

SLOVENSKI STANDARD
SIST EN 676:2004+A2:2008
01-november-2008

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Automatic forced draught burners for gaseous fuels

Automatische Brenner mit Gebläse für gasförmige Brennstoffe

Brûleurs automatiques à air soufflé pour combustibles gazeux

Ta slovenski standard je istoveten z: **EN 676:2003+A2:2008**

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ICS:

27.060.20 Plinski gorilniki Gas fuel burners

SIST EN 676:2004+A2:2008 **en,fr,de**

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EUROPEAN STANDARD

EN 676:2003+A2

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2008

ICS 27.060.20

Supersedes EN 676:2003

English Version

Automatic forced draught burners for gaseous fuels

Brûleurs automatiques à air soufflé pour combustibles gazeux

Automatische Brenner mit Gebläse für gasförmige Brennstoffe

This European Standard was approved by CEN on 3 April 2003 and includes Amendment 1 approved by CEN on 1 April 2008 and Amendment 2 approved by CEN on 1 April 2008.

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 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 Management Centre has the same status as the official versions.

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

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EN 676:2003+A2:2008 (E)**Foreword**

This document (EN 676:2003+A2:2008) has been prepared by Technical Committee CEN/TC 131 "Gas burners using fans", the secretariat of which is held by DIN.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2008 and conflicting national standards shall be withdrawn at the latest by June 2010.

This document includes Amendment 1, approved by CEN on 2008-04-01 and Amendment 2, approved by CEN on 2008-04-01.

This document supersedes $\boxed{A_2}$ EN 676:2003 $\boxed{A_2}$.

The start and finish of text introduced or altered by amendment is indicated in the text by tags $\boxed{A_1}$ $\boxed{A_1}$ and $\boxed{A_2}$ $\boxed{A_2}$.

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 $\boxed{A_2}$ Annexes ZB, ZC, ZD and ZE $\boxed{A_2}$, which are integral parts of this document.

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$\boxed{A_1}$ *deleted text* $\boxed{A_1}$

According to edition 1996 the following fundamental changes are given:

- revisions for special applications: [SIST EN 676:2004+A2:2008](https://standards.iteh.ai/catalog/standards/sist/d23df54f-64e4-4c00-9c99-fc8c423e994a/sist-en-676-2004a2-2008)
- implementation of NO_x-classes and forming of arithmetic average values for determining the NO_x-values;
- implementation of appliance categories for forced draught burners.

$\boxed{A_2}$ Following a request from CEN/TC 131, CEN has agreed to defer the date of withdrawal of EN 676:2003 for a transition period of 2 years. $\boxed{A_2}$

$\boxed{A_2}$ Annexes A, B, C, D, E, F, G, H, I, ZA, ZB, ZC, ZD and ZE are informative. $\boxed{A_2}$

$\boxed{A_1}$ Annexes J and K are normative. $\boxed{A_1}$

This document includes a Bibliography.

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

Introduction

This European Standard is primarily intended for automatic forced draught gas burners having a combustion air fan, operated with gaseous fuels, and intended to be marketed as a complete assembly.

EN 437 sets out a system of classification of appliances into categories defined according to the gases and pressures for which they are designed.

Such a system of classification, when applied to forced draught burners, can lead to difficulties in defining the precise category to which a particular burner should be allocated. For example many burners are designed to operate on a wide range of fuel gases with little or no modification other than adjustment of air supply.

The technical committee responsible for the standard decided that the following appliance categories for forced draught burners should apply:

- single categories: I_{2R} for natural gas and I_{3R} for liquefied petroleum gas;
- dual category: II_{2R/3R} for natural and liquefied petroleum gas.

All the burners of this standard marked with these categories are commissioned on site and the measured values are recorded in a commissioning report.

However it should be noted that the Gas Appliance Directive requires the specification of the type of gas and the supply pressure used as well as the burner category.

Forced draught gas burners according to this standard are often used in industrial applications. The safety principles are the same as for forced draught gas burners used for household/commercial applications. Industrial forced draught gas burners however should operate safely in their industrial environment and the risks involved can differ from those for household applications. These industrial forced draught gas burners can be characterized by the ability to withstand industrial environmental influences, like moisture, high temperature, electrical and magnetic phenomena, vibrations, etc.

Principal requirements for installation and construction of gas burners and industrial thermal processing are covered by EN 746-family.

Special requirements for forced draught burners for industrial premises will be given as a note with the addition "Industrial application".

Further information and application limitation for EN 676 forced draught burners which are used for industrial application are given in informative annex I.

