical cabling.

#### 4.4 Fuel tank design

The fuel tank capacity shall be sufficient to enable the engine to run on full load, in the most unfavourable atmospheric and environmental conditions, for the required period of duty. Minimum period of duty values, are:

- 3 h for LH;
- 4 h for OH / FH1 to FH2;
- 6 h for HHP and HHS / FH3 to FH 5 or HHS1 to HHS 5.

These may be increased if required by the client specification. The design, installation and maintenance of the fuel and fluid systems shall be fully compliant with the local safety and environmental requirements.

The fuel tank shall be of welded steel. Where there is more than one engine, there shall be a separate fuel tank and fuel feed pipe for each one.

The fuel tank shall be fixed at a higher level than the engine's fuel pump to ensure a positive head, but not directly above the engine. Where the tank cannot be installed on the same baseplate or mounting frame as the pump set unit the fuel lines shall be kept to a minimum length, and installation parameters (e.g. minimum and maximum height of tank relative to pump set) shall be specified by the pump set manufacturer.

The fuel tank shall have a fuel level gauge and communicate with the pump set control panel to enable low fuel level alarms. Where required, specification fuel leak monitoring functionality shall be provided.

Any valves in fuel feed pipe between the fuel tank and the engine shall be sited on or near the fuel tank. They shall not be located on or near the engine. They shall have an indicator and be locked in the open position and electrically monitored. Fuel feed pipe joints shall not be soldered. Metallic pipes and steel hoses shall be used for fuel lines.

The feed pipe shall be situated at least 20 mm above the bottom of the fuel tank. A drain valve of at least DN 20 diameter shall be fitted to the base of the tank.

The pump set manufacturer shall provide suitable connection to allow the fuel tank vent to be terminated outside the building.

#### 4.5 Fuel, lubricating oil and coolant quality

The diesel fire pump driver manufacturer shall specify the required fuel (e.g. as specified in EN 590), lubricating oil and coolant characteristics.

Fuel tanks shall be marked with required fuel grade.

Fuel oils used in diesel engines can be subject to detrimental effects from prolonged storage. Therefore, it is recommended that a proper maintenance schedule is put into place to ensure the fuel remains suitable for engine operation, efficiency, and longevity.

#### 4.6 Speed of rotation

The nominal driver speed shall not exceed  $3\,600\text{ min}^{-1}$ .