

D]bg_] [fYb]_] nfU_Ug'df]g] bc' _cbj Y_W]cžnUc[fYj Ub^Y'bYghUbcj Ub^g_] \
dfcglcfcj žn]a Ybg_c'a c ^c`Xc`j _'1 bc'' \$\$ _K žVfYn`j Ybh] Urcf^UnUn[cfYj Ub]
nfU_]b#U]dfcXi _h'n[cfYj Ub^U

Non-domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW, without a fan to assist transportation of combustion air and/or combustion products

Gasbefeuerte Warmluftzeuger mit erzwungener Konvektion zum Beheizen von Räumen für den nicht-häuslichen Gebrauch mit einer Nennwärmebelastung nicht über 300 kW, ohne Gebläse zur Beförderung der Verbrennungsluft und/oder der Abgase

SIST EN 621:1999
7-57817-99/vidue621-1999
Générateurs d'air chaud à convection forcée utilisant les combustibles gazeux pour le chauffage de locaux autres que l'habitat individuel, de débit calorifique sur Hi inférieur ou égal à 300 kW, sans ventilateur pour aider l'alimentation en air comburant et/ou l'évacuation des produits de combustion

Ta slovenski standard je istoveten z: EN 621:1998

ICS:

97.100.20

SIST EN 621:1999

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 621:1999

<https://standards.iteh.ai/catalog/standards/sist/c061ffb9-d37a-490b-aa2b-7a878832a322/sist-en-621-1999>

ICS 91.140.20

Descriptors: heaters, gas appliances, hot air generators, premises, definitions, classifications, specifications, performance evaluation, equipment specifications, safety, efficiency, tests, technical notices

English version

Non-domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW, without a fan to assist transportation of combustion air and/or combustion products

Générateurs d'air chaud à convection forcée utilisant les combustibles gazeux pour le chauffage de locaux autres que l'habitat individuel, de débit calorifique sur H inférieur ou égal à 300 kW, sans ventilateur pour aider l'alimentation en air comburant et/ou l'évacuation des produits de combustion

Gasbefeuerte Warmlufterzeuger mit erzwungener Konvektion zum Beheizen von Räumen für den nicht-häuslichen Gebrauch mit einer Nennwärmebelastung nicht über 300 kW, ohne Gebläse zur Beförderung der Verbrennungsluft und/oder der Abgase

This European Standard was approved by CEN on 15 February 1997.

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 Central Secretariat 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 Central Secretariat 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 621:1999

<https://standards.iteh.ai/catalog/standards/sist/061f6b9-d37a-490b-aa2b-7a878832a322/sist-en-621-1999>

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

CONTENTS

Foreword	6
1 SCOPE	7
2 NORMATIVE REFERENCES	8
3 DEFINITIONS	10
3.1 Appliance and its constituent parts	10
3.2 Adjusting, control and safety devices	11
3.3 Operation of the appliance	12
3.4 Gases	14
3.5 Conditions of operation and measurement	15
3.6 Marking of the appliance and packaging	15
3.7 Classification	16
3.7.1 Classification of gases	16
3.7.2 Classification of appliance	16
4 CONSTRUCTION AND DESIGN REQUIREMENTS	19
4.1 General	19
4.1.1 Conversion to different gases	19
4.1.2 Materials and method of construction	20
4.1.3 Accessibility for maintenance and use	20
4.1.4 Thermal insulation	20
4.1.5 Gas connection	20
4.1.6 Soundness	21
4.1.7 Supply of combustion air and evacuation of combustion products	21
4.1.8 Supply and distribution of air for space heating	22
4.1.9 Position of the combustion chamber and heat exchanger	22
4.1.10 Checking the state of operation	22
4.1.11 Electrical equipment	23
4.1.12 Operational safety in the event of fluctuation, interruption and restoration of the auxiliary energy	23
4.1.13 Motors and fans	23
4.2 Adjusting, control and safety devices	24
4.2.1 General	24
4.2.2 Gas rate adjusters and range-rating devices	24
4.2.3 Aeration adjusters	25
4.2.4 Manual controls	25
4.2.5 Governors	25
4.2.6 Multifunctional controls	25
4.2.7 Flame supervision devices	25
4.2.8 Automatic shut-off valves	26
4.2.9 Automatic burner control systems	27
4.2.10 Gas strainers	27
4.3 Ignition devices	27
4.3.1 General	27
4.3.2 Ignition device for the main burner	27
4.3.3 Ignition burners	27
4.4 Flame supervision system	27
4.4.1 Non-automatic burner systems	27
4.4.2 Automatic burner systems	28
4.5 Start-gas flame establishment	28

