



SLOVENSKI STANDARD
SIST EN 12162:2002

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Liquid pumps - Safety requirements - Procedure for hydrostatic testing

Liquid pumps - Safety requirements - Procedure for hydrostatic testing

Flüssigkeitspumpen - Sicherheitstechnische Anforderungen - Prozessverfahren für hydrostatische Druckprüfung

Pompes pour liquides - Exigences de sécurité - Procédure d'essai hydrostatique

Ta slovenski standard je istoveten z: EN 12162:2001

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ICS 23.080

English version

Liquid pumps - Safety requirements - Procedure for hydrostatic testing

Pompes pour liquides - Exigences de sécurité - Procédure
d'essai hydrostatique

Flüssigkeitspumpen - Sicherheitstechnische Anforderungen
- Prozessverfahren für hydrostatische Druckprüfung

This European Standard was approved by CEN on 18 January 2001.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by September 2001, and conflicting national standards shall be withdrawn at the latest by September 2001.

This European Standard 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.

Annex A is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

CEN have prepared a series of related machinery safety standards, some of which are to be harmonised European Standards, in order to implement the essential requirements for health and safety set down in the Supply of Machinery (Safety) Directive. This European Standard is one of this series and provides the procedure to be used for a specific verification requirement of EN 809.

The subject of this European Standard is the proving of the integrity of pump parts intended to withstand internal pressure. It refers, therefore, to the in-process testing of pump parts so that each item may be considered to have been examined.

This European standard is a type C standard as stated in EN 1070.

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1 Scope

This standard specifies the hydrostatic test procedure to be applied to pressure containing parts of all types of liquid pumps including any auxiliary equipment making up a pump unit as described in the scope of EN 809:1998, except :

- domestic water pumps within the scope of EN 60335-2-41:1996 or EN 60335-2-51:1997 ;
- domestic circulation pumps within the scope of EN 1151:1999 ;
- submersible pumps within the scope of prEN 13386:1998 ;
- fire-fighting pumps with primers within the scope of prEN 1028-1:1993 and prEN 1028-2:1993 ;
- pump parts with a maximum allowable working pressure below 0.1 bar.

Requirements are included for applying an hydrostatic test at different pressures to separate zones within a pump which are subject to different allowable maximum working pressures.

This standard is for pumps and pump units which are placed upon the market after the publication date of the standard.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

prEN 1028-1:1993, *Fire fighting pumps - Fire fighting centrifugal pumps with primer - Part 1 : Classification - General and safety requirements.*

prEN 1028-2:1993, *Fire fighting pumps - Fire fighting centrifugal pumps with primer - Part 2 : Classification - Verification of general and safety requirements.*

EN 1151:1999, *Rotodynamic pumps - Circulation pumps having an electrical effect not exceeding 200 W for heating installations and domestic hot water installations - Requirements, testing, marking.*

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

prEN 13386:1998, *Liquid pumps - Submersible pumps and pumps units for liquids - Particular safety requirements.*

EN 60335-2-41:1996, *Safety of household and similar electrical appliances - Part 2: Particular requirements for electric pumps for liquids having a temperature not exceeding 35 °C.*

EN 60335-2-51: 1997, *Safety of household and similar electrical appliances - Part 2: Particular requirements for stationary circulation pumps of heating and service water installations.*

3 Terms and definitions

For the purposes of this standard, EN 12723:2000 and the following definition apply:

"Item" or "items to be tested"

any part, component, sub-assembly, pump or pump units which is to be the subject of hydrostatic pressure test¹⁾

4 General

4.1 All pressure containing items shall be hydrostatically pressure tested. The purpose of this hydrostatic test is to demonstrate the absence of leakage through pressure containing walls of any item under test and from the joints formed by an assembly of items under test, by imposing a defined pressure in excess of the allowable working pressure for which the item is supplied.

