
Plinski kotli za centralno ogrevanje - Tipa B <+>11<+> and B<+>11BS<+> z atmosferskimi gorilniki z imensko močjo do vključno 70 kW

Gas-fired central heating boilers - Type B11 and B11BS boilers fitted with atmospheric burners of nominal heat input not exceeding 70 kW

Heizkessel für gasförmige Brennstoffe - Heizkessel des Typs B11 und B11BS mit atmosphärischen Brennern mit einer Nennwärmebelastung kleiner als oder gleich 70 kW

Chaudières de chauffage central utilisant les combustibles gazeux - Chaudières des types B11 et B11BS équipées de brûleurs atmosphériques dont le débit calorifique nominal est inférieur ou égal à 70 kW

Ta slovenski standard je istoveten z: EN 297:1994

ICS:

91.140.10	Sistemi centralnega ogrevanja	Central heating systems
97.100.20	Plinski grelniki	Gas heaters

SIST EN 297:1997**en**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 297:1997

<https://standards.iteh.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-b8fe1a835893/sist-en-297-1997>

EUROPEAN STANDARD

EN 297

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 1994

UDC 697.326:662.95:614.8:620.1

Descriptors: Heaters, central heating, boilers, gas appliances, burners, heat balance, equipment specifications, performance evaluation, safety, tests, verification, marking, name plate

English version

Gas-fired central heating boilers - Type B11 and B11BS boilers fitted with atmospheric burners of nominal heat input not exceeding 70 kW

Chaudières de chauffage central utilisant les combustibles gazeux - Chaudières des types B11 et B11BS équipées de brûleurs atmosphériques dont le débit calorifique nominal est inférieur ou égal à 70 kW

Heizkessel für gasförmige Brennstoffe - Heizkessel der Typ B11 und B11BS mit atmosphärischen Brennern mit einer Nennwärmebelastung kleiner als oder gleich 70 kW

This European Standard was approved by CEN on 1994-05-18. 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.

The European Standards exist 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

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

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

	Page
Contents	2
Foreword	7
1 General	8
1.1 Scope	8
1.2 Normative references	8
1.3 Definitions	10
1.3.1 Reference conditions	10
1.3.2 Combustible gases	10
1.3.3 Constituent parts of the boiler	11
1.3.4 Operation of the boiler	15
1.4 Classification	18
1.4.1 Classification of gases	18
1.4.2 Classification of boilers	19
2 Constructional requirements	23
2.1 General	23
2.1.1 Conversion to different gases	23
2.1.2 Materials and methods of construction	23
2.1.3 Design	29
2.1.4 Use and servicing	29
2.1.5 Connections to the gas and water pipes	30
2.1.6 Soundness	30
2.1.7 Supply of combustion air and evacuation of the combustion products	31
2.1.8 Checking the state of operation	31
2.1.9 Drainage	32
2.1.10 Electrical equipment	32
2.1.11 Operational safety in the event of failure of the auxiliary energy	32
2.2 Requirements for adjusting, control and safety devices	32
2.2.1 General	32
2.2.2 Adjuster and range-rating device	33
2.2.3 Gas circuit	34
2.2.4 Gas governor	35
2.2.5 Ignition devices	36
2.2.6 Flame supervision devices	37
2.2.7 Thermostats and water temperature limiting devices	37
2.2.8 Remote control	39
2.2.9 Expansion vessel and pressure gauge	39
2.2.10 Combustion products discharge safety device	39

2.3	Burners	40
2.4	Pressure test points	40
3	Operational requirements	41
3.1	General	41
3.2	Soundness	41
3.2.1	Soundness of the gas circuit	41
3.2.2	Soundness of the combustion circuit	41
3.2.3	Soundness of the water circuit	41
3.3	Nominal, maximum and minimum heat inputs and nominal output	41
3.3.1	General	41
3.3.2	Nominal heat input	41
3.3.3	Maximum and minimum heat input	42
3.3.4.	Minimum heat input for ignition	42
3.3.5	Nominal output	42
3.4	Safety of operation	42
3.4.1	Limiting temperatures	42
3.4.2	Ignition - Cross lighting - Flame stability	43
3.5	Adjusting, control and safety devices	44
3.5.1	General	44
3.5.2	Control devices	44
3.5.3	Automatic valves	45
3.5.4	Ignition devices	45
3.5.5	Flame supervision devices	46
3.5.6	Gas governor	48
3.5.7	Thermostats and water temperature limiting devices	48
3.5.8	Combustion products discharge safety device	50
3.6	Combustion	51
3.6.1	Carbon monoxide	51
3.6.2	Other pollutants	51
3.7	Useful efficiencies	51
3.7.1	Useful efficiency at the nominal heat input	51
3.7.2	Useful efficiency at part load	51
3.8	Non-condensation in the flue	51
3.9	Resistance of the materials to pressure	52
3.9.1	General	52
3.9.2	Boilers of pressure class 1	52
3.9.3	Boilers of pressure class 2	52
3.9.4	Boilers of pressure class 3	52
3.10	Hydraulic resistance	52

