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CHEMICAL INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

HG/T 20580-2011

Replacing HG 20580-1998

Specification for design basis of steel chemical vessels

钢制化工容器设计基础规定

(English Translation)

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1.0.1

This standard supplements and concretizes the design base for steel chemical vessels on the basis of "Steel pressure vessels" GB 150 and in combination with the practical engineering design.

1.0.2

Unless otherwise specified, the application scope of this standard is the same as that of "Steel pressure vessels" GB 150.

2 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. For dated reference, subsequent amendments to (excluding correction to), or revisions of, any of these publications do not apply. However, the parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards. For undated references, the latest edition of the normative document referred to applies.

Steel pressure vessels GB 150

Tubular heat exchangers GB 151

Dimension, shape, weight and tolerances for hot-rolled steel plates and sheets GB/T 709-2006

Steel plates for boiler and pressure vessels GB 713-2008

Hot-rolled plates and strips of carbon structural steels and high strength low alloy structural steels GB/T 3274

Low alloy steel plates for low temperature pressure vessels GB 3531-2008

Stainless steel plate, sheet and strip for pressure equipments GB 24511-2009

Seamless steel tubes for high-pressure for chemical fertilizer equipments GB 6479-2000

Seamless steel tubes for liquid service GB/T 8163-2008

Stainless steel clad plates sheets and strips GB/T 8165-2008

Seamless steel tubes for petroleum cracking GB 9948-2006

Steel spherical tanks GB 12337

Stainless steel seamless tubes for fluid transport GB/T 14976-2002

Load code for the design of building structures GB 50009

Code for seismic design of buildings GB 50011

Code for design of steel structures GB 50017

Code for design of vertical cylindrical welded steel oil tanks GB 50341

Specification on design of steel shell with liner HG/T 20678-2000

Carbon steel rectangular saddle ring packing HG/T 21554.1-1995

Stainless steel rectangular saddle ring packing HG/T 21554.2-1995

Carbon steel pall ring packing HG/T 21556.1-1995

Stainless steel pall ring packing HG/T 21556.2-1995

Carbon steel cascade ring packing HG/T 21557.1-1995

Stainless steel cascade ring packing HG/T 21557.2-1995

Stainless steel netted plat corrugated packing HG/T 21559.1-1995

Steel vertical vessels supported by skirt JB/T 4710-2005

Explosion welded clad plate for pressure vessels-part 1: stainless steel-steel clad plate

NB/T 47002.1-2009

Supervision regulation on safety technology for stationary pressure vessel TSG
R0004-2009

1 Pressure

Pressure refers to the force vertically acted on the object per unit area, namely intensity of pressure in physics.

1) Absolute pressure

Absolute pressure is the pressure measured subject to zero pressure in absolute vacuum, expressed by the pressure unit followed by A or a.

2) Gauge pressure

Gauge pressure is the difference between the internal pressure of pressure vessels and the ambient atmospheric pressure, expressed by the pressure unit followed by G or g. In the design documents (including drawings) of pressure vessels, the referred pressure refers to the gauge pressure unless otherwise specified.

3) Degree of vacuum

Degree of vacuum refers to the rarefaction degree of gas under the vacuum state.

Degree of vacuum = ambient atmospheric pressure [0.1 MPa(A)]-absolute pressure in the vessel (A).

The absolute value of negative gauge pressure in the vessel design is the degree of vacuum.

2 Operating pressure, working pressure

It is the maximum pressure that can be reached on the top of the vessel under normal working conditions.

"Normal working conditions" refers to the state of vessels normally and safely operating within the range of specified design conditions (such as environment, material, temperature and pressure) in the production process of continuous and normal operation.

3 Design pressure

It refers to the set maximum pressure on the top of the vessel, which shall be taken as the basic design conditions together with the corresponding design temperature, and its value shall not be less than the working pressure.

The design pressure determining principles are detailed in Chapter 4 of this standard.

4 Calculation pressure

It refers to the pressure for determining the thickness of each part of the vessel at corresponding design temperature, in consideration of the additional loads such as static pressure of liquid column.

As for the vessels composed of two or more pressure chambers (such as the vessel with jacket and the multi-cavity tower-type vessel with middle head), the maximum pressure difference between chambers shall be considered for determining the calculation pressure.

5 Maximum allowable working pressure (MAWP)

It refers to the maximum gauge pressure on the top of the vessel at the design temperature. This pressure is the minimum value of the calculation results according to the effective thickness of each pressure part of the vessel, in consideration of all the loads on the part.

The maximum allowable working pressure is used to set the initial pressure of vessel overpressure limit, make the best of the rounding thickness of the vessel, enlarge the pressure difference between the working pressure and the release pressure of the safety valve or rupture disk as much as possible, so as to make the pressure vessels work more stably.

6 Set pressure

1) Opening pressure

It refers to the predetermined pressure at which the safety valve clack starts to rise under the operating conditions.

2) Design bursting pressure

In the case of designing the rupture disk, the bursting pressure value at the design bursting temperature shall be proposed by the designer.

As for the pressure vessels equipped with overpressure relief devices, the set pressure of overpressure relief devices shall not be higher than the design pressure of the vessels.

As for the pressure vessels indicated with the maximum allowable working pressure in the drawings, the set pressure of the overpressure relief devices is allowed to be not higher than the maximum allowable working pressure of the vessels.