4.5.1	Non-automatic burner systems	28
4.5.2	Automatic burner systems	29
4.6	Main flame establishment	30
4.6.1	Establishment by means of a start-gas flame	30
4.6.2	Direct establishment of the main flame, e.g. spark ignition, hot surface igniter	30
4.7	Main burner	30
4.8	Facility for remote control	30
4.9	Thermostats and control of air temperature	31
4.9.1	General requirements	31
4.9.2	Overheat cut-off device	31
4.9.3	Overheat control device	31
4.9.4	Overheat cut-off/control devices	31
4.9.5	Fan delay controls	31
4.9.6	Sensors	31
4.10	Gas pressure test points	31
4.11	Combustion chamber pressure reliefs	32
4.12	Facilities for commissioning and testing	32
5	OPERATIONAL REQUIREMENTS	33
5.1	Safety of operation	33
5.1.1	Soundness	33
5.1.2	Heat inputs	33
5.1.3	Limiting temperatures	34
5.1.4	Ignition, cross-lighting, flame stability	34
5.1.5	Combustion	35
5.1.6	Overheat cut-off device	36
5.1.7	Heat exchanger thermal cycling	36
5.2	Efficiency	36
6	TEST METHODS	38
6.1	General	38
6.1.1	Characteristics of test gases: reference and limit gases	38
6.1.2	Conditions for preparation of the test gases	38
6.1.3	Practical application of test gases	41
6.1.4	Test pressures	43
6.1.5	Test procedures	44
6.1.6	General test conditions	44
6.2	Construction and design	46
6.2.1	Automatic burner control systems (manually operated devices)	46
6.2.2	Ignition opening time	46
6.2.3	Extinction safety time	46
6.2.4	Safety time	46
6.3	Safety of operation	46
6.3.1	Soundness	46
6.3.2	Heat inputs	48
6.3.3	Limiting temperatures	50
6.3.4	Ignition, cross-lighting, flame stability	51
6.3.5	Combustion	56
6.3.6	Overheat cut-off device	58
6.3.7	Heat exchanger thermal cycling	59
6.4	Efficiency	59
6.4.1	General conditions of test	60
6.4.2	Test conditions	60
6.4.3	Test procedure	60

STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 621:1999

[https://standards.iteh.ai/catalog/standards/sist/c061ff59-d37a-490b-aa2b-](https://standards.iteh.ai/catalog/standards/sist/c061ff59-d37a-490b-aa2b-7a878832a322/sist-en-621-1999)

[7a878832a322/sist-en-621-1999](https://standards.iteh.ai/catalog/standards/sist/c061ff59-d37a-490b-aa2b-7a878832a322/sist-en-621-1999)

6.4.4 Accuracy of measurement	60
6.4.5 Calculation of efficiency	61
6.4.6 Supplementary test for appliances with a modulating or high/low control	62
7 MARKING AND INSTRUCTIONS	72
7.1 Marking of the appliance	72
7.1.1 Description	72
7.1.2 Data plate	72
7.1.3 Other marking	73
7.2 Marking of the packaging	73
7.3 Utilization of symbols on the appliance and packaging	73
7.3.1 Electrical supply	73
7.3.2 Type of gas	73
7.3.3 Gas supply pressure	74
7.3.4 Country of destination	74
7.3.5 Category	75
7.3.6 Other information	75
7.4 Instructions	75
7.4.1 General	75
7.4.2 Technical instructions for installation and adjustment	75
7.4.3 Instructions for use and maintenance	76