A1) This document is a type C standard as stated in EN ISO 12100-1 and EN ISO 12100-2.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standard, for machines that have been designed and built according to the provisions of this type C standard. **A1)**

EN 676:2003+A2:2008 (E)

1 Scope

A1 This European Standard specifies the terminology, the general requirements for the construction and operation of automatic forced draught gas burners and also the provision of control and safety devices, and the test procedure for these burners. **A1**

This standard is applicable to

- **A1** automatic gas burners with a combustion air fan (hereinafter called "burners") as described in 3.1.2 and gas line components, intended for use in appliances of different types, and that are operated with gaseous fuels; **A1**
- total pre-mixed burners and nozzle mixed burners.

The standard is applicable to

- **A1** single burners with a single combustion chamber; **A1**
- single-fuel and dual-fuel burners when operating only on gas;
- **A1** gas function of dual-fuel burners designed to operate simultaneously on gaseous and liquid fuels. **A1**

A1 This European Standard deals with all significant machine hazards, hazardous situations and events relevant to burners, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer, see Annex J.

This European Standard specifies the requirements to be met by the manufacturer to ensure the safety during commissioning, start-up, operation, shut-down and maintenance.

This European Standard does not deal with hazards due to specific applications.

This European Standard is not applicable to automatic forced draught gas burners which are manufactured before the date of its publication as EN. **A1**

A2 This European Standard does not apply to burners specifically designed for use in industrial processes carried out on industrial premises.

This European Standard deals also with the additional requirements for the burners in the scope with pressurised parts and /or firing pressurised bodies, see Annex K. **A2**

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).

A2 EN 88-1, *Pressure regulators and associated safety devices for gas appliances — Part 1: Pressure regulators for inlet pressures up to and including 500 mbar*

EN 88-2 *Pressure regulators and associated safety devices for gas appliances — Part 2: Pressure regulators for inlet pressures above 500 mbar up to and including 5 bar* **A2**

EN 161, *Automatic shut-off valves for gas burners and gas appliances*

EN 267, *Forced draught oil burners — Definitions, requirements, testing, marking*

A1 EN 294, *Safety of machinery — Safety distance to prevent danger zones from being reached by the upper limbs* **A1**

EN 298, *Automatic gas burner control systems for gas burners and gas burning appliances with or without fans*

EN 334, *Gas pressure regulators for inlet pressures up to 100 bar*

A1 EN 953, *Safety of machinery — Guards - General requirements for the design and construction of fixed and movable guards*

EN 1088:1995, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection* **A1**

EN 1092-1, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: Steel flanges*

EN 1092-2, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 2: Cast iron flanges*

A1 EN 1092-3 **A1**, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 3: Copper alloy flanges*

EN 1643, *Valve proving systems for automatic shut-off valves for gas burners and gas appliances*

EN 1854, *Pressure sensing devices for gas burners and gas burning appliances*

A2 EN 10204, *Metallic products — Types of inspection documents* **A2**

EN 10208-1, *Steel pipes for pipelines for combustible fluids — Technical delivery conditions — Part 1: Pipes of requirement class A*

EN 10208-2, *Steel pipes for pipelines for combustible fluids — Technical delivery conditions — Part 2: Pipes of requirement class B*

EN 10216-1, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10217-1, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 12067-1, *Gas/air ratio controls for gas burners and gas burning appliances — Part 1: Pneumatic types*

A1 EN 12067-2 **A1**, *Gas/air ratio controls for gas burners and gas burning appliances — Part 2: Electronic types*

A1 EN 15036-1:2006, *Heating boilers — Test regulations for airborne noise emissions from heat generators — Part 1: Airborne noise emissions from heat generators* **A1**

A2 EN 50156-1:2004, *Electrical equipment for furnaces and ancillary equipment — Part 1: Requirements for application design and installation* **A2**

A1 *deleted text* **A1**

A1 EN 60335-2-102:2007, *Household and similar electrical appliances — Safety — Part 2-102: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections (IEC 60335-2-102:2004, modified)* **A1**

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

A1 *deleted text* **A1**

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A1 EN 60730-1, *Automatic electrical controls for household and similar use — Part 1: General requirements (IEC 60730-1:1999, modified + A1:2003, modified)*

EN 61310-1, *Safety of machinery — Indication, marking and actuating — Part 1: Requirements for visual, auditory and tactile signals (IEC 61310-1:1995 + Corrigendum 1995)* **A1**

A1 EN 10220 **A1**, *Seamless and welded steel tubes — Dimensions and masses per unit length*

A1 EN ISO 228-1 **A1**, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

EN ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes* **A1** (ISO 3166-1:2006) **A1**

A1 EN ISO 4871, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)* **A1**

A2 EN ISO 9606-2, *Qualification test of welders — Fusion welding — Part 2: Aluminium and aluminium alloys (ISO 9606-2:2004)*

