

HG

Chemical Industry Standard of the People's Republic
of China

HG/T 5633-2019

**Heat exchanger of multitubular
silicon carbide**

列管式碳化硅换热器

(English Translation)

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Foreword

SAC/TC 162 is in charge of this English translation. In case of any doubt about the contents of English translation, the Chinese original shall be considered authoritative.

This standard is drafted in accordance with the rules given in the GB/T 1.1-2009.

This standard was proposed by China Petroleum and Chemical Industry Federation.

This standard was prepared by SAC/TC 162 National Technical Committee for Standardization of Non-metallic Chemical Equipment.

Heat exchanger of multitubular silicon carbide

1 Scope

1.1 This standard specifies terms and definitions, types, main dimensions and basic parameters, raw materials, design, manufacturing, inspection and acceptance, packaging, transportation, storage, and quality documents of tubular silicon carbide heat exchangers (hereinafter referred to as "heat exchangers").

1.2 This standard is applicable to tubular heat exchangers whose nominal diameter is not greater than 900 mm and whose silicon carbide tubes are adopted as components of heat exchange.

1.3 This standard is not applicable to heat exchangers with extremely hazardous media except for sulfuric acid.

1.4 This standard is applicable to the design pressure of heat exchanger as follows:

- a) For sulfuric acid, highly hazardous media, gas and liquefied gas and other media, the working pressure at the side of medium should be less than 0.1MPa;
- b) For media except for Item a), the design pressure should not be greater than 1.6MPa and the maximum working temperature of medium should be less than its normal boiling point.

1.5 This standard is applicable to the design temperature of heat exchanger as follows:

- a) The shell of the heat exchanger is steel vessel, which should meet the requirements of GB/T 150 code;
- b) The shell of the heat exchanger is glass lined vessel, which should meet the requirements of GB 25025 code;
- c) The shell of the heat exchanger is fluoroplastic lined vessel, which should meet the requirements of GB/T 35974.2 code;
- d) The shell of the heat exchanger is rubber lined vessel, which should meet the requirements of HG/T 20677 code.

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 150.1 *Pressure vessels – Part 1: General requirements*

GB/T 150.2 *Pressure vessels – Part 2: Materials*

GB/T 150.3 *Pressure vessels – Part 3: Design*

GB/T 150.4 *Pressure vessels – Part 4: Fabrication, inspection and testing, and acceptance*

GB/T 151 *Heat exchangers*

GB/T 3045 *Conventional abrasive—Chemical analysis of silicon carbide*

GB/T 10610 *Geometrical product specifications (GPS) – Surface texture: Profile method – Rules and procedures for the assessment of surface texture*

GB 25025 *Specification of glass-lined equipment for industry*
 GB/T 26501 *General technical specification for pressure vessels lined with fluoroplastics*
 GB/T 35974.2 *Plastics and plastic lining pressure vessels—Part 2: Material*
 GB/T 35974.5 *Plastics and plastic lining pressure vessels—Part 5: Fabrication, inspection and testing for pressure vessels with plastic lining*
 HG/T 20592 *Steel pipe flanges (PN designated)*
 HG/T 20677 *Design code for chemical equipment with rubber lining*
 JB/T 4712.1 *Vessel supports—Part 1: Saddle support*
 JB/T 4712.3 *Vessel supports—Part 3: Lug support*
 JB/T 4711 *Coating and packing for pressure vessels transport*
 JB/T 4732 *Steel Pressure Vessels—Design by Analysis*
 JC/T 2212 *Solid—state pressureless sintered silicon carbide ceramic heat exchanger tubes*
 NB/T 47003.1 *Steel welded atmospheric pressure vessels*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in GB/T 150.1, GB/T 151 and the following apply.

3.1 Silicon carbide

A chemical compound formed by the reaction of silicon dioxide with carbon at temperatures above 2000°C.

3.2 Free silicon

An unreacted monomer of silicon molecules present in silicon carbide.

3.3 Design temperature

Design temperature of metal parts is the same as GB/T 150.1 code, design temperature of metal lining parts, including glass lining parts, is the highest temperature that the lining layer can reach; Design temperature of tubes is the highest temperature that the wall of tubes can reach. Both design temperature and design pressure are design load conditions of heat exchanger designing.

4 Structure, main dimensions and basic parameters

4.1 Structure type, main dimensions, number of tubes and heat transfer area

Structure of heat exchanger see Figure 1, the detailed list of parts of heat exchanger see Table 1; main dimension marking profile of heat exchanger see Figure 2, main dimension list see Table 2; dimensions of nozzles see Table 3, tubes arrangement and heat transfer area of heat exchangers which diameter of tube is $\varnothing 14$ mm see Table 4, tubes arrangement and heat transfer area of heat exchangers which diameter of tube is $\varnothing 19$ mm see Table 5.