TABLES

Table 1: Classification of gases	16
Table 2: Valving requirements	26
Table 3: Characteristics of the test gases	39
Table 4: Calorific values of the test gases of the third family	40
Table 5: Test gases corresponding to the appliance categories	42
Table 6: Test pressures where no pressure couple exists	43
Table 7: Test pressures where a pressure couple exists	44
Table 8: $V_{CO_2,N}$ values	56
Table 9: Accuracy of measurement	61
Table 10: V_{CO_2} values	61
Table 11: Gas type symbols	74

iTeh STANDARD PREVIEW

FIGURES

(standards.iteh.ai)

Figure 1: Leakage indicator	63
Figure 2: Test of an appliance under abnormal draught conditions	64
Figure 3: Test apparatus for type C ₁₁ appliances	65
Figure 4: Test apparatus for type C ₃₁ appliances - flat roof	66
Figure 5: Test apparatus for type C ₃₁ appliances - angled roof	67
Figure 6: Sampling probe for type B ₁₁ and C ₃₁ appliances	68
Figure 7: Sampling probe for type C ₁₁ appliances	69
Figure 8: Sampling position for type C ₁₁ appliances	70
Figure 9: Mean specific heat of dry products of combustion	71

ANNEXES

Annex A (informative)	
National situations	77
Annex B (informative)	
Equivalence rules	90
Annex C (normative)	
Requirements for high-voltage ignition circuits	92
Annex D (informative)	
Facilities for commissioning and testing (see 4.12)	94
Annex E (informative)	
Means of identification of the various types of gas in force in the various countries	95
Annex F (informative)	
A-deviations	96
Annex G (normative)	
Special national conditions	97
Annex ZA (informative)	
Clauses of this European Standard addressing requirements or provisions of EU Directives . . .	98

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 621:1999](#)

<https://standards.iteh.ai/catalog/standards/sist/c061ffb9-d37a-490b-aa2b-7a878832a322/sist-en-621-1999>

Foreword -

This European Standard has been prepared by Technical Committee CEN/TC 179 "Gas-fired air heaters", the secretariat of which is held by NNI.

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 July 1998, and conflicting national standards shall be withdrawn at the latest by July 1998.

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 Annex ZA, which is an integral part of this standard.

This European Standard is applicable to appliances which are intended to be type tested. Requirements for appliances which are not intended to be type tested would need to be subject to further consideration.

The test gases, test pressures and appliance categories given in this Standard are in accordance with those specified in EN 437:1993 "Test gases, test pressures and appliance categories".

NOTE: For countries requesting special categories (specified in EN 437:1993), the absence of specific information concerning A.3.3 and A.3.4 implies that the general requirements described in this standard (see 4.1.1, 4.2.2, 4.2.3 and 4.2.5) also apply to these special categories.

Work is in progress to look for a device to detect failure of the heat exchanger. If successful, this could be an alternative to the "heat exchanger thermal cycle" requirement, 5.1.7.

Other European Standards covering gas-fired air heaters are as follows.

EN 525	Non-domestic direct gas-fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW
EN 778	Domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 70 kW, without a fan to assist transportation of combustion air and/or combustion products
prEN 1020	Non-domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 300 kW, incorporating a fan to assist transportation of combustion air and/or combustion products
prEN 1196	Domestic and non-domestic gas-fired air heaters - Supplementary requirements for condensing air heaters
prEN 1319	Domestic gas-fired forced convection air heaters for space heating, with fan-assisted burners not exceeding a net heat input of 70 kW
prEN 12669	Non-domestic gas-fired hot air blowers for agriculturalized and supplementary space heating including special requirements for use in greenhouses

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.

