SLOVENSKI STANDARD
SIST EN 16752:2015

01-november-2015

Centrifugalne črpalke - Preskusni postopek za zaprto embalažo

Centrifugal pumps - Test procedure for seal packings

Kreiselpumpen - Abnahmeprüfung für Packungen

Pompes centrifuges - Procédure d'essai pour garnitures tressées

Ta slovenski standard je istoveten z: **EN 16752:2015**

ICS:

21.140	Tesnilke, mašilke	Seals, glands
23.080	Črpalke	Pumps

SIST EN 16752:2015 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16752

September 2015

ICS 21.140; 23.080

English Version

Centrifugal pumps - Test procedure for seal packings

Pompes centrifuges - Procédure d'essai pour garnitures tressées

Kreiselpumpen - Abnahmeprüfung für Packungen

This European Standard was approved by CEN on 1 August 2015.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN 16752:2015) 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of an identical text or by endorsement, at the latest by March 2016, and conflicting national standards shall be withdrawn at the latest by March 2016.

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1 Scope

This European Standard gives details of a test procedure for packings to be used to seal the stuffing boxes of centrifugal pumps. It gives provisions on the design of test equipment, standard test parameters and reporting criteria. It does not specify performance criteria which should be agreed between supplier and customer, but does define 3 tightness classes.

When necessary, this European Standard is also applicable to packings used on other rotary equipment such as mixers and agitators.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 286-2, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts (ISO 286-2)*

3 Terms and definitions

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

3.1
stuffing box
space into which compression packing is inserted

Note 1 to entry: Stuffing box is also known as packing gland.

3.2
gland follower
part that provides into a stuffing box to compress a packing set or a packing ring

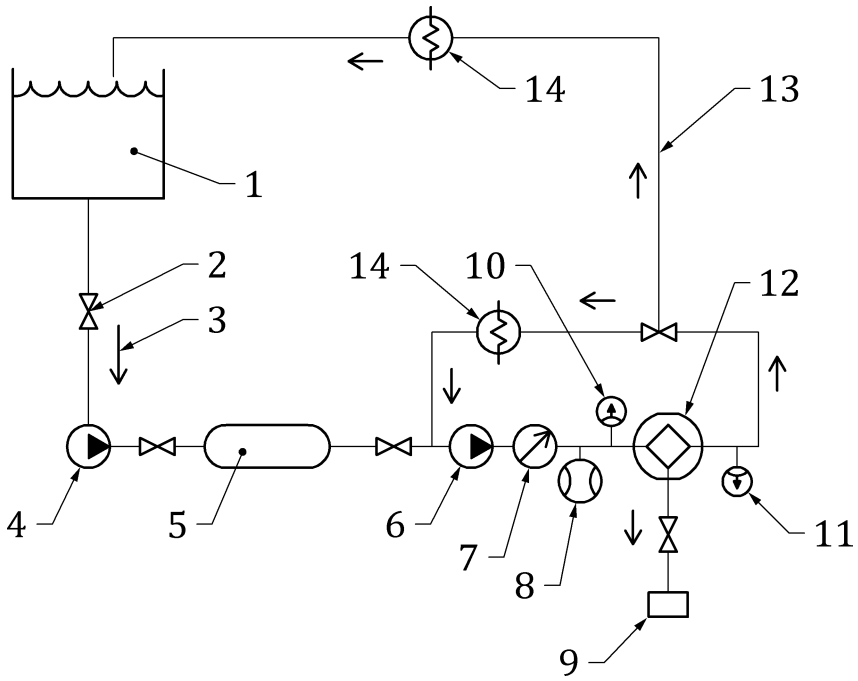
3.3
shaft
metal rod connecting the impeller of a pump to the motor

3.4
leakage
flow of liquid permitted to pass the packing

3.5
housing bore
dimension of the annular space that packing is inserted into

4 Test facility, testing apparatus

The test facility shall be arranged as described in Figure 1.

