

HG

CHEMICAL INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

HG/T 20585-2011

Replacing HG 20585-1998

Technical requirements for steel low-temperature pressure vessels

钢制低温压力容器技术要求

(English Translation)

Issued on: May 18, 2011

Implemented on: June 1, 2011

Issued by: Ministry of Industry and Information Technology of the
People's Republic of China

Table of Contents

1	Scope
2	Normative References
3	Terms and Definitions
4	General
5	Pressure Vessels under Lower Temperature and Lower Stress Condition
6	Materials
7	Strength Calculation and Structural Design
8	Fabrication and Inspection
	Annex A (Normative Annex) Specifications of Cold Fabricated Austenitic Steel Rod for Bolts and Nuts
	Annex B (Normative Annex) Welding Consumables for Low Temperature Vessels
	Explanation of Wording in This Standard

1.0.1

This standard is applicable to the steel low temperature pressure vessels with design temperature lower than or equal to -20°C.

1.0.2

Unless otherwise specified, the other application scope, normative references and definitions of this standard are the same as those of "Steel Pressure Vessels" GB 150.

2 Normative References

The following documents are indispensable for the application of this standard. For dated references, only the dated edition is applicable to this document. For undated references, the latest editions of the normative documents (including all the amendments) are applicable to this document.

Steel Pressure Vessels GB 150

Tubular Heat Exchangers GB 151

Metallic Materials-Charpy Pendulum Impact Test Method GB/T 229

Steel Plates for Boilers and Pressure Vessels GB 713

Stainless Steel Covered Electrodes GB/T 983

Mechanical Properties of Corrosion-resistant Stainless-steel Fasteners-Part 1: Bolts, Screws and Studs GB/T 3098.6

Low Alloy Steel Plates for Low Temperature Pressure Vessels GB 3531

Stainless Steel Rods and Wires for Inert-Gas Shield Welding GB/T 4233

Stainless Steel Wires for Welding GB/T 4242

Carbon Steel Covered Electrodes GB/T 5117

Low Alloy Steel Covered Electrodes GB/T 5118

Steel Plate with Through-thickness Characteristics GB/T 5313

Quenched and Tempered High Strength Steel Plates for Pressure Vessels GB 19189

Stainless Steel Plate, Sheet and Strip for Pressure Equipments GB 24511

Specification of Design Base for Steel Chemical Vessels HG/T 20580

Specification of Materials Selection for Steel Chemical Vessels HG/T 20581

Specification of Strength Calculation for Steel Chemical Vessels HG/T 20582

Specification for Structural Design of Steel Chemical Vessels HG/T 20583

Technical Requirements for Fabrication of Steel Chemical Vessels HG/T 20584

Type and Specification for Pressure Vessel Flanges JB/T 4700

Welding Procedure Qualification for Steel Pressure Vessels JB 4708

Low-alloy Steel Forgings for Low Temperature Pressure Equipments NB/T 47009

Stainless and Heat-resisting Steel Forgings for Pressure Equipments NB/T 47010

Nondestructive Testing of Pressure Equipments JB 4730

Steel Pressure Vessels - Design by Analysis JB 4732

Mechanical Property Tests of Product Welded Test Coupons for Steel Pressure Vessels JB 4744

Technical Permission of Steel Welding Rod Purchasing for Pressure Vessels JB/T 4747

Supervision Regulation on Safety Technology for Stationary Pressure Vessel TSG R0004-2009

The design for the low temperature pressure vessels shall not only meet the relevant requirements of this standard but also meet the corresponding requirements of the above-mentioned standards.

3.0.1 Lowest operating temperature

It refers to the lowest metal temperature that may appear during the normal operating process of vessels.

3.0.2 Lowest environment temperature

It is the lowest value of the "monthly average lowest air temperature" over the years in this area.

"Monthly average lowest air temperature" means the quotient of the sum of lowest temperature at all the days in the current month divided by the number of days in that month.

3.0.3 Lowest design temperature

It refers to the set lowest metal temperature of the pressure parts under the normal operating conditions, regarded as the design load conditions together with corresponding design pressure.

1 Where each part of the vessel may generate different temperatures during the operating process, the predicted different temperatures may be regarded as the design temperature for each corresponding part.

2 Where the vessel walls directly contact the working medium and have external insulation, the lowest temperature of medium or the value of normal operating temperature of medium minus the possible downward fluctuating value of temperature shall be regarded as the design temperature.

3 Where there are heat transfer processes at both sides of the vessel wall, the design temperature may be determined according to the lowest temperature of the wall temperature calculated according to the heat transfer or the measured wall temperature, in consideration of the temperature fluctuating value.

4 As for the pressure vessels subject to the low temperature of environment, where their design temperature is controlled by the environment temperature, the lowest design temperature shall be determined according to the following principles.

1) As for the storing vessels containing compressed gas and without insulation facilities, the design temperature shall be the value of lowest environment temperature minus 3°C;

2) As for the storing vessels containing the liquid accounting for more than 1/4 of the vessel and without insulation facilities, the design temperature shall be the lowest environment temperature;

3) As for the vessels with insulation facilities, in which the materials are frequently in the flow conditions, the design wall temperature shall be determined through calculation

analysis or with reference to the examples, in comprehensive consideration of the temperature of material, flow, vessel size and heat dissipation conditions;

4) Except the vessels specially set for the emergency shutdown, the consideration for the influence of environment temperature to the vessel wall temperature shall be based on the normal operating conditions.

Generally, the design temperature is not determined by the unexpected temperature drop under the accident states or the natural temperature drop after shutdown.