



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

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Standard for seismic design of petrochemical steel equipment

石油化工钢制设备抗震设计标准

(English Translation)

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1 General provisions

1.0.1

In order to implement the national laws and regulations on earthquake prevention and disaster reduction, implement a prevention-oriented policy, mitigate the seismic damage by seismic-fortifying the petrochemical equipment, reduce economic loss, this standard is

hereby formulated.

1.0.2 This standard is applicable to the seismic design of the petrochemical

horizontal vessel, vertical vessels supported by legs, vertical vessels supported by lugs, vertical vessels supported by skirt, spherical tanks supported by legