NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB/T 39488-2020

Safety and control devices for gas burners and gas-burning appliances - Particular requirements - Electronic type gas and air ratio control system

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1 Scope

This Standard specifies the structure and materials, requirements, test methods, inspection rules, marking, installation and operating instructions, packaging, transportation and storage of electronic type gas and air ratio control system for burners and burning appliances using city gas as specified in GB/T 13611.

This Standard applies to the electronic type gas and air ratio control system for gas-fired water heaters, gas-fired heating boilers, gas burners/machines, gas heaters, gas boilers and other gas-fired appliances or equipment under closed-loop control and for premixed combustion.

2 Normative References

The following documents are indispensable to the application of this document. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 2828.1 Sampling Procedures for Inspection by Attributes - Part 1.Sampling Schemes Indexed by Acceptance Quality Limit (AQL) for Lot-by-lot Inspection (GB/T 2828.1-2012, ISO 2859-1.1999, IDT)

GB/T 4208 Degrees of Protection Provided by Enclosure (IP code) (GB/T 4208-2017, IEC 60529.2013, IDT)

GB/T 13611 Classification and Basic Characteristics of City Gas

GB/T 14536.1-2008 Automatic Electrical Controls for Household and Similar Use - Part 1. General Requirements [IEC 60730-1.2003 (Ed3.1), IDT]

GB/T 14536.6-2008 Automatic Electrical Controls for Household and Similar Use - Particular Requirements for Automatic Electrical Burner Control Systems (IEC 60730-2-5.2004, IDT)

GB/T 30597-2014 General Requirements of Safety and Control Devices for Gas Burners and Gas-burning Appliances (ISO 23550.2011, MOD)

3 Terms and Definitions

The terms and definitions defined in GB/T 30597, GB/T 14536.1 and GB/T 14536.6, and the following are applicable to this document.

3.1 electronic type gas and air ratio control system

ERC A closed-loop control system composed of an electronic control module, actuators (including at least a gas regulating unit and an air flow regulating unit), and specified feedback signals, used to regulate the gas and air ratio. See Figure 1.

3.2 electronic control module

An electronic main control module containing all input/output control elements. See Figure 1.

3.3 defined state

A safe state that the system enters after a fault, characterized by one of the following.

a) The system passively enters a state where the gas supply is cut off, and when the cause of entering this state no longer exists, restarting is only possible in accordance with specific requirements;

b) The system actively executes a safety shut-down or enters a locked state within a specified time;

c) The system continues to operate and meets all safety-related functional requirements.

NOTE. adapted from GB/T 30597-2014, Definition 3.15.

3.4 fault reaction time

The time from the occurrence of a fault to the ERC entering the defined state.

NOTE. adapted from GB/T 30597-2014, Definition 3.16.

3.5 safety shut-down

Achieving safe gas shut-off through a limiter, safety shut-off device or internal fault detection.

NOTE. adapted from GB/T 14536.6-2008, Definition 2.3.122.

4.1 General Requirements

The ERC shall be a closed-loop system and shall comply with the following provisions.

a) The ERC shall include at least an electronic control module, two actuators (gas and air regulating unit part), and a sensor part (gas and air regulating unit sensor part or process sensor part). The structure and acceptable feedback types are shown in Figure

1 and Table 1;

Figure 1 -- Schematic Diagram of ERC Structure

b) The entire system shall include external devices, such as servo motors, regulators,

positioning devices, sensors, variable speed controllers for the combustion air blower, and combustion analysis feedback systems, etc.;

c) The ERC shall have continuous related self-test modes, such as operating mode,

4.3 Materials

The materials of the regulator and related mechanical components shall comply with the requirements of 5.3 in GB/T 30597-2014.

4.4 Gas Connection

The connection mode of the gas regulator and related mechanical components shall comply with the provisions of 5.4 in GB/T 30597-2014.

4.5 Electronic Elements

The structural design of the part of ERC that uses electronic elements shall comply with the provisions of 5.5 in GB/T 30597-2014.

5.1 General Requirements

The ERC shall comply with the provisions of 6.1 in GB/T 30597-2014.

5.2 Component Requirements

The components of the regulator shall comply with the provisions of 6.2 in GB/T 30597-2014.

5.3.1 Airtightness

The airtightness of the gas regulator of the ERC shall comply with the provisions of 6.3.1 in GB/T 30597-2014.

5.3.2 Torsion and bending

The torsional and bending resistance of the regulator of the ERC shall comply with the provisions of 6.3.2 in GB/T 30597-2014.

5.3.3 Rated flow rate

The rated flow rate of the ERC regulator shall comply with the requirements of 6.3.3 in GB/T 30597-2014.

5.3.4 Durability

The durability of the ERC regulator and related mechanical components shall comply with