ITW STANDARD PREVIEW

(standards.iteh.ai)

SIST EN 297:1997

<https://standards.iteh.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-b8c1a833893/sist-en-297-1997>

4	Test methods	53
4.1	General	53
4.1.1	Characteristics of the reference and limit gases	53
4.1.2	Requirements for the preparation of test gases	53
4.1.3	Carrying out the tests	54
4.1.4	Test pressures	59
4.1.5	Conduct of the tests	60
4.1.6	General test conditions	60
4.1.7	Summary of the test conditions	63
4.2	Soundness	63
4.2.1	Soundness of the gas circuit	63
4.2.2	Soundness of the combustion circuit	64
4.2.3	Soundness of the water circuit	64
4.3	Nominal, maximum and minimum heat inputs and nominal output	64
4.3.1	General	64
4.3.2	Nominal heat input	66
4.3.3	Maximum and minimum heat input	66
4.3.4	Minimum heat input for ignition	67
4.3.5	Nominal output	67
4.4	Safety of operation	67
4.4.1	Limiting temperatures	67
4.4.2	Ignition - Cross lighting - Flame stability	68
4.5	Adjusting, control and safety devices	71
4.5.1	General	71
4.5.2	Control devices	71
4.5.3	Automatic valves	72
4.5.4	Ignition devices	73
4.5.5	Flame supervision devices	74
4.5.6	Gas governor	77
4.5.7	Thermostats and water temperature limiting devices	78
4.5.8	Combustion products discharge safety device	80
4.6	Combustion	81
4.6.1	Carbon monoxide	81
4.6.2	Other pollutants	84
4.7	Useful efficiencies	84
4.7.1	Useful efficiency at the nominal heat input	84
4.7.2	Useful efficiency at part load	85
4.8	Non-condensation in the flue	85
4.8.1	Exceeding the dew point temperature	85
4.8.2	Determination of flue losses	85
4.8.3	Maximum useful efficiency	86
4.8.4	Minimum temperature of the combustion products	86
4.9	Resistance of the materials to pressure	86
4.9.1	General	86
4.9.2	Boilers of pressure class 1	86
4.9.3	Boilers of pressure class 2	87
4.9.4	Boilers of pressure class 3	87
4.10	Hydraulic resistance	87

iTeh STANDARD PREVIEW

(standards.iteh.ai)

SIST EN 297:1997

[https://standards.iteh.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-](https://standards.iteh.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-081e1a835823/sist-en-297-1997)[081e1a835823/sist-en-297-1997](https://standards.iteh.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-081e1a835823/sist-en-297-1997)

5	Marking and instructions	88
5.1	Marking of the boiler	88
5.1.1	Data plate	88
5.1.2	Supplementary marking	88
5.1.3	Warnings	88
5.2	Instructions	89
5.2.1	Technical instructions for the installer	89
5.2.2	Use and maintenance instructions for the user	91
5.2.3	Conversion instructions	91
5.2.4	Packaging	92
5.2.5	Presentation	92
Table 1	: Classification gases	18
Table 2	: Mechanical properties and chemical compositions of carbon and stainless steel	25
Table 3	: Minimum requirements for cast iron	26
Table 4	: Parts cast in aluminium and aluminium alloys	26
Table 5	: Parts cast in copper or copper alloys	26
Table 6	: Minimum thickness for rolled parts	27
Table 7	: Nominal minimum thickness of boiler sections of cast materials	27
Table 8	: Weld joints and welding processes	93
Table 9a	: Characteristics of the test gases	55
Table 9b	: Calorific values of the third family test gases	57
Table 9c	: Reference gas characteristics at 0 °C	57
Table 10	: Test gases corresponding to the boiler categories	58
Table 11a	: Test pressures when there is no pressure couple	59
Table 11b	: Test pressures when there is a pressure couple	60
Annex A (informative) - National situations		99
A.1	Categories marketed in the various countries	99
A.1.1	Simple categories marketed	100
A.1.2	Double categories marketed	101
A.2	Boiler supply pressures	102
A.3	Flue connections in the various countries	103
A.4	Gas connections conditions in common use in the various countries	104
Annex B (informative) - Particular national conditions		105
B.1	Gases distributed locally	105
B.2	Special categories marketed nationally or locally	107
B.3	Particular conditions	111
Annex C (informative) - Practical method of calibrating the test rig to enable the heat loss D_p to be determined		112

