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

GB/T 16507.1-2022

Replacing GB/T 16507.1-2013

Water-tube boilers - Part 1: General requirements

水管锅炉 第1部分：总则

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1 Scope

GB/T 16507.1-2022 is the Chinese national standard on water-tube boilers - part 1: general requirements, 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.

1.1 This document specifies the general technical requirements for scope definition, boiler parameters, construction specifications, energy saving and environmental protection of water-tube boilers.

1.2 This document applies to the following fixed water-tube boilers:

- a) Steam boilers with rated steam pressure greater than or equal to 0.1MPa;
- b) Hot water boilers with rated outlet pressure greater than or equal to 0.1MPa and rated thermal power greater than or equal to 0.1MW;
- c) Flue-type waste heat boilers with the main purpose of remaining (waste) heat utilization.

1.3 This document does not apply to water-tube boilers in the following ranges:

- a) Portable water-tube boilers;
- b) Cooling devices to meet the needs of equipment and process flow.

1.4 Refer to this document for fixed water-tube boilers with rated pressure less than 0.1MPa.

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 753, Steam condition series for utility boilers

GB/T 1921, Parameters for industrial steam boilers

GB/T 2900.48, Electrotechnical terminology of boilers

GB 3095, Ambient air quality standards

GB 3096, Environmental quality standard for noise

GB/T 3166, Parameters for hot water boilers

GB/T 10180, Thermal performance test code for industrial boilers

GB/T 10184, Performance test code for utility boiler

GB/T 10863, Thermal test method for gas pass heat recovery boiler

GB/T 10868, Steam converting valves for power station

GB/T 10869, Control valves for power station

GB/T 11943, Boiler drawings

GB/T 12241, Safety valves - General requirements

5 Definition of boiler scope

5.1 General requirements The scope of the boiler referred to in this document includes the boiler proper, pipelines within the scope of the boiler, safety accessories and instruments,

and so on. Refer to the definition in

3.1.2 for the boiler proper. Pipelines, safety accessories and instruments within the scope of the boiler are defined in accordance with the provisions of 5.2~5.3.

5.2 Pipelines within boiler scope The pipelines within the boiler scope include:

a) For power plant boilers, it includes the main water supply pipeline, main steam pipeline, reheat steam pipeline, and branch pipelines within the first valve (excluding valves), as shown in Figure 1; NOTE: The main water supply pipeline refers to the pipeline from the check valve at the outlet of the feedwater pump to the inlet header of the economizer. The main steam pipeline refers to the pipeline from the outlet header of the final superheater to the high-pressure main steam valve of the steam turbine (for boilers operating in the main pipe, to the first valve before the main pipe). Reheat steam cold section pipeline refers to the pipeline from the exhaust check valve of the steam turbine to the inlet header of the reheater. The hot section pipeline of reheat steam refers to the pipeline from the outlet header of the final reheater to

6 Boiler parameters

6.1 Boiler capacity The capacity of the boiler is expressed by rated evaporation (t/h) or maximum continuous evaporation (t/h) or rated thermal power (MW).

6.2 Rated parameters

6.2.1 The rated parameters of the boiler include rated evaporation (t/h) or rated thermal power (MW), rated pressure (gauge pressure) and rated temperature.

6.2.2 The rated parameters at the outlet of the boiler can be selected according to the following criteria:

- a) The rated parameters of fixed hot water boilers for industrial or domestic use are in accordance with GB/T 3166;
- b) The rated parameters of industrial stationary steam boilers are in accordance with GB/T 1921;
- c) The rated parameters of stationary steam boilers for power generation are in accordance with GB/T 753.

6.3 Pressure rating The boiler pressure rating is:

- a) Supercritical boiler: $p \geq 22.1 \text{ MPa}$;
- b) Subcritical boiler: $16.7 \text{ MPa} \leq p < 22.1 \text{ MPa}$;
- c) Ultra-high pressure boiler: $13.7 \text{ MPa} \leq p < 16.7 \text{ MPa}$;
- d) High pressure boiler: $9.8 \text{ MPa} \leq p < 13.7 \text{ MPa}$;

e) Sub-high pressure boiler: $5.3\text{MPa} \leq p < 9.8\text{MPa}$;

f) Medium pressure boiler: $3.8\text{MPa} \leq p < 5.3\text{MPa}$.

g) Low-pressure boiler: $p < 3.8\text{MPa}$.

7.1 Material allowable stress

7.1.1 Pressure element material The metal temperature is determined according to the working fluid temperature, ambient temperature or flue gas temperature of the part where the non-pressure element is located, combined with heat transfer conditions.

7.3 Load

7.3.1 When determining the dimensions (including wall thickness) of pressure elements, the loads caused by the following conditions shall be considered.

a) The internal or external pressure it is subjected to, and the static pressure it is subjected to.

b) When the additional stress generated by the following loads on the element causes the average stress increase to exceed 10% of the allowable stress, its influence shall be included: 1) Under the working conditions of operation and hydrostatic test, the self-weight of components (including those caused by component metal, internal storage medium, heat insulation and insulation layer, dust accumulation and slagging, fluidized bed material layer); 2) Loads borne by structural connections or loads caused by supports.

c) The pressure elements are subjected to the following loads. Additional analysis and calculation shall be carried out using the methods specified in the corresponding standards according to the actual situation: 1) The forces and moment loads formed by the integrally arranged connecting piping system or its thermal expansion, as well as the forces and moments formed by the instantaneously changing temperature difference or the difference in thermal expansion coefficient; 2) The periodic loads caused by rapid and frequent changes in pressure and temperature during normal operation and during start-up or shutdown.

7.3.2 When necessary, the following loads shall also be taken into account:

a) Gravity loads of ancillary equipment, pipes, escalators, platforms;

b) Wind load, earthquake load, snow load;

c) Forces connecting pipes and other components;

d) Shock loads, including shock loads caused by sharp pressure fluctuations and reaction forces caused by fluid shocks;

e) Forces during transport or hoisting.