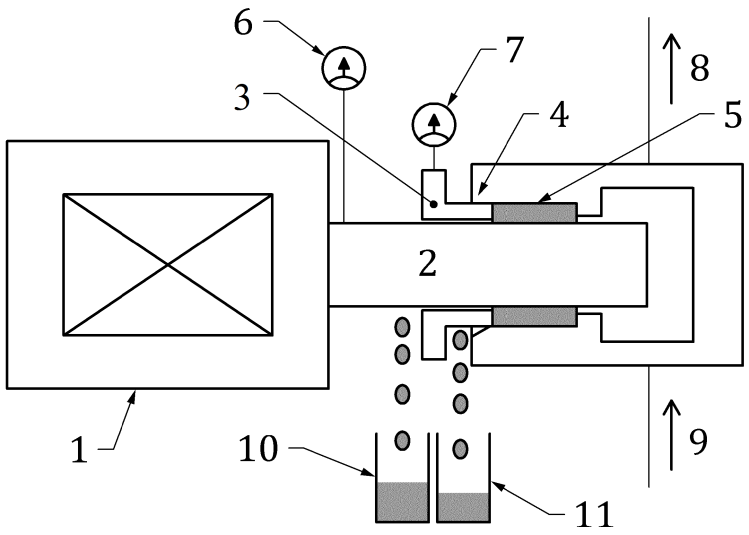


Key

1 tank
2 valve
3 direction of flow
4 pump
5 pressure container
6 water circulation pump
7 pressure gauge
8 flow measurement
9 drain
10 inlet temperature gauge
11 outlet temperature gauge
12 testing apparatus
13 alternate return line
14 heat exchanger

Figure 1 — Test arrangement

The testing apparatus shall be compliant with the description given in Figure 2. In particular, it shall consist of a suitable housing for retaining the test fluid and either one or more stuffing boxes to house the test packing. Each stuffing box shall be fitted with a gland follower and suitable retaining plate capable of controlled axial adjustment. There shall be a test shaft mounted on suitable bearings and attached to a suitable drive mechanism.



Key

1 motor
2 test shaft
3 gland follower
4 stuffing box
5 test packing
6 torque measurement
7 gland follower temperature
8 water in
9 water out
10 shaft leakage measurement
11 gland leakage measurement

Figure 2 — Testing apparatus details

The testing apparatus shall also conform to the following additional requirements:

a) the shaft speed shall be controlled within a maximum variation of ± 5 %;

b) the test head shall be designed and constructed so as to maintain stuffing box bore alignment relative to the shaft axis within 0,10 mm;

c) the design of the test head and support shall ensure minimum vibration;

d) the surface roughness of the stuffing box bore shall be no worse than 1,6 µm Ra. The surface roughness of the shaft shall be no worse than 0,4 µm Ra and the shaft shall be free of helical machine marks;

e) shaft and housing shall be manufactured from corrosion resistant stainless steel (e.g. 1.4016 or 1.4404 in accordance with EN 10088-1) without surface coating and shaft hardness shall be 40 HRC minimum;

f) the tolerances on shaft and stuffing box bore shall be h10 and H10 respectively in accordance with EN ISO 286-2;

g) the test fluid shall be circulated through the test housing at a rate such that the temperature of the test medium entering the housing remains constant within ± 5 °C and the outlet temperature is no more than 10 °C higher than the inlet temperature;

h) means shall be provided for collecting and measuring the volume of fluid leakage during the test, the leakage from the shaft and stuffing box bore sides shall be measured separately;

i) means shall be provided to measure the temperature of the fluid as it enters and leaves the test housing and the temperature of the gland follower within (3 ± 0,5) mm of the outer packing ring (i.e. packing temperature). In particular, a probe shall be positioned in a blind hole drilled axially into the gland follower;

j) means shall be provided to measure frictional power consumption of the packing. This shall be achieved by continuous torque measurement. The following value, called hereafter Normalized Power Consumption, shall be then calculated by taking the power in Watts divided by the packing contact area in square metres divided by the speed in metres per second – rationalised to Ws/m³.

$$\text{Normalized Power Consumption (W.s/m}^3\text{)} = \frac{P(W)}{Sc\left(m^2\right)\times linear\ rotation\ speed\left(m/s\right)}$$

With dissipated power $P(W)=T(N\cdot m)\times\omega(rad/s)$ where T is the measured torque

With $\omega(rad/s)=\frac{2\pi}{60}\times rotation\ speed(rpm)$

With Surface contact **Sc (m²) = π x D (m) x L (m)** where D is shaft diameter and L is packing height

With linear rotation speed (m:s) = $\frac{rotation\ speed(rpm)\times\pi\times D(m)}{60}$ where D is shaft diameter

The test packing shall be made of 4 pre-formed rings or 4 rings of packing cut from length form material to size, cut with a 'skive' (diagonal) cut in accordance with installation good practice.

NOTE FSA/ESA gives guidelines for good practice in the document Compression Packing Technical Manual (3rd Edition).

5 Pre-test procedure

Prior to the installation of rings in the stuffing box, the following steps shall be undertaken:

1) Inspect the packing for conformity to its specification and measure and record its cross-section dimensions: measure the radial cross-section of each ring at two diametrically opposite positions and record the average section of the whole set and the overall set depth.

2) Measure and record the shaft and housing bore diameters and their surface roughness.

3) Weigh each ring and record the weight of the set.

6 Installation

The 4 rings of packing in each stuffing box shall be installed as follows:

— Install one ring at a time. Make sure it is clean and has not picked up any dirt in handling.

— Seat rings firmly (except PTFE filament and graphite yarn packings to which only sufficient pre-load should be applied to ensure full axial contact and then tightened gradually after start up).