

ICS 27.060.30
CCS J98



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 16508.6-2022

Replacing GB/T 16508.6-2013

Shell boilers - Part 6: Combustion systems

锅壳锅炉 第6部分：燃烧系统

Issued on: July 11, 2022

Implemented on: February 1, 2023

**Issued by: State Administration for Market Regulation;
Standardization Administration of China**

Table of Contents

- 1 Scope
- 2 Normative references
- 3 Terms, definitions and symbols
- 4 Combustion systems for liquid and gaseous fuels
 - 4.1 Fuel and burner selection
 - 4.3 Air supply and induction systems
 - 4.3.1 Air supply system
 - 4.3.2 Air induction system
 - 4.4 Combustion system safety and control
- 5 Layered combustion systems for solid fuels
 - 5.1 Fuel and combustion equipment
 - 5.2 Air supply and induction systems
 - 5.2.1 Air supply system
 - 5.2.2 Air induction system

1 Scope

GB/T 16508.6-2022 is the Chinese national standard on shell boilers - part 6: combustion systems, in the field of energy and heat transfer engineering. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 11 July 2022 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 February 2023. Classification: ICS 27.060.30, CCS J98. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document specifies the technical requirements for shell boiler combustion systems. This document is applicable to the shell boiler combustion systems defined in GB/T 16508.1, including:

a) Fuel inlet pipelines for liquid and gas fuel boilers, air supply and induction systems, combustion equipment as well as all related control and monitoring equipment;

b) Material supply (such as coal, biomass briquette fuel, etc.) system, air supply and induction system, combustion equipment, ash removal (slag) device and all related control and monitoring equipment of solid fuel layer-fired boilers. This document does not apply to combustion systems that use pulverized coal and coal- water slurry as fuel.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 2900.48, Electrotechnical terminology of boilers

GB 11174, Liquefied petroleum gases

GB/T 13612, Manufactured gas

GB/T 16508.1, Shell boilers - Part 1: General requirements

GB/T 16508.5, Shell boilers - Part 5: Safety appurtenances and instruments GB 17820, Natural gas

GB/T 18342, Commercial coal quality - Coal for travelling grate boiler

GB/T 24146, Rubber hoses and hose assemblies for use in oil burners - Specification

GB 25989, Fuel oils for burners

GB/T 36699, Specification for liquid fuels and gaseous fuels burners of boilers

GB/T 38753, Liquefied natural gas

GB 50041, Standard for design of boiler plant

JB/T 3271, Specification for travelling grate stokers NB/T 47034, Technical conditions of industrial boilers NB/T 47050, Technical specification for reciprocating grate NB/T 47062, Biomass molded fuel fired boilers

3 Terms, definitions and symbols

For the purposes of this document, the terms and definitions defined in GB/T 2900.48 and GB/T 16508.1 as well as the followings apply.

3.1 liquid fuel Natural organic fuels that are liquid at normal temperature and pressure as well as their processed liquid fuels, including light oil, heavy oil, and biomass oil.

3.2 gaseous fuel Natural organic fuels or artificial fuels that are gaseous at normal temperature and pressure, including natural gas, liquefied petroleum gas, coke oven gas, mixed city gas, blast furnace gas, converter gas, combustible industrial tail gas, hydrogen and biogas, etc.

3.3 solid fuel Solid fossil fuels, biomass fuels and processed fuels, including various qualities of coal (bituminous coal, anthracite, lignite, etc.), biomass solid fuels, combustible solid waste, etc.

3.4 flame detector A device that detects the presence or absence of a flame and sends a signal to the control device. NOTE: It generally consists of a sensing device and a switching device.

3.5 ignition device A device for igniting fuel in the ignition burner or main burner.

4.1 Fuel and burner selection

4.1.1 Natural gas shall meet the requirements of GB 17820. Liquefied natural gas, liquefied petroleum gas and artificial gas shall meet the requirements of GB/T 38753, GB/T 11174, and GB/T 13612, respectively.

4.1.2 Under the premise of not affecting the safe operation of the burner, the liquid fuel shall reach the viscosity required for its normal combustion at the burner inlet. Fuel oil shall meet the requirements of GB 25989.

4.1.3 Each boiler shall be equipped with an accumulative instrument for fuel quantity. It can be configured during boiler room design.

4.1.4 When designing or selecting a burner, factors such as boiler structure and parameters, fuel characteristics, flue gas resistance, excess air coefficient, and pollutant emissions shall be considered. They shall adapt to boiler load changes, use environment, etc.

4.1.5 The burner equipped with the boiler shall meet the requirements of GB/T 36699. Meet the following requirements when selecting:

- a) The actual output power of the burner shall be greater than or equal to the boiler thermal power divided by the boiler thermal efficiency.
- b) The flame diameter and length of the burner shall match the furnace chamber size of the boiler.

4.1.6 When the burner leaves the factory as an independent product, the accompanying documents shall at least include the following:

- a) Drawings of product appearance and installation dimensions;
- b) Electrical wiring diagram;
- c) Product instruction manual;
- d) Product certificate of conformity;
- e) Product type test certificate or inspection spot check certificate (copy);

f) Product packing list.

4.3.1 Air supply system

4.3.1.1 When multiple burners share one blower, a pressure measuring device shall be installed in front of each burner on the air supply pipeline.

4.3.1.2 When the air required for combustion is provided by a shared blower, a cut-off device (such as a baffle) shall be provided on the air duct of each burner. The following requirements shall be met:

- a) The opening and closing positions of the cut-off device shall be clearly indicated.
- b) When the fuel supply to the burner is cut off, the air supply shall be cut off according to the procedure.

4.3.2 Air induction system

4.3.2.1 The exhaust gas temperature of each boiler shall be monitored. For steam boilers with a rated evaporation capacity not less than 20 t/h or hot water boilers with a rated thermal power not less than 14 MW, the oxygen content in the exhaust gas shall be monitored. If the system has an induced fan, the opening or frequency of the induced fan shall be monitored.

4.3.2.2 Under the premise of ensuring that no flammable and explosive mixtures are produced, the exhaust ducts of multiple boilers can share one chimney. The smoke exhaust shall be guaranteed to be smooth. Baffles and limit devices shall be installed in the branch flue of each boiler. When the boiler is running, the baffle shall be fully open.

4.3.2.3 When setting up the flue gas recirculation system, the flue gas and air shall be mixed evenly. Take effective measures to prevent moisture condensation in the mixed gas from affecting normal combustion.

4.3.2.4 When the flue gas is corrosive, effective anti-corrosion measures shall be taken for the flue.

4.4 Combustion system safety and control

4.4.1 The burner shall be equipped with ignition device, automatic controller, safety cut-off valve, flame detector, air pressure monitoring device, fuel pressure monitoring device and other safety protection devices.

4.4.2 The configuration of the automatic safety cut-off valve of the burner shall comply with the provisions of GB/T 36699. For rotor cup atomized liquid fuel burners and medium atomized liquid fuel burners, the selection and arrangement of safety cut-off valves can refer to the requirements of pressure atomized burners.