Annex D (informative) - Main symbols and abbreviations used	113
Annex E (informative) - Summary of the test conditions	114
E.1 first family	114
E.2 second family	115
E.3 third family	116
<hr/>	
Annex F (informative) - Composition of the gas circuit	117
Annex G (informative) - Table identifying conformity with the essential requirements of the gas appliance directive	118
Annex H (informative) - Deviation A for Switzerland	121
Figure 1a : Test rig with direct recirculation	122
Figure 1b : Test rig with heat exchanger	123
Figure 2 : Sampling probe for flue diameters greather than DN 100	124
Figure 3 : Sampling probe for flue diameters not greather than DN 100	125
Figure 4 : Test of a boiler under special draught conditions	126
Figure 5 : Connections to the 5 m flue	127
Figure 6 : Device for checking the soundness of the gas circuit	128
Figure 7 : Soundness test for components (pressure loss method)	129
Figure 8 : Determination of the hydraulic resistance	130
Figure 9 : Test rig for the combustion products discharge safety device	131

ITeH STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 297:1997](https://standards.iteh.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-b8fe1a835893/sist-en-297-1997)

<https://standards.iteh.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-b8fe1a835893/sist-en-297-1997>

Foreword

The European standard EN 297 has been prepared by the Technical Committee CEN/TC 109 "Gas-fired central heating boilers", the Secretariat of which is held by the IBN.

It was established to deal with aspects related to :

- safety;
- rational use of energy;
- fitness for purpose.

Other types of boilers, and those of higher nominal heat input excluded from this standard, are dealt with in separate standards.

Amendment 1, dealing with combustion products discharge safety devices, has been included in this standard.

Other amendments are being prepared and will complete EN 297 eventually.

This European standard has been prepared under a mandate given to CEN by the Commission of the European Communities and the European Free Trade Association and supports essential requirements of the EC Directive(s).

This standard covers only type testing.

Matters related to quality assurance systems, tests during production and to certificates of conformity to auxiliary devices are not dealt with in this standard.

If the manufacturer indicates that the boiler has been tested in accordance with EN 297, the boiler must comply completely with the requirements of this standard.

Type B₁₁ boilers must be fitted with a combustion products discharge safety device in order to meet the Essential Requirement of clause 3.4.3 of the Directive 90/396/EEC. In this standard these boilers are designated as type B_{11BS}.

However, boilers intended to be installed :

- either in the open air (standards.iteh.ai)
- or in a room separated from living rooms and provided with appropriate ventilation directly to the outside,

need not to carry such a device, but in this case, appropriate warnings on the packaging and in the instructions must clearly indicate the limit on the use of this type of boiler. In this standard these boilers are designated as type B₁₁.

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 December 1995, and conflicting national standards shall be withdrawn at the latest by December 1995.

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

1 General

1.1 Field of application

This European standard specifies the requirements and test methods for the construction, safety, fitness for purpose, rational use of energy, classification and marking of gas-fired central heating boilers, hereafter referred to as "boilers".

This standard applies to type B₁₁ and B_{11BS} boilers :

- fitted with atmospheric burners;
- that use gases corresponding to the three gas families and to the pressures stated in 4.1.4;
- that have a nominal heat input not exceeding 70 kW (on net calorific value);
- where the temperature of the water does not exceed 95 °C during normal operation;
- where the maximum water-side operating pressure does not exceed 6 bar.

This standard does not contain all the necessary requirements for :

boilers :

- intended to be installed in the open;
- having multiple heating units with a single draught diverter;
- with fan-assisted combustion;
- of the condensing type;
- intended to be connected to a common flue having mechanical extraction;
- fitted with manual or automatic means of adjusting the air supply and/or adjusting the evacuation of the combustion products;
- of the combination type (central heating and domestic hot water production);

appliances :

- combining the functions of an independent space heater and a hot water generator for central heating.

<https://standards.iteh.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-b0e8103/sist-en-297-1997>

This standard only covers type testing.

