SLOVENSKI STANDARD
SIST EN 293:2000

01-junij-2000

Tlaļ ne ġobe za razprġevanje olja pri gorilnikih - Minimalne zahteve - Preskuġanje

Oil pressure atomizing nozzles - Minimum requirements - Testing

Öldruckzerstäuberdüsen - Mindestanforderungen - Prüfungen

Gicleurs sans retour pour bruleurs a fioul domestique a pulvérisation - Prescriptions minimales - Essais

Ta slovenski standard je istoveten z: **EN 293:1992**

ICS:

27.060.10	Gorilniki na tekoļ e in trdo gorivo	Liquid and solid fuel burners

SIST EN 293:2000 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 293:1992

May 1992

UDC 662.944-225.8

Descriptors: Jet pumps, liquid fuel appliances, domestic fluid, atomizing burners, definitions, equipment specifications, performance evaluation, flow rate, spraying, tests, inspection, marking

English version

Oil pressure atomizing nozzles - Minimum requirements - Testing

Gicleurs sans retour pour brûleurs à fioul domestique à pulvérisation - Prescriptions minimales - Essais

Öldruckzerstäuberdüsen - Mindestanforderungen - Prüfungen

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This European Standard was drawn up by the Technical Committee CEN/TC 47 "Atomizing oil burners and their components - Function - Safety - Testing". It has been submitted to the Formal Vote and it is now adopted.

National Standards identical to this European Standard shall be published at the latest by 1992-11-30 and conflicting national standards shall be withdrawn at the latest by 1992-11-30.

According to the CEN/CENELEC Common Rules, the following countries are bound to implement this standard : Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard applies to oil pressure atomizing nozzles without back-flow - herein called atomizing nozzles - with a nominal throughput ≤ 6,30 kg/h at 10 bar with a fuel oil. They are characterized by the requirements concerning the operational function according to clause 5.

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.

ENV 299 Oil pressure atomizing nozzles; Angle- and spray characteristics

3 Definitions

3.1 Atomizing nozzle

An atomizing nozzle is a device in which fuel oil is atomized through transformation of pressure energy into kinetic energy. The atomizing nozzle is an essential part of the oil atomizing burner, and, together with the mixing device, it provides a combustible oil/air-mixture.

In this standard atomizing nozzles are devices working without by-pass in compliance with the flow principle (Simplexnozzles).

3.2 Reference conditions

The reference conditions comprise test pressure, test temperature, viscosity, surface tension and density of the test oil at the time of the test, at specified values at a point immediately upstream of the nozzle.

3.3 Nominal throughput

The nominal throughput is the mass flow expressed in kg/h at 10 bar.

3.4 Test pressure

The oil pressure is measured immediately before the atomizing nozzle (see figure 2).

3.5 Index angle

See ENV 299.

3.6 Sectional distribution

The sectional distribution of an atomizing nozzle indicates a degree of symmetry of the atomizing cone.

4 Construction requirements

4.1 Components

The components used for atomizing nozzles shall be able to withstand the mechanical, thermal and chemical demands to which they are exposed during operation.

The atomizing nozzle shall be free of manufacturing residues and other contamination, test oil excepted.

During installation and maintenance, the directions of the manufacturer shall be observed.

The atomizing nozzles shall be provided with a strainer or filter with a mesh size of maximum 75 micron - at a nominal throughput of 1,00 - 3,15 kg/h - and maximum 140 micron - at a nominal throughput of 3,55 - 6,30 kg/h - or giving equivalent filtration. The atomizing nozzle shall be temperature resistant up to and including 120 °C.

4.2 Dimensions

To secure the interchangeability of atomizing nozzles, the dimensions defined in figure 1 shall be observed.

5 Functional requirements

The atomizing nozzles shall be shaped so as to atomize the fuel oil satisfactorily at the prescribed nominal throughput and the pressure range indicated by the manufacturer.

Under normal conditions of application and mounting, any changes which might influence the functional abilities of the nozzle are not permissible.

5.1 Pressure resistance

The atomizing nozzle shall be designed so that it can withstand a static pressure of 50 bar.

5.2 Reference test conditions

The nozzle testing shall be carried out under reference conditions as follows:

pressure :	(10 ± 0,035) bar
viscosity:	(3,4 ± 0,04) mm^2/s
density :	(0,840 ± 0,01) kg/l
surface tension :	(2,95 ± 0,20).10-² J/m^2
temperature :	(20 ± 1) °C

5.3 Nominal throughput

The nominal throughput at a test pressure of 10 bar and the permissible tolerances of ± 4 % are given in table 1. Intermediate values are permissable, if the tolerances are adhered to (Throughput values in l/h and gal/h see annex A).

Table 1 Nominal throughput

Nominal throughput kg/h	Throughput max. value kg/h	Throughput min. value kg/h
1,00	1,040	0,960
1,25	1.300	1,200
1,60	1,664	1,536
1.80	1,872	1,728
2.00	2,080	1,920
2.25	2,340	2,160
2.50	2,600	2,400
2.80	2,912	2,688
3.15	3,276	3,024
3,55	3,692	3,408
4,00	4,160	3,840
4,50	4,680	4,320
5,00	5,200	4,800
5,60	5,824	5,376
6,30	6,552	6,048

6 Testing

6.1 General

After the tests for throughput, and the tests in respect of ENV 299 have been made with the reference oil as defined in 5.2, a final test for pressure resistance and temperature resistance shall be made.

6.2 Pressure resistance test

After deairation of the atomizing nozzle the nozzle orifice shall be closed and a test pressure of 50 bar shall be applied for at least 5 min. The atomizing nozzle shall then be submitted to a visual check.

6.3 Temperature resistance test

The temperature resistance shall be determined by exposing the atomizing nozzle, with its strainer or filter, gradually up to a temperature of 120 °C (the minimum time for the temperature increase is 15 min).

The temperature of 120 °C shall be kept constant for at least 15 minutes. The cooling shall be equally gradual, after which the atomizing nozzle shall be disassembled and the several nozzle parts shall be subject to a visual check.

6.4 Test of throughput

6.4.1 Test equipment (Example)

The oil-feeding device upstream of the atomizing nozzle (see for example figure 2) is composed of the following parts:

- Oil tank

- flow meter

- pump, equipped with a pressure-regulating device

- fast acting toroidal valve to be switched on or off with a timer

- nozzle adapter

- oil collector to receive the atomized fuel oil to which a weighing device is connected to measure the throughput

It shall be guaranteed that all connecting pipes from the tank to the toroidal valve are always filled with the test oil (fit a device to avoid back-flow, tank to be arranged at the upper part of the test rig...), so that the starting time can be reduced and errors, resulting from mis-feeding, can be avoided.

6.4.2 Test specifications

The reference oil shall be examined frequently as to its characteristics and conformity to 5.2.

By means of measuring devices, fitted directly upstream of the atomizing nozzle, the oil-temperature is recorded (sensor or thermo-elements) and the values of the atomizing pressure (pressure control device) are indicated.

The measuring devices to determine to the oil-througput, the atomizing pressure and test circle may have a maximum measuring accuracy of ± 0,4 %.

6.4.3 Test procedure

Test with equipment as given in 6.4.1. (Example)

The atomizing nozzle to be tested is screwed into the adapter. The torodial valve is opened to regulate the pressure and the temperature.

When the operational state is established, the torodial valve shall be closed for a moment to check the weight on the weighing device. Hereafter, the test shall be carried out, the duration of which is as long as pre-determined by the timer.

6.4.4 Test method and evaluation of results

Distinction between two test methods is made. The throughput measured shall be within the tolerances stated in table 1 (see 5.3).

6.4.4.1 Gravimetric method Determination of throughput by mass

The test oil collected during the measuring period is related to unit time. The throughput is expressed in kg/h.

6.4.4.2 Volumetric method Determination of throughput by measurement of volume

By multiplying the obtained value in l/h by the density of oil in kg/l, the throughput, expressed in kg/h, is obtained.

6.5 Testing of the Spray Characteristics

See ENV 299

6.6 Spray distribution

6.6.1 Test equipment

Sectorial patternator with cylindrical tank, the minimum internal diameter of which is 278 mm and the bottom of which is slightly sloped and divided into 12 sections, each of them having an apex angle of 30 degrees.

Each section is connected at the lower part via an oil discharge pipe to a vertically positioned calibrated gauge, graduated up to 50 ml.

The upper part of the tank is covered, the nozzle adapter shall be placed vertically in the centre of the cover; the adapter shall be adjustable upwards and downwards and shall be turnable for 360 degrees around its vertical axis. The adapter axis shall coincide exactly with the centre of each of the 12 sections.

6.6.2 Test procedure

The nozzle to be tested is screwed into the adapter.

The distance between nozzle orifice and upper part of the center tube of the sections is 50 mm (see figure 3).

The test shall be carried out after an operating state during which the atomizing pressure is set to 10 bar. During the starting phase, the graduated gauges are covered, so that no reference oil may enter.

The test begins as soon as the atomizing pressure has stabilized and when the viscosity of the test oil complies with the requirements fixed in 5.2. The gauges shall then be uncovered without interrupting the atomizing.

The test is completed as soon as one of the gauges is filled with 50 ml of oil. The gauges shall then be covered and the atomizing be interrupted.

6.6.3 Evaluation of results

The distribution of the spray pattern is characterized by the level of oil contained in the 12 gauges. The distribution of test oil shall be recorded for each of the gauges and the arithmetic mean value be determined. This mean value is compared with the obtained lowest value. The result allows to determine the distribution symmetry of the nozzle.