



Institut luxembourgeois de la normalisation
de l'accréditation, de la sécurité et qualité
des produits et services

ILNAS-EN 12259-12:2023

Fixed firefighting systems - Components for sprinkler and water spray systems - Part 12: Pumps

Installations fixes de lutte contre
l'incendie - Composants des systèmes
d'extinction du type sprinkleur et à
pulvérisation d'eau - Partie 12 : Pompes

Ortsfeste Brandbekämpfungsanlagen -
Bauteile für Sprinkler- und
Sprühwasseranlagen - Teil 12:
Sprinklerpumpen

09/2023



National Foreword

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ILNAS-EN 12259-12:2023

EUROPEAN STANDARD **EN 12259-12**

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2023

ICS 13.220.20

English Version

**Fixed firefighting systems - Components for sprinkler and
water spray systems - Part 12: Pumps**

Installations fixes de lutte contre l'incendie -
Composants des systèmes d'extinction du type
sprinkleur et à pulvérisation d'eau - Partie 12 : Pompes

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Sprinkler- und Sprühwasseranlagen - Teil 12:
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This European Standard was approved by CEN on 23 July 2023.

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European foreword

This document (EN 12259-12:2023) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by March 2024, and conflicting national standards shall be withdrawn at the latest by March 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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1 Scope

This document specifies requirements for single stage and multi-stage centrifugal pumps with mechanical seal or soft packing for use in automatic sprinkler systems and is for use with EN 12845 and EN 17451¹.

This document is applicable for the following pumps, independent of installed orientation (vertical, horizontal or sloped according to the manufacturer indications):

- end suction pumps (close coupled or long coupled) of the back pull-out type pump;
- axial horizontal split case pumps;
- ring section pumps including multistage single or multi outlet;
- single or multistage inline pumps (pump with inlet and outlet in line);
- submersible motor borehole pumps.

This document is also applicable to vertical turbine pumps.

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

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

EN 12845, *Fixed firefighting systems — Automatic sprinkler systems — Design, installation and maintenance*

EN ISO 9906:2012, *Rotodynamic pumps - Hydraulic performance acceptance tests - Grades 1, 2 and 3 (ISO 9906:2012)*

EN ISO 17769-1, *Liquid pumps and installation - General terms, definitions, quantities, letter symbols and units - Part 1: Liquid pumps (ISO 17769-1)*

ISO 3069:2000, *End-suction centrifugal pumps — Dimensions of cavities for mechanical seals and for soft packing*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12845, EN ISO 17769-1 and the following apply.

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

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

¹ Under preparation. Stage at the time of publication: prEN 17451.

3.1.1**back pull-out type pump**

centrifugal pump design type which allows the rotating assembly to be pulled out of the pump casing without having to remove the pump casing from the piping

3.2 Symbols and abbreviated terms

NPSH net positive suction head in m

NPSH_r net positive suction head required in m

Q_r rated flow of the pump in l/min when tested in accordance 4.1.1

NOTE It is determined from the flow of the pump to generate an NPSH_r of 8,5 m for vertical line shaft and submersible pumps or 5 m for all other pumps.

Q_0 zero flow condition in l/min (closed valve)

p_{allw} maximum allowable casing working pressure in bar

4 Assessment methods and criteria**4.1 Characteristic curves, minimum flow and rotational speed tests****4.1.1 Assessment method**

Pump characteristic curves shall be drawn for the rated speed condition. The highest flow to be shown in the curves shall be sufficient to demonstrate a non-overloading power characteristic or a flow corresponding to at least NPSH_r of 16 m.

In case of non-overloading power characteristic, all curves shall be shown including values which are minimum 15 % higher than the flow at the maximum power consumption.

The flow, power consumption, NPSH_r and the corresponding delivery head shall be determined in accordance with EN ISO 9906:2012, Grade 2. The measurement uncertainty as specified in EN ISO 9906:2012, Grade 2B shall be applied.

NOTE For examples, see Annex A.

Type tests and conversion of test data shall be undertaken using methods in accordance with EN ISO 9906:2012, Grade 2B and the tolerances given there.

Where there are a range of impeller diameters, tests shall include the maximum and minimum impeller diameters. Performance between tested impeller diameters can be interpolated in accordance with EN ISO 9906:2012, 6.2 for changes not exceeding ± 4 % in impeller diameter.

Inlet, outlet and threaded connections shall be in accordance with appropriate National, European or International Standards. Casing wear rings shall be fitted and shall be prevented from rotating.

The test data required for the purpose of evaluation in accordance with EN ISO 9906:2012, are established at a minimum of 7 points uniformly distributed between the lowest rate of flow and the highest rate of flow to be measured. The lowest rate of flow to be measured shall be between zero and the minimum by-pass flow. NPSH_r shall be determined for minimum and maximum impeller diameters and speeds at 5 points between $0,3 Q_r$ and the highest flow, where Q_r is the rated flow. The highest flow to be measured shall be sufficient to demonstrate a non-overloading power characteristic or a flow corresponding to at least NPSH_r of 16m.

Pump characteristic curve conversions for alternative drivers with speeds between the minimum and maximum tested speeds shall be converted using the formula (see also EN ISO 9906:2012, Clause 6):

$$\left(\text{NPSHr} \right)_T = \left(\text{NPSHr} \right) \left[\frac{n_{sp}}{n} \right]^x$$

where

NPSHr is the required NPSH in m;

$\left(\text{NPSHr} \right)_T$ is the corrected NPSHr in m for the specified speed n_{sp} ;

n is the speed of rotation in 1/min;

n_{sp} is the specified speed of rotation 1/min;

x is the conversion exponent according to manufacturer's specification.

The test to verify the validity of the above formula shall entail measuring the NPSHr value for the lowest and highest intended speed.

The test water temperature at the inlet to submersible motor driven pumps shall be 20 ± 5 °C. No motor cooling means shall be used.

Multistage pumps shall be tested in accordance with the minimum and maximum number of stages allowed by their design.

4.1.2 Criteria for rotational speed

The pump shall operate within the rotational speed limits declared by the manufacturer.

When tested in accordance with 4.1.1, the rated speed shall not exceed 3 600 1/min and the maximum allowable continuous speed shall be at least 105 % of the rated speed.

4.1.3 Criteria for characteristic curves

Pump shall have a stable characteristic curve $H(Q)$ within the measurement uncertainty range as specified in EN ISO 9906:2012, Grade 2B.

Between flows of zero-flow and Q_r the pump shall have a $H(Q)$ curve where the maximum head and zero-flow head (churn) are coincidental and the total head declines continuously with increasing rate of flow. It is permitted to have the zero-flow head (churn) max. 5 % or 0,5 bar (whichever is the lesser) below maximum head.

NOTE For examples, see Annex A.

Pumps shall be capable of supplying 140 % of Q_r flow at no less than 70 % of pressure at Q_r .

The criterion for NPSHr is 3 % drop in total differential head for the first stage of multi-stage pumps or for single-stage pumps as specified in EN ISO 9906:2012. The measurement uncertainty as specified in EN ISO 9906:2012, Grade 2B shall be applied.

The flow, power consumption, NPSHr and the corresponding total differential head of the pump shall be determined in accordance with EN ISO 9906:2012, Grade 2B.