4.2 This test procedure shall be applied to a sampling programme only where the manufacturer can show the validity of the sampling programme and that it is appropriate for the application.

An example of a sampling programme is given in annex A.

4.3 Pumps with double volutes, multiple stages, and otherwise with internal separating walls and to be tested segmentally shall have a hydrostatic pressure applied to each segment related to the operating conditions in the segment when the pump is working at its allowable working pressure.

4.4 Pressure containing chambers which function independently shall be tested separately without pressure being applied to any adjacent chamber.

4.5 To avoid excessive loads on crank-shafts in multiplex reciprocating pump assemblies those elements in the suction stage of the cycle shall be supported or disconnected from the crank-shaft.

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5 Timing of the test

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The manufacturer shall allow sufficient time during manufacture for the test and examination of all items within the scope of this standard. The test may be carried out on an individual item or on a sub-assembly as a group of items. Normally, the hydrostatic test is carried out :

- after completion of machining ;
- prior to the application of coatings, insulation, and overlays, (protection of raw parts against rust shall not be considered as a coating) ;
- following non-destructive testing, or after special leak tests below a gauge pressure of 0,5 bar
- on reciprocating positive displacement pumps, at the start of the performance test of the fully assembled pump.

¹⁾ A rotating mechanical seal assembled into a pump or into a separate sub-assembly, together with an end plate to connect the stationary elements of the seal to the stationary parts of the pump, will not be considered as an item to be tested but may be subjected to the test pressure.

6 Preparation for testing

6.1 Items to be subjected to test shall be free from grease, oil and other contaminants, and any cleaner used shall be compatible with the materials of manufacture of the pump, its auxiliaries, and its intended use.

6.2 The items to be tested are to be assembled for the test and all openings are to be blanked-off by appropriate means which may include blind flanges, plugs, closures and tension rings. Care shall be taken in selecting the closure arrangements not to impose forces capable of distorting the items under test nor of otherwise obscuring any leak. Through bolting shall not be used unless it is part of the construction of the item being tested.

6.3 The item to be tested and the gauge lines are to be vented and filled completely with the test liquid.

6.4 Wherever feasible the mating parts and fasteners used in any assembly shall be those to be used in the delivered pump, otherwise reasons for deviating from this requirement shall be recorded.

7 Test equipment

7.1 The test equipment shall comprise a device for generating the test pressure using a test liquid defined in clause 8.1, the item to be tested prepared in accordance with clause 6, and a pressure indicating device.

NOTE The device generating the test pressure may be the pump under test.

7.2 The hydrostatic test shall be carried out with calibrated pressure gauges. The pressure indicating device selected shall be accurate to within $\pm 1,5\%$ of the reading at the test pressure. The reference point for the pressure shall be the lowest point of the item to be tested. The applied test pressure shall be uniformly distributed within the item being tested.

8 Test liquid

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8.1 The hydrostatic test is normally to be carried out using clean water at ambient temperature, with the addition of corrosion preventative and organic growth inhibitors where necessary. If the properties of the material imposes a limit on the test temperature which affects the test procedure this is to be noted on the test record.

8.2 An alternative liquid shall be used where clean water is not appropriate for the application. The liquid used and the reason for its selection shall be recorded.

Where residual chloride deposition is not acceptable for the application, the chloride content of the test liquid shall not exceed 50 ppm (0,005 %).

9 Test pressure

9.1 The hydrostatic test pressure relates to the allowable working pressure at ambient temperature of the items to be tested. Where the items to be tested are to be offered for general application the test pressure shall relate to their maximum allowable working pressure.

9.2 The hydrostatic test pressure shall be calculated from the formula:

$$P_{\text{test}} = K_1 \times K_2 \times P_{\text{allw}}$$

where

P_{test} is the hydrostatic test pressure ;

P_{allw} is the allowable working pressure at operating temperature ;

K_1 is a factor whose value shall be determined by the pump specification, but shall not be less than 1,3 ;