SLOVENSKI STANDARD
SIST EN 16297-2:2013

01-junij-2013

Nadomešča:
SIST EN 1151-1:2007
SIST EN 1151-1:2007/AC:2008

Črpalke - Centrifugalne črpalke - Obtočne črpalke - 2. del: Izračun indeksa energijske učinkovitosti (EEI) za samostojne obtočne črpalke

Pumps - Rotodynamic pumps - Glandless circulators - Part 2: Calculation of energy efficiency index (EEI) for standalone circulators

Pumpen - Kreiselpumpen - Umwälzpumpen in Nassläuferbauart - Teil 2: Berechnung des Energieeffizienzindexes (EEI) von externen Umwälzpumpen

Pompes - Pompes rotodynamiques - Circulateurs sans presse-étoupe - Partie 2: Calcul de l'indice d'efficacité énergétique (IEE) pour les circulateurs indépendants

Ta slovenski standard je istoveten z: **EN 16297-2:2012**

ICS:

23.080	Črpalke	Pumps

SIST EN 16297-2:2013 **en,fr**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 16297-2

October 2012

ICS 23.080

English Version

Pumps - Rotodynamic pumps - Glandless circulators - Part 2: Calculation of energy efficiency index (EEI) for standalone circulators

Pompes - Pompes rotodynamiques - Circulateurs sans presse-étoupe - Partie 2: Calcul de l'indice d'efficacité énergétique (EEI) pour les circulateurs indépendants

Pumpen - Kreiselpumpen - Umwälzpumpen in Nassläuferbauart - Teil 2: Berechnung des Energieeffizienzindexes (EEI) von externen Umwälzpumpen

This European Standard was approved by CEN on 18 August 2012.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 16297-2:2012: E

Contents

Page

Foreword

This document (EN 16297-2:2012) 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 April 2013, and conflicting national standards shall be withdrawn at the latest by April 2013.

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

This document 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.

This document, together with EN 16297-1:2012, supersedes EN 1151-1:2006.

EN 16297 consists of the following parts under the general title *Pumps — Rotodynamic pumps —Glandless circulators*:

— Part 1: General requirements and procedures for testing and calculation of energy efficiency index (EEI);

— Part 2: Calculation of energy efficiency index (EEI) for standalone circulators;

— Part 3: Energy efficiency index (EEI) for circulators integrated in products.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The European Standard has been prepared under mandate M/469 EN of 22 June 2010 given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Requirements of the EU Directive 2005/32/EC of 6 July 2005 and Commission Regulation (EC) 641/2009 of 22 July 2009 by describing procedures for measurement and calculation of hydraulic power, power consumption, and energy efficiency index of circulators.

1 Scope

This European Standard specifies the procedure for calculating the energy efficiency index (EEI) of standalone circulators.

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 809:1998+A1 :2009, *Pumps and pump units for liquids – Common safety requirements*

EN 16297-1:2012, *Pumps – Rotodynamic pumps – Glandless circulators – Part 1: General requirements and procedures for testing and calculation of energy efficiency index (EEI)*

EN 60335-2-51:2003, *Household and similar electrical appliances – Safety – Part 2-51: Particular requirements for stationary circulation pumps for heating and service water installations*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in EN 16297-1:2012 and the following apply.

3.1
standalone circulator
circulator designed to operate independently from a product that generates and/or transfers heat

Note 1 to entry For the purpose of this document, the term **circulator** is used in the following in place of **standalone circulator**.

3. 2
differential pressure controlled circulator
circulator adapting in time the differential pressure to the demand by varying the speed

4 Symbols and units

For the purpose of this document, the symbols, quantities and units given in Table 1 of EN 16297-1:2012 apply.

5 Performance requirements and safety requirements

The requirements of EN 16297-1, EN 809 and EN 60335-2-51 apply.

6 Calculation of energy efficiency index (EEI)

6.1 General conditions

Standalone circulators with pump housing shall be measured as a complete unit.

Standalone circulators without pump housing shall be measured in pump housing identical to the pump housing in which they are intended to be used.

6.2 Procedure

6.2.1 Load profile for calculation of average compensated power input, P_{Lavg}

The load profile for calculation of average compensated power input, P_{Lavg}, for standalone circulators is shown in Table 1.

Table 1 — Load profile for calculation of average compensated power input, $P_{L,avg}$

Q in % of $Q_{100\%}$	Time in % of annual operating hours
100	L1 = 6
75	L2 = 15
50	L3 = 35
25	L4 = 44

6.2.2 Part load operating points

Part load operating points are measured by using following procedure:

a) Calculate H_{ref} at each part load point on the reference control curve (see Figure 4 in EN 16297-1:2012).

b) Select and set a control curve (control curve or non-controlled curve) which is as close as possible to the reference control curve and reaches point ($Q_{100\%}$, $H_{100\%}$) within the tolerance of $H_{100\%}$.

c) Change the system curve to reach the part load operating points.

6.2.3 Calculation of average compensated power input, $P_{L,avg}$

The average compensated power input, $P_{L,avg}$, is calculated as:

$$P_{L,avg} = L_1 \times P_{L,100\%} + L_2 \times P_{L,75\%} + L_3 \times P_{L,50\%} + L_4 \times P_{L,25\%}$$
$$= 0,06 \times P_{L,100\%} + 0,15 \times P_{L,75\%} + 0,35 \times P_{L,50\%} + 0,44 \times P_{L,25\%}$$

$P_{L,avg}$ must be based on measurements from 100 % flow to 0 % flow or as average of $P_{L,avg}$ based on data measured from 0% flow to 100% flow and 100 % flow to 0 % flow. If more than one control curve reaches the point ($Q_{100\%}$, $H_{100\%}$) within the tolerance of $H_{100\%}$, it is recommended to make the calculation on more than one curve and use the curve which gives the lowest $P_{L,avg}$.

6.2.4 Calibration factor

The calibration factor for standalone circulators is $C_{xx\%} = C_{20\%} = 0,49$.

6.2.5 Calculation of energy efficiency index (EEI), ε_{EEI}

The energy efficiency index (EEI), ε_{EEI}, for standalone circulators is calculated as:

$$\varepsilon_{EEI} = \frac{P_{L,avg}}{P_{ref}} \times C_{20\%} = \frac{P_{L,avg}}{P_{ref}} \times 0,49$$

It is permissible to substitute the parameter ε_{EEI} by the abbreviation EEI in data sheets, manuals, leaflets, brochures etc.