1 SCOPE

This European Standard specifies the requirements and test methods for the safety and efficiency of non-domestic gas-fired air heaters not exceeding a net heat input of 300 kW with (an) atmospheric burner(s) and without a fan to assist the transportation of combustion air and/or flue gases, hereafter referred to as "appliances".

This European Standard applies to Type B₁₁, C₁₁ and C₃₁ appliances intended for use in other than single unit residential dwellings. Provision of the heated air may be by means of ducting or may be directly into the heated space.

This standard does not apply to:

- appliances intended for use in a single unit residential dwelling;
- appliances of the condensing type;
- appliances for outdoor installation;
- dual purpose air conditioning appliances (heating and cooling);
- appliances where the air is heated by an intermediate fluid;
- appliances with forced draught burners;
- appliances fitted with a manual or automatic means of adjusting the combustion air supply or the combustion products evacuation (including flue dampers);
- portable or transportable forced convection appliances;
- appliances having multiple heating units with a single draught diverter;
- appliances fitted with more than one flue outlet.

This European Standard is applicable to appliances which are intended to be type tested.

NOTE: Requirements for appliances which are not type tested would need to be subject to further consideration.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 621:1999](#)

<https://standards.iteh.ai/catalog/standards/sist/c061fb9-d37a-490b-aa2b-7a878832a322/sist-en-621-1999>

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.

EN 88:1991	Pressure governors for gas appliances for inlet pressures up to 200 mbar
EN 125:1991	Flame supervision devices for gas burning appliances - thermoelectric flame supervision devices
EN 126:1995	Multifunctional controls for gas burning appliances
EN 161:1991	Automatic shut-off valves for gas burners and gas appliances
EN 257:1992	Mechanical thermostats for gas burning appliances
EN 298:1993	Automatic gas burner control systems gas burners and gas burning appliances with or without fans
EN 437:1993	Test gases - Test pressures - Appliance categories
EN 23166:1993	Codes for the representation of names of countries (ISO 3166:1993)
prEN 50165:1993	Electrical equipment of non-electric heating appliances for household and similar appliances
EN 60335-1:1988	Safety of household and similar electrical appliances - Part 1: General requirements
EN 60529:1991	Degrees of protection provided by enclosures (IP code)
EN 60730-1:1991	Automatic electrical controls for household and similar general purposes - Part 1: General requirements
EN 60730-2:1992	Automatic electrical controls for household and similar use - Part 2: Particular requirements for electrical controls for household appliances
EN 60730-2-9:1995	Automatic electrical controls for household and similar use - Part 2: Particular requirements for heat-sensing controls
EN 61058-1:1992	Switches for appliances - Part 1: General requirements
IEC 479-1:1994	Effects of current passing through the human body - Part 1: General aspects
IEC 479-2:1987	Effects of current passing through the human body - Part 2: Special aspects
ISO 7-1:1994	Pipe threads where pressure-tight joints are made on the threads - Part 1: Designation, dimensions and tolerances
ISO 228-1:1994	Pipe threads where pressure-tight joints are not made on the threads - Part 1: Designation, dimensions and tolerances
ISO 1182:1990	Fire tests - Building materials - Non-combustibility test
ISO 6976:1991	Natural gas - Calculation of the calorific value, the density and the relative density
ISO 7005-1:1992	Metallic flanges - Part 1: Steel flanges
ISO 7005-2:1988	Metallic flanges - Part 2: Cast iron flanges
ISO 7005-3:1988	Metallic flanges - Part 3: Copper flanges and composite flanges

3 DEFINITIONS

For the purposes of this standard, the following definitions apply:

3.1 Appliance and its constituent parts

3.1.1 non-domestic air heater: An appliance designed for the heating and possibly ventilation of a building other than a single unit residential dwelling.

3.1.2 forced convection air heater: An appliance designed to provide space heating from a central source by distributing heated air, by means of an air moving device, either through ducting or directly into the heated space.