EN ISO 9606-3, *Approval testing of welders — Fusion welding — Part 3: Copper and copper alloys (ISO 9606-3:1999)*

EN ISO 9606-4, *Approval testing of welders — Fusion welding — Part 4: Nickel and nickel alloys (ISO 9606-4:1999)*

EN ISO 9606-5, *Approval testing of welders — Fusion welding — Part 5: Titanium and titanium alloys, zirconium and zirconium alloys (ISO 9606-5:2000)* **A2**

A1 EN ISO 12100-1, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)* **A1**

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

EN ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)* **A1**

A2 EN ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding (ISO 15609-1:2004)*

EN ISO 15609-2, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 2: Gas welding (ISO 15609-2:2001)*

EN ISO 15609-3, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 3: Electron beam welding (ISO 15609-3:2004)*

EN ISO 15609-4, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 4: Laser beam welding (ISO 15609-4:2004)*

EN ISO 15609-5, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 5: Resistance welding (ISO 15609-5:2004)*

EN ISO 15612, *Specification and qualification of welding procedures for metallic materials — Qualification by adoption of a standard welding procedure (ISO 15612:2004)*

EN ISO 15614-7, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 7: Overlay welding (ISO 15614-7:2007)*

EN ISO 15614-11, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 11: Electron and laser beam welding (ISO 15614-11:2002)* **A2**

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

3 Terms and definitions

^[A1] For the purposes of this document, the terms and definitions given in EN ISO 12100-1 and the following apply. ^[A1]

3.1 General terms and definitions

3.1.1

forced draught burner

burner in which the total air for combustion is supplied by means of a fan

3.1.2

automatic forced draught burner

burner that is fitted with an automatic ignition, flame monitoring and burner control devices. Ignition, flame monitoring and the on/off switching of the burner occur automatically. The heat input of the burner can be adjusted during operation either automatically or manually

3.1.3

dual-fuel burner

burner in which both gaseous and liquid fuels can be burnt either simultaneously or in succession

3.1.4

total pre-mixed burner

burner in which part, or all, of the air for complete combustion of the gas is mixed with the gas upstream of the mixture outlet ports

3.1.5

nozzle mixed burner

burner in which part, or all, of the air required for combustion of the gas is mixed with the gas at, or downstream of, the air and gas ports

3.1.6

integrated ignition burner

burner with direct main ignition burner at reduced rate with by-pass start gas supply

3.1.7

start gas rate

gas rate ignited by the ignition device during the start-up of the burner

3.1.8

industrial applications

industrial applications means:

- the extraction,
- growth,
- refining,
- processing,
- production,
- manufacture or
- preparation

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of materials, plants, livestock, animal products, food or artefacts

3.1.9**combustion chamber**

part of the appliance in which the combustion takes place

3.2 Specific terms and definitions**3.2.1 Combustible gases****3.2.1.1****reference conditions**

these correspond to 15 °C, 1 013,25 mbar, unless otherwise specified

3.2.1.2**calorific value**

quantity of heat produced by the combustion, at a constant pressure equal to 1 013,25 mbar, of unit volume or mass of gas, the constituents of the combustible mixture being taken at reference conditions and the products of combustion being brought back to the same conditions

A distinction is made between:

— the gross calorific value: in which the water produced by combustion is assumed to be condensed;

Symbol: H_s

and

— the net calorific value: in which the water produced by combustion is assumed to be in the vapour state.

Symbol: H_i

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Units: either

— megajoules per cubic metre (MJ/m³) of dry gas at the reference conditions, or

— megajoules per kilogram (MJ/kg) of dry gas

3.2.1.3**relative density**

ratio of the masses of equal volumes of dry gas and dry air at the same conditions of temperature and pressure

Symbol: d

3.2.1.4**Wobbe index**

ratio of the calorific value of a gas per unit volume and the square root of its relative density under the same reference conditions. The Wobbe index is said to be gross or net according to whether the calorific value used is the gross or net calorific value

Symbols: gross Wobbe index: W_s

net Wobbe index: W_i

Units: either

— megajoules per cubic metre (MJ/m³) of dry gas at the reference conditions, or

— megajoules per kilogram (MJ/kg) of dry gas

3.2.1.5**gas pressure**

static pressure of the moving gas, relative to the atmospheric pressure, measured at right angles to the direction of flow of the gas. It is expressed in millibars (mbar) or in bars (bar)

3.2.1.6**reference gases**

test gases on which burners operate under nominal conditions when they are supplied at the corresponding normal pressure

3.2.1.7**limit gases**

test gases representative of the extreme variations in the characteristics of the gases for which burners have been designed

NOTE The characteristics of the reference and limit gases are given in Table C.1.