1.2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate place 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 Pressure governors for gas appliances for inlet pressures up to 200 mbar.
- EN 125 Flame supervision devices for gas burning appliances - thermoelectric flame supervision devices.
- EN 126 Multifunctional controls for gas burning appliances.
- EN 161 Automatic shut-off valves for gas burners and gas appliances.
-
- EN 278 Rubber materials for diaphragms in domestic appliances using combustible gases up to 200 mbar.
- EN 279 Homogeneous rubber materials for dynamic seals in domestic appliances using combustible gases up to 200 mbar.
- EN 291 Rubber seals - Static seals in domestic appliances for combustible gas up to 200 mbar - Specification for material.
- EN 298 Automatic gas burner control systems for gas burners and gas-burning appliances with or without fans.
- EN 437 Test gases - Test pressures - Appliance categories
- prEN 1057 Copper and copper alloys - Seamless, round copper tubes for water and gas in sanitary and heating applications.
- EN 10021 General technical delivery requirements for steel and iron and steel products.
- EN 10029 Hot rolled steel plate 3mm thick or above - Tolerances on dimensions, shape and mass.
- EN 24063 Welding, brazing, soldering and braze welding of metals - Nomenclature of processes and reference numbers for symbolic representation on drawings (ISO 4063 : 1990).
- EN 60335-1 Safety of household and similar electrical appliances.
Part 1 : General requirements.
- EN 60529 Degrees of protection provided by enclosures (IP code).
- EN 60742 Isolating transformers and safety isolating transformers - Requirements.
- ISO 7-1 Pipe threads where pressure-tight joints are made on the threads.
Part 1- Designation, dimensions and tolerances.
- ISO 185 Grey cast iron - Classification.
- ISO 228-1 Pipe threads where pressure-tight joints are not made on the threads,
Part 1- Designation, dimensions and tolerances.
- ISO 262 ISO general purpose metric screw threads - Selected sizes for screws, bolts and nuts.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 297:1997](https://standards.iteh.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-061e1853693/sist-en-297-1994)

[https://standards.iteh.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-](https://standards.iteh.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-061e1853693/sist-en-297-1994)

[061e1853693/sist-en-297-1994](https://standards.iteh.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-061e1853693/sist-en-297-1994)

ISO 301	Zinc alloy ingots intended for casting.
ISO 857	Welding, brazing and soldering processes - Vocabulary Bilingual edition .
ISO 2553	Welded, brazed and soldered joints - Symbolic representation on drawings.
ISO 7005	Metallic flanges.
IEC-730-2-9	Automatic electrical controls for household and similar use. Part 2 : Particular requirements for electrical controls for household appliances.

1.3 Definitions

For the purposes of this standard the following definitions apply.

1.3.1 reference conditions : Dry gas at a temperature of 15 °C, and at an absolute pressure of 1013,25 mbar.

1.3.2 Combustible gases

1.3.2.1 Reference gas - limit gases

In each gas family or group, test gases are defined :

- one or several "reference gas(es)" : gas(es) with which the boilers operate in nominal conditions, when they are supplied at the corresponding normal pressure;
- "limit gases" : gases representative of the extreme variations in the characteristics of the gases capable of being used.

1.3.2.2 calorific value : The quantity of heat produced by the combustion at a constant pressure of 1013,25 mbar of unit volume or mass of gas, the constituents of the combustible mixture being brought to 15 °C and 1013,25 mbar, the combustion products being brought to the same conditions.

Two types of calorific value are identified :

- gross calorific value : water produced by combustion is taken to be condensed

Symbol : H_g

- net calorific value : water produced by combustion is taken to be in the vapour state

Symbol : H_n

SIST EN 297:1997
<https://standards.itech.ai/catalog/standards/sist/2557fde0-661f-4cfl-b32b-b8fe1a835893/sist-en-297-1997>

Units :

- either megajoules per cubic meter of dry gas brought to reference conditions (MJ/m^3);
- or megajoules per kilogram of dry gas (MJ/kg).

1.3.2.3 relative density : The ratio of the masses of equal volumes of gas and dry air under the same conditions of temperature and pressure : 15 °C and 1013,25 mbar.

Symbol : d

1.3.2.4 Wobbe index : The ratio of the calorific value of the gas per unit volume to the square root of the density under the same reference conditions 15 °C and 1013,25 mbar. The Wobbe index is called gross or net according to whether the gross or the net calorific value is used.

Symbols : gross Wobbe index : W_g ; net Wobbe index : W_n

Units :

- either megajoules per cubic meter of dry gas brought to reference conditions (MJ/m^3);
- or megajoules per kilogram of dry gas (MJ/kg).

1.3.2.5 gas pressure : All the pressures are static pressures of the moving gas, relative to the atmospheric pressure, measured at right angles to the direction of flow of the gas.

Symbol : p

Units : millibars (mbar).