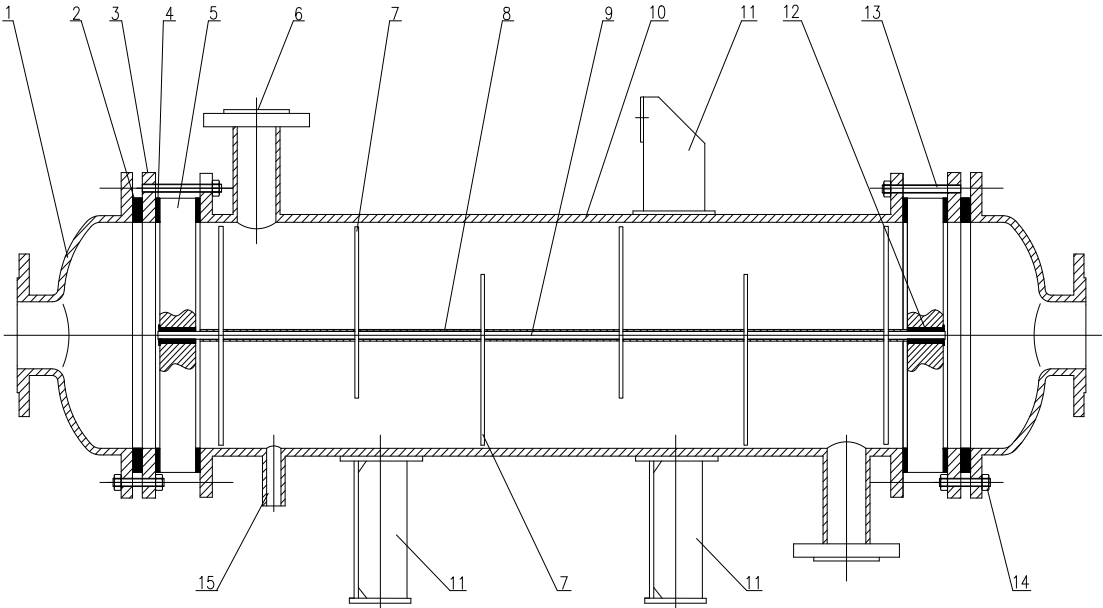


Fig.1 Structure of multitubular silicon carbide heat exchanger

Table 1 Detailed list of component parts

No.	Name	Code No.	Qty.	Material	Remark
1	Channel/Head	/	2	Carbon steel, stainless steel, glass lining parts, PTFE lining, etc	/
2	Gasket	/	2	PETE, PTFE coated parts, fluororubber, etc	/
3	Flange	HG/T 20592	2	Carbon steel, stainless steel, glass lining parts, PTFE lining, etc	/
4	Gasket	/	4	PTFE, PTFE coated parts, fluororubber, etc	/
5	Tube-sheet	/	2/4	Modified PTFE, PTFE lining, PTFE and metal components, etc	/
6	Nozzle	/	2	Carbon steel, stainless steel, glass lining parts, PTFE lining, etc	/
7	Baffle	/	According to the drawing requirements	Modified PTFE, carbon steel or other plastic/rubber materials	/
8	Spacer	/	According to the drawing requirements	Modified PTFE, carbon steel or other plastic/rubber materials	/
9	Tubes	JC/T 2212	According to the drawing requirements	Silicon carbide	/
10	Shell	/	1	Carbon steel, stainless steel, glass lining parts, PTFE lining, etc	/
11	Lug support	JB/T 4712.3	2/4	Carbon steel	For vertical equipment
	Saddle support	JB/T 4712.1	2	Carbon steel	For horizontal equipment
12	Packing seal assembly between tube and tube-sheet	/	According to the drawing requirements	PTFE, Fluororubber, etc	/
13	Bolts and other fasteners	/	According to the drawing requirements	/	/

Table 1 (Continued)

14	Bolts, clip and other fasteners	/	According to the drawing requirements	/	When the head is glass lined material, it shall be a special clamp for it.
15	Drain connection	/	According to the drawing requirements	Carbon steel, stainless steel, glass lining parts, PTFE lining, etc	/
Remark: The sequence numbers in the table correspond one to one with those in Figure 1.					

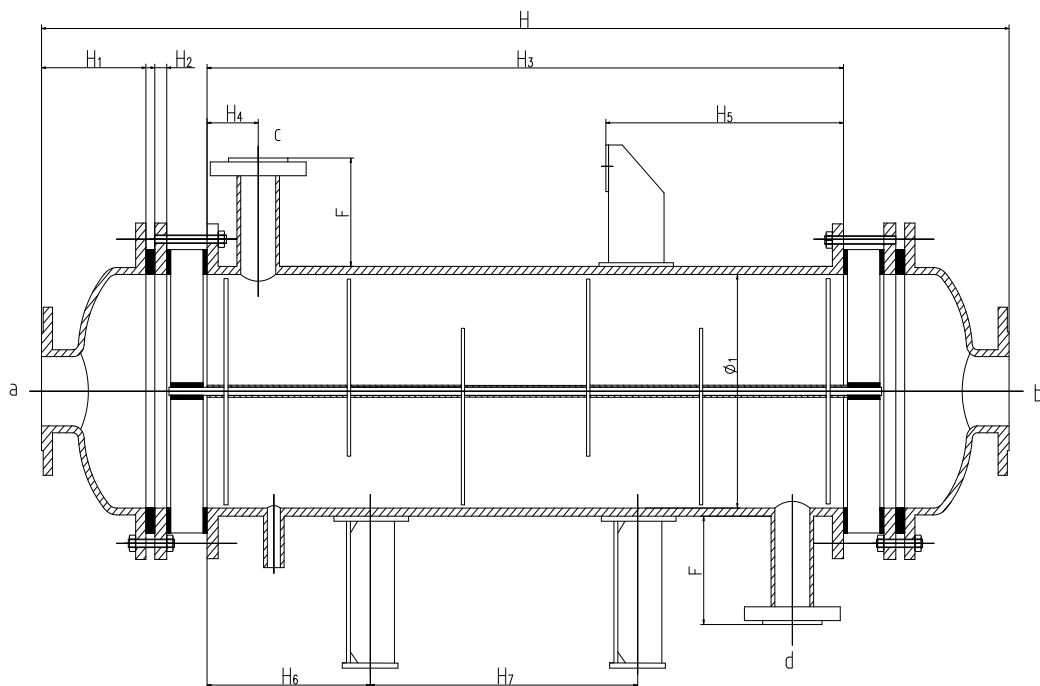


Fig.2 Main dimensions of multitubular silicon carbide heat exchanger

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