3.2.1.8**normal pressure**

pressure under which the burners operate in nominal conditions when they are supplied with the corresponding reference gas

3.2.1.9**limit pressures**

pressures representative of the extreme variations in the burner supply conditions

NOTE The test pressures are given in Table 5.

3.2.1.10**supply pressure**

pressure measured at the measuring point M1 as specified in Figure 1, at which the nominal conditions are achieved

3.2.1.11**adjustment pressure**

pressure measured at the measuring point M2 as specified in Figure 1, at which the nominal conditions are achieved

3.2.1.12**burner head pressure**

pressure measured at the measuring point M3 as specified in Figure 1, at which the nominal conditions are achieved

3.2.1.13**pressure in the combustion chamber**

pressure or depression, relative to atmospheric pressure, prevailing in the combustion chamber

3.2.2 Operation of the burner**3.2.2.1 gas rate****3.2.2.1.1****volumetric flow rate**

volume of gas consumed by the burner in unit time during continuous operation

Units: cubic metres per hour (m^3/h), litres per minute (l/min), cubic decimetres per hour (dm^3/h) or cubic decimetres per second (dm^3/s).

Symbol: V

EN 676:2003+A2:2008 (E)**3.2.2.1.2****nominal volumetric flow rate**

volumetric flow rate stated by the manufacturer, expressed in cubic metres per hour (m³/h)

3.2.2.1.3**maximum flow rate**

highest flow rate stated by the manufacturer, expressed in cubic metres per hour (m³/h) at reference conditions

3.2.2.1.4**minimum flow rate**

lowest flow rate stated by the manufacturer, expressed in cubic metres per hour (m³/h) at reference conditions

3.2.2.1.5**mass flow rate**

mass of gas consumed by the burner in unit time during continuous operation

Symbol: *M*

Units: kilograms per hour (kg/h), or grams per hour (g/h)

3.2.2.1.6**nominal mass flow rate**

mass flow rate stated by the manufacturer

3.2.2.1.7**heat input**

quantity of energy used in unit time corresponding to the volumetric or mass flow rates, the calorific value used being either the net or gross calorific value

Symbol: Q_F

Unit: kilowatt (kW)

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Burners with fixed heat input or single stage burners have a single heat input. Range-rated burners have a maximum heat input and a minimum heat input declared by the manufacturer.

3.2.2.1.8**maximum heat input**

highest value of the heat input declared by the manufacturer

Symbol: $Q_{F \max}$

3.2.2.1.9**minimum heat input**

lowest value of the heat input declared by the manufacturer

Symbol: $Q_{F \min}$

3.2.2.2 running conditions**3.2.2.2.1****burners for permanent operation**

burners that are designed to remain in the running condition for more than 24 h without interruption

3.2.2.2.2**burners for intermittent operation**

burners that are designed to remain in the running condition for less than 24 h

3.2.3 Gas line components

3.2.3.1

gas line

part of the burner which is made up of the valves and controls and safety devices in which gas is conveyed between the inlet connection and the burner head

3.2.3.2

range-rating device

component on the burner intended to be used for adjusting the heat input, within a range of heat inputs stated by the manufacturer, to suit the actual heat requirements of the installation.

This adjustment can be progressive or in discrete steps

3.2.3.3

automatic shut-off valve

valve which opens when energised and closes automatically when de-energised

3.2.3.4

filter/strainer

device that enables foreign elements, which might otherwise cause failures in the system, to be collected

3.2.3.5

pressurised parts

pipework components and devices having pressure bearing housings with a pressure greater than 0,5 bar and a size greater or equal to DN 100 mm

NOTE See EU Directive 97/23/EC.

3.2.3.6

means for draining and venting

devices to allow harmless draining and venting of the pressurised fuel supply lines 

3.2.4 Adjusting, control and safety devices

3.2.4.1

pressure governor

device which maintains the downstream pressure constant to within fixed limits independent of variations, within a given range, of the upstream pressure

3.2.4.2

adjustable pressure governor

pressure governor fitted with a means of adjusting the loading on the diaphragm and thus the downstream pressure

3.2.4.3

gas pressure protection devices

device which compares the actual value of the pressure with the desired value, gives a signal when the actual value exceeds or drops below the desired value and initiates the controlled shut-down

3.2.4.4

flame detector device

device by which the presence of a flame is detected and signalled

It can consist of a flame sensor, an amplifier and a relay for signal transmission. These parts, with the possible exception of the actual flame sensor, can be assembled in a single housing for use in conjunction with a programming unit