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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 16508.5-2022

Replacing GB/T 16508.5-2013

Shell boilers - Part 5: Safety appurtenances and instruments

锅壳锅炉 第5部分：安全附件和仪表

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1 Scope

GB/T 16508.5-2022 is the Chinese national standard on shell boilers - part 5: safety appurtenances and instruments, 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 9 March 2022 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 October 2022. 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 requirements for safety appurtenances and instruments of shell boilers, including safety valves, pressure measuring devices, water level measuring devices, temperature measuring devices, sewage and water discharge devices, safety protection and other devices. This document applies to the safety appurtenances and

instruments selected for shell boilers defined in GB/T 16508.1.

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/T 12241, Safety valves - General requirements

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

GB/T 16508.3, Shell boilers - Part 3: Design and strength calculation

GB/T 36699, Specification for liquid fuels and gaseous fuels burners of boilers NB/T 47063, Safety valves for power station

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 set pressure of safety valve The set pressure at which a safety valve begins to open under operating conditions.

3.2 ignition safety time The safety time for burner ignition flame to ignite. That is, when no ignition flame is formed, the time interval between the ignition fuel control valve getting the opening signal and the closing signal.

3.3 extinction safety time When the burner is running, the time interval from when the flame detection device sends out the signal of flame extinguishment to when the safety shut-off valve starts to close.

4 Basic requirements

4.1 The safety appurtenances and instruments configured by the boiler shall meet the requirements for safe and reliable operation of the boiler.

4.2 The safety appurtenances and instruments configured by the boiler shall meet the requirements of relevant product standards.

4.3 All necessary parts required by boiler drawings and technical documents shall be equipped with measuring devices such as pressure, water level and temperature. The measuring device shall have an appropriate range and be safe and reliable. The measured values shall be accurate enough. Configure local and remote pressure, water level and temperature measuring devices according to the requirements of this document.

4.4 The calibration and maintenance of measuring instruments shall comply with the regulations of the national metrology management department.

5.1 Quantity and type

5.1.1 Each boiler shall be equipped with at least two safety valves (including drum and superheater safety valves). Only one safety valve may be installed if one of the following requirements is met:

a) Steam boilers with rated evaporation not greater than

0.5 t/h;

b) Steam boilers with rated evaporation less than 2 t/h and equipped with reliable overpressure interlock protection device;

c) Hot water boilers with a rated heating power no greater than

5.1.2 Steam boilers shall adopt full-open spring safety valves, lever safety valves or control safety valves (including pulse type, pneumatic type, hydraulic type and electromagnetic type, etc.). The hot water boiler can use a micro-opening safety valve. The selected safety valve shall meet the requirements of the corresponding technical transmission system.

5.4.7 The safety valve exhaust pipe of the steam boiler meets the following requirements.

a) Steam boiler safety valve shall be equipped with exhaust pipe. The exhaust pipe shall lead directly to a safe place. There shall be enough flow cross-sectional area. Ensure smooth exhaust. At the same time, the exhaust pipe shall be fixed. Avoid affecting the correct action of the safety valve due to thermal expansion or exhaust steam reaction. There shall not be any external force from the exhaust pipe applied to the safety valve.

b) The exhaust pipes of two independent safety valves shall not be connected.

c) The exhaust pipe arranged in the open air shall be equipped with a protective cover. The installation of the protective cover shall not hinder the normal operation and maintenance of the safety valve.

d) When the exhaust pipe of the safety valve is equipped with a muffler, its structure shall have a sufficient flow cross-sectional area. There must be a suitable bracket and a reliable hydrophobic device.

e) The bottom of the exhaust pipe of the safety valve shall be equipped with a drainpipe connected to a safe place. Valves shall not be installed on discharge pipes and drainpipes.

5.4.8 The safety valve of the hot water boiler shall be equipped with a discharge pipe. The discharge pipe shall lead directly to a safe place. There is enough discharge flow area to ensure smooth discharge. Valves shall not be installed on the discharge pipe. Antifreeze measures shall be taken.

5.5 Use and verification

5.5.1 After the safety valve is installed (including maintenance and replacement), its set pressure and tightness shall be verified. For the control type safety valve, the reliability test of the control circuit and the opening performance test shall be carried out, respectively.

5.5.2 After the safety valve is verified, it shall be locked or sealed. The inspection results of the set pressure and tightness shall be recorded in the boiler safety technical file.

5.5.3 During the operation of the boiler, the safety valve shall not be disconnected arbitrarily; the set pressure of the safety valve shall not be increased arbitrarily, or the safety valve shall not be invalidated.

5.5.4 During the operation of the boiler, the discharge test of the safety valve shall be carried out regularly. For control type safety valves, the control system shall be tested regularly.

5.5.5 In-use boiler safety valves are verified at least once a year. Verification is generally carried out when the boiler is running. If the on-site verification is difficult or after the safety valve is repaired, it can be carried out on the safety valve verification platform. The verified safety valve shall not be dropped, smashed or collided during transportation or installation.

6 Pressure measuring device

6.1 Each boiler shall be equipped with pressure gauges at the following locations:

a) in the steam space of the steam boiler shell (drum);

b) before the feed water regulating valve;

c) at the outlet of the economizer;

d) between superheater outlet and main steam valve;

e) on the shell (drum) of the hot water boiler;

f) at the outlet of water inlet valve and inlet of water outlet valve of hot water boiler;

g) at the outlet and inlet of the circulating water pump of the hot water boiler;

h) at the oil pump inlet (oil return) and outlet of the ignition oil system of oil-fired boilers and coal-fired boilers;

i) behind the gas source inlet of the ignition gas system of gas-fired boilers and coal- fired boilers and the pressure-regulating valve (regulator valve) of the gas valve group.

6.2 The selected pressure gauge meets the following requirements.

a) The pressure gauge accuracy shall not be lower than level 2.5. For boilers with a rated working pressure of not less than