3.1.3 gas inlet connection: The part of the appliance intended to be connected to the gas supply.

3.1.4 mechanical joint; mechanical means of obtaining soundness: A means of assuring the soundness of an assembly of several (generally metallic) parts without the use of liquids, pastes, tapes, etc. There are, for example:

- metal to metal joints;
- conical joints;
- toroidal sealing rings ("O" rings);
- flat joints.

3.1.5 gas circuit: The part of the appliance that conveys or contains the gas between the appliance gas inlet connection and the burner(s).

3.1.6 restrictor: A device with an orifice, which is placed in the gas circuit so as to create a pressure drop and thus reduce the gas pressure at the burner to a predetermined value for a given supply pressure and rate.

3.1.7 gas rate adjuster: A component allowing an authorized person to set the gas rate of the burner to a predetermined value according to the supply conditions.

Adjustment may be progressive (screw adjuster) or in discrete steps (by changing restrictors).

The adjusting screw of an adjustable governor is regarded as a gas rate adjuster.

The action of adjusting this device is called "adjusting the gas rate".

A factory sealed gas rate adjuster is considered to be non-existent.

3.1.8 setting an adjuster: Immobilization of an adjuster by some means such as a screw after the manufacturer or installer has adjusted it. The adjuster is said to be "set" in this position.

3.1.9 sealing an adjuster: Setting of an adjuster using a material such that any attempt to change the adjustment breaks the sealing material and makes the interference with the adjuster apparent. The adjuster is said to be "sealed" in its adjustment position.

A factory sealed adjuster is considered to be non-existent.

A governor is considered to be non-existent if it has been factory sealed in a position such that it is not operational in the range of supply pressures corresponding to the appliance category.

3.1.10 putting an adjuster or a control out of service: Putting an adjuster or a control (of temperature, pressure, etc.) out of action and sealing it in this position. The appliance then functions as if the adjuster or control had been removed.

3.1.11 injector: A component that admits the gas into a burner.

3.1.12 main burner: A burner that is intended to assure the thermal function of the appliance and is generally called the burner.

3.1.13 ignition device: Any means (flame, electrical ignition device or other device) used to ignite the gas at the ignition burner or at the main burner.

This device can operate intermittently or permanently.

3.1.14 ignition burner: A burner whose flame is intended to ignite another burner.

3.1.15 aeration adjuster: A device enabling the air to be set at the desired value according to the supply conditions.

The action of adjusting this device is called "adjusting the aeration".

3.1.16 Combustion products circuit

3.1.16.1 combustion chamber: An enclosure inside which combustion of the air-gas mixture takes place.

3.1.16.2 flue outlet: The part of a Type B appliance that connects with a flue to evacuate the products of combustion.

3.1.16.3 draught diverter: A device placed in the combustion products circuit to reduce the influence of flue-pull and that of down-draught on the burner performance and combustion.

3.2 Adjusting, control and safety devices

3.2.1 range rating device: A component on the appliance intended to be used by the installer to adjust the heat input of the appliance, within a range of heat inputs stated by the manufacturer, to suit the actual heat requirements of the installation.

This adjustment may be progressive (e.g. by use of a screw adjuster) or in discrete steps (e.g. by changing restrictors).

3.2.2 automatic burner control system: A system comprising at least a programming unit and all the elements of a flame detector device. The various functions of an automatic burner control system may be in one or more housings.

3.2.3 programming unit: A device which reacts to signals from control and safety devices, gives control commands, controls the start-up sequence, supervises the burner operation and causes controlled shut-down, and if necessary safety shut-down and lock-out. The programming unit follows a predetermined sequence of actions and always operates in conjunction with a flame detector device.

3.2.4 programme: The sequence of control operations determined by the programming unit involving switching on, starting up, supervising and switching off the burner.

3.2.5 flame detector device: A 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, may be assembled in a single housing for use in conjunction with a programming unit.

3.2.6 flame signal: The signal given by the flame detector device, normally when the flame sensor senses a flame.

3.2.7 flame simulation: A condition which occurs when the flame signal indicates the presence of a flame when in reality no flame is present.

3.2.8 pressure governor¹⁾: A device which maintains the outlet pressure constant independent of the variations in inlet pressure and/or flow rate within defined limits.

3.2.9 adjustable pressure governor: A governor provided with means for changing the outlet pressure setting.

¹⁾ The term "governor" is used in this case and for a volume governor.

3.2.10 flame supervision device: A device that, in response to a signal from the flame detector, keeps the gas supply open and shuts it off in the absence of the supervised flame.

3.2.11 automatic shut-off valve: A valve designed to open when energized and to close automatically when de-energized.

3.2.12 control thermostat: A device controlling the operation of the appliance (by on/off, high/low or modulating control) and enabling the temperature to be kept automatically, within a given tolerance, at a predetermined value.

3.2.13 overheat cut-off device: A device that shuts off and locks out the gas supply before the appliance is damaged and/or before safety is put into question, and that requires manual intervention to restore the gas supply.

This device is preset and sealed by the manufacturer (see 4.9.4).

3.2.14 overheat control device: An automatic reset device that shuts down the gas supply to the burner when the temperature of the delivered air exceeds a certain preset value during abnormal operating conditions.

3.2.15 fan delay control: A control that starts and/or stops the air delivery fan when the temperature of the delivered air reaches a certain predetermined value.

3.2.16 temperature sensing element; temperature sensor: A component that detects the temperature of the environment to be supervised or controlled.

3.2.17 modulating control: An automatic control by which the heat input of the appliance can be varied in a continuous manner between the nominal heat input and a minimum value.

3.2.18 high/low control: An automatic control which permits an appliance to operate either at the nominal heat input or at a fixed reduced heat input.

3.3 Operation of the appliance

3.3.1 volumetric flow rate: The volume of gas consumed by the appliance in unit time during continuous operation.

Symbol: V

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).

3.3.2 mass flow rate: The mass of gas consumed by the appliance in unit time during continuous operation.

Symbol: M

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

3.3.3 heat input: The quantity of energy used in unit time corresponding to the volumetric or mass flow rates, the calorific value to be used being the net or gross calorific value.

Symbol: Q

Units: kilowatts (kW).

<https://standards.iteh.ai/catalog/standards/sist/c061ffb9-d37a-490b-aa2b-7a878832a322/sist-en-621-1999>

3.3.4 nominal heat input: The value of heat input declared by the manufacturer.

Symbol: Q_n

3.3.5 flame stability: The characteristic of flames which remain on the burner ports or in the flame reception zone intended by the construction.

3.3.6 flame lift: The total or partial lifting of the base of the flame away from the burner port or the flame reception zone provided by the design.

3.3.7 light-back: The entry of a flame into the body of the burner.

3.3.8 light-back at the injector: Ignition of the gas at the injector, either as a result of light-back into the burner or by the propagation of a flame outside the burner.

3.3.9 sooting: A phenomenon appearing during incomplete combustion and characterized by deposits of soot on the surfaces or parts in contact with the combustion products or with the flame.

3.3.10 yellow tipping: The yellowing of the tip of the blue cone of an aerated flame.

3.3.11 first safety time²⁾: The interval between the ignition burner gas valve, the start gas valve or main gas valve, as applicable, being energized and the ignition burner gas valve, start gas valve or main gas valve, as applicable, being de-energized if the flame detector signals the absence of a flame at the end of this interval.

3.3.12 second safety time: The interval between the main gas valve being energized and the main gas valve being de-energized if the flame detector signals the absence of a flame at the end of this interval. This only applies where there is a first safety time applicable to either an ignition burner or start gas flame.

3.3.13 start gas: Gas that is supplied at the start gas rate to establish the start gas flame.

3.3.14 start gas rate: The restricted gas flow rate admitted either to a separate ignition burner or to the main burner during the first safety time.