1.3.2.5.1 test pressure : Gas pressures used to check the operational characteristics of boilers using combustible gases. They comprise of normal and limit pressures.

Units : millibars (mbar).

1.3.2.5.2 normal pressure : Pressure under which boilers operate under nominal conditions when supplied with the corresponding reference gas.

Symbol : p_n

1.3.2.5.3 limit pressure : Pressures representative of the extreme variations of the supply conditions of the boilers.

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

1.3.2.5.4 pressure couple : Combination of two distinct gas distribution pressures applied because of the significant difference that exists between the Wobbe indices within a single gas family or group.

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

1.3.3 Constituent parts of the boiler

1.3.3.1 Gas supply

1.3.3.1.1 gas inlet connection : The part of the boiler intended to be connected to the gas supply.

1.3.3.1.2 gas circuit : An assembly of parts of the boiler that carry or contain the combustible gas between the boiler gas inlet connection and the burner(s).

1.3.3.1.3 restrictor : A device with one or more orifices, which is placed in the gas circuit so as to create a pressure drop and thus bring the gas pressure at the burner to a predetermined value for a given supply pressure and a given rate.

1.3.3.1.4 injector : A component that admits gas into the burner.

1.3.3.1.5 gas rate adjuster : A component allowing the gas rate of the burner to be brought to a predetermined value according to the supply conditions.

The action of operating this component is called, "adjustment of the gas rate".

1.3.3.1.6 range-rating device : A component on the boiler intended to be used by the installer to adjust the nominal heat input of the boiler, within the range of maximum and minimum heat inputs stated by the manufacturer, to suit the actual heat requirements of the installation.

1.3.3.1.7 primary aeration adjuster : A device enabling the primary aeration of a burner to be set to the desired value according to the supply conditions.

1.3.3.1.8 sealing an adjuster or a control : Arrangements made to make evident any attempt to change its adjustment (e.g. breakage of a device or of a sealing material).

A sealed adjuster or control is considered to be non-existent.

1.3.3.1.9 putting an adjuster or a control out of service : Action intended to put an adjuster or control (rate, pressure, etc...) out of service.

1.3.3.1.10 Burner

1.3.3.1.10.1 main burner : A burner that is intended to assure the thermal function of the boiler and is generally called "the burner".

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

1.3.3.1.10.2.1 manual ignition device : A device by means of which the burner is ignited following manual intervention.

1.3.3.1.10.2.2 automatic ignition device : An automatic device which ignites the ignition burner or the main burner directly.

1.3.3.1.10.3 ignition burner : A burner intended to ignite a main burner. Those recognized are respectively :

a) Permanent ignition burner :

An ignition burner that operates continuously throughout the whole period that the boiler is in use;

b) Intermittent ignition burner :

An ignition burner that is ignited before and extinguished at the same time as the main burner;

c) **Alternating ignition burner :**

An ignition burner that is extinguished as soon as ignition of the main burner is effected. It re-ignites at the main burner flame just before the latter goes out;

d) **Interrupted ignition burner :**

An ignition burner that operates only during the ignition sequence.

1.3.3.2 combustion products circuit : Circuit including the combustion chamber, the heat exchanger and the circuit permitting evacuation of the combustion products to the flue, up to and including the flue outlet.

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

1.3.3.2.2 flue outlet : The part of the boiler through which the combustion products are evacuated to the flue system.

1.3.3.2.3 draught diverter : A device, placed in the combustion products circuit of a boiler, that is intended to maintain the quality of combustion within certain limits and to keep the combustion stable under certain conditions of updraught and downdraught.

1.3.3.2.4 combustion products discharge safety device : A device that at least causes safety shutdown of the main burner when there is an unacceptable spillage of combustion products at the draught diverter.

1.3.3.3 Adjusting, control and safety devices

1.3.3.3.1 pressure governor : A device which maintains the downstream pressure constant to within fixed limits independent of variations, within a given range, of the upstream pressure and the gas rate.

1.3.3.3.1.1 adjustable pressure governor : A pressure governor fitted with a means of adjusting the adjuster of the downstream pressure.

This means is considered as an "adjusting device".

1.3.3.3.2 volume governor : A device which maintains a rate between fixed limits, independent of upstream and downstream pressures, within a range of given values.

1.3.3.3.3 water rate monitoring device : A device that shuts off the gas supply to the main burner when the water rate through the boiler is less than a predetermined value and automatically reopens the gas supply when the water rate at least reaches this value.

1.3.3.3.4 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.

1.3.3.3.5 control thermostat : A device enabling the water temperature to be kept automatically, within a given range, at a predetermined value.