



National Standard of the People's Republic of China

GB 151—1999

Tubular Heat Exchangers



Issued on 1999-02-26

Enforced on 2000-01-01

Issued by China State Bureau of Quality and Technical Supervision

CONTENTS

Foreword	III
1 Scope	1
2 Applicable Standards	2
3 General Requirements	4
4 Materials	18
5 Design	21
6 Fabrication, Testing and Inspection, and Acceptance	98
7 Installation, Trial Run and Maintenance	107
Annex A (normative) Tubular Heat Exchangers in Low Temperature Service	108
Annex B (normative) Welding Procedure Qualification for Tube-to-Tubesheet Joints	115
Annex C (normative) Welded Austenitic Stainless Steel Tubes for Exchanger	118
Annex D (normative) Data of Non-Ferrous Metals for Exchanger Design	120
Annex E (informative) Tube Bundle Vibration	125
Annex F (informative) Calculation for Wall Temperature	139
Annex G (informative) Joints for Tubesheet-to-Shell and Tubesheet-to-Channel/Bonnet	154
Annex H (informative) Gaskets	157
Annex J (informative) Table for Exchanger Tube Characteristics	158
Annex K (informative) Calculation for Entrance or Exit Area between Shell and Tube Bundle	159

FOREWORD

This Standard is the revised edition of GB151—1989 based upon the “Project Plan for Standard Formulation and Revision” issued by the China State Bureau of Quality and Technical Supervision in 1993.

In light of the practical experiences since implementation of GB151—1989 and the developing demand of domestic tubular heat exchangers, and in reference to latest version of relevant foreign Codes, the content variations in this Standard are prescribed as follows:

1. Applicable scope is revised.
2. The original name *Steel Tubular Heat Exchangers* is altered to *Tubular Heat Exchangers* due to adding contents about aluminum, copper and titanium exchanger tubes.
3. The following contents are added:
Foreword
Applicable Standards
Annex C (normative) Welded Austenitic Stainless Steel Tubes for Exchanger
Annex D (normative) Data of Non-Ferrous Metals for Exchanger Design
Annex K (informative) Calculation for Entrance or Exit Area between Shell and Tube Bundle
4. The following contents are deleted from GB151—1989:
Annex A (Supplementary Document) Expansion Joint
Annex E (Referential Document) Threaded Exchanger Tube
5. The calculation formulas for flat cover, tubesheet of U-tube type heat exchanger and floating head flange of heat exchanger are improved, and the calculation formula for ligament width is presented.
6. Exchanger classification of Class I and Class II is altered to tube bundle classification of Class I and Class II.

Moreover, some provisions are rewritten in the chapters and paragraphs concerned.

This Standard will replace GB151—1989 from the implementation date.

The Annexes A, B, C and D are normative.

The Annexes E, F, G, H, J and K are informative.

This Standard is directed by the China National Standardization Committee on Pressure Vessel (CNSCPV), and prepared by the Sub-Committee on Heat-Exchange Equipments of CNSCPV.

The contributing members for preparing this Standard are listed below:

Lanzhou Petroleum Mechanical Research Institute	Zhu Juxian, Zhang Yanfeng
	Ma Xiaozhen
China Huan-Qiu Chemical Engineering Corp.	Zheng Tiansun
Luoyang Petro-Chemical Engineering Co. of SINOPEC	Sang Peiqing, Li Mingwei
Beijing Petro-Chemical Engineering Co. of SINOPEC	Lan Wenqing, Li Shiyu
Lanzhou Petro-Chemical Design Institute of SINOPEC	He Yongcai
China Wu-Huan Chemical Engineering Co.	Liu Youyi
Lanzhou Petro-Chemical Machinery Works	Fang Zuci, Li Xiaoyang
Qinghua University	Huang Kezhi, Xue Mingde
Tianjin University	Nie Qingde

The contributing members for editing this Standard are listed below:

China Petro-Chemical Engineering and Planning Institute of SINOPEC

Huang Xiurong

Shou Binan, Gu Zhenming

Wang Weiguo, Ye Qianhui

China General Petro-Chemical Mechanical Engineering Co.

Zhang Zhongkao

Supervision Bureau of Occupational Safety/Health and Boiler/Pressure Vessel

Hou Minglie

Construction Co-Ordination Bureau

Liang Zhixun

Lanzhou Petroleum Mechanical Research Institute

Zhou Jiandong, Chen Xiaozhou

This Standard was initially issued in February 1989 and enforced on September 1, 1989; and the first revised edition is issued in February 1999.

The CNSCPV has the authority to provide official interpretations of this Standard.

Tubular Heat Exchanger

1 SCOPE

This Standard specifies the requirements for design, fabrication, testing and inspection, and acceptance of unfired tubular heat exchangers (abbreviated “exchangers”, hereinafter).

1.1 This Standard is applicable to the exchangers of fixed tubesheet type, floating head type, U-tube type and packed floating tubesheet/head type (word “type” to be omitted, hereinafter).

1.2 The applicable parameters for exchangers shall be:

Nominal diameter $DN \leq 2600\text{mm}$;

Nominal pressure $PN \leq 35\text{MPa}$;

The product of nominal diameter (mm) and nominal pressure (MPa) shall not exceed 1.75×10^4 .

This Standard may also be referred for exchanger design and fabrication, of which the parameters exceed the above scope.

1.3 The applicable design temperature range in this Standard is identical to the specified application temperature range of material selected.

1.4 The following kinds of exchangers are exempted from the scope of this Standard:

(a) fired exchangers and waste heat boilers;

(b) exchangers subject to nuclear radiation;

(c) exchangers requiring fatigue analysis;

(d) exchangers covered in other Industrial Standards, such as specific exchangers used in industries of refrigeration, sugar making, pulp and paper making and beverage etc.

1.5 For the exchangers of design pressure less than 0.1MPa or vacuum less than 0.02MPa, JB/T4735 and the corresponding provisions of this Standard may be applied for design, fabrication, testing and inspection, and acceptance.

1.6 When the following design methods are adopted, they shall be evaluated and approved by the China National Standardization Committee on Pressure Vessel:

a) design by analysis (except the qualified Designer holding a certificate);

b) design by hydrostatic proof test for verification;

c) empirical design compared with the construction of similar design for like services.

完整版本请在线下单

或咨询：

TEL: 400-678-1309

QQ: 19315219

Email: info@lancarver.com

<http://www.lancarver.com>

线下付款方式：

1. 对公账户：

单位名称：北京文心雕语翻译有限公司

开户行：中国工商银行北京清河镇支行

账 号：0200 1486 0900 0006 131

2. 支付宝账户：info@lancarver.com

注：付款成功后，请预留电邮，完整版本将在一个工作日内通过电子 PDF 或 Word 形式发送至您的预留邮箱，如需索取发票，下单成功后的三个工作日内安排开具并寄出，预祝合作愉快！