3.3.15 start gas flame: A flame established at the start gas rate either at the main burner or at a separate ignition burner.

3.3.16 running condition of the system: A running condition in which the burner is in normal operation under the supervision of the programming unit and its flame detector device.

3.3.17 automatic burner system: A burner system in which, when starting from the completely shut-down condition, the gas is ignited and the flame is detected and proved without manual intervention.

3.3.18 non-automatic burner system: A burner system with an ignition burner which is ignited under manual supervision.

3.3.19 controlled shut-down: The process by which the power to the gas shut-off valve(s) is removed immediately, e.g. as a result of the action of a controlling function.

3.3.20 safety shut-down: The process which is effected immediately following the response of a safety limiter or sensor or the detection of a fault in the burner control system and which puts the burner out of operation by immediately removing the power to the gas shut-off valve(s) and the ignition device.

3.3.21 Lock-out

3.3.21.1 non-volatile lock-out: The safety shut-down condition of the system, such that a restart can only be accomplished by a manual reset of the system and by no other means.

3.3.21.2 volatile lock-out: The safety shut-down condition of the system, such that a restart can only be accomplished by either the manual reset of the system, or an interruption of the electrical supply and its subsequent restoration.

3.3.22 spark restoration: The process by which, after disappearance of the flame signal in the running condition, the ignition device is energized again without the gas supply having been totally interrupted. This process ends with the restoration of the running condition or, if there is no flame signal at the end of the safety time, with volatile or non-volatile lock-out.

3.3.23 automatic recycling: The process by which, following loss of flame signal during the running condition or accidental interruption of the operation of the appliance, the gas supply is interrupted and the complete start sequence is automatically re-initiated. This process ends with

²⁾ Where there is no second safety time, this is called the safety time.

the restoration of the running condition or, if there is no flame signal at the end of the safety time, or, if the cause of the accidental interruption has not disappeared, with volatile lock-out or non-volatile lock-out.

3.3.24 ignition opening time: The time interval between ignition of the supervised flame and the moment when the valve is held open.

3.3.25 extinction safety time: The time interval between extinction of the supervised flame and the gas supply being shut off:

- to the main burner;
- and/or to the ignition burner.

3.3.26 ignition interlock: A part which prevents the operation of the igniter as long as the main gasway is open.

3.3.27 re-start interlock: A mechanism which prevents the re-opening of the gasway to the main burner or the main burner and the ignition burner until the armature plate has separated from the magnetic element.

3.4 Gases

3.4.1 test gases: Gases intended for the verification of the operational characteristics of appliances using combustible gases. They comprise the reference and the limit gases.

3.4.2 reference gases: Test gases on which appliances operate under nominal conditions, when they are supplied at the corresponding normal pressure.

3.4.3 limit gases: Test gases representative of the extreme variations in the characteristics of the gases for which appliances have been designed.

3.4.4 gas pressure: The static pressure, relative to the atmospheric pressure, measured at right angles to the direction of flow of the gas.

Units: millibars (mbar) or bars.

3.4.5 test pressures: Gas pressures used to verify the operational characteristics of appliances using combustible gases. They consist of normal and limit pressures.

Units: millibars (mbar).

NOTE: 1 mbar = 10^2 Pa.

3.4.6 normal pressure: The pressure under which the appliances operate in nominal conditions, when they are supplied with the corresponding reference gas.

Symbol: p_n

3.4.7 limit pressures: Pressures representative of the extreme variations in the appliance supply conditions.

Symbols:

maximum pressure: p_{\max}
minimum pressure: p_{\min}

3.4.8 pressure couple: Combination of two distinct gas distribution pressures applied by reason of the significant difference existing between the Wobbe indices within a single family or group in which

- the higher pressure corresponds only to gases of low Wobbe index; and
- the lower pressure corresponds to gases of high Wobbe index.

3.4.9 relative density: The ratio of the masses of equal volumes of dry gas and dry air under the same conditions of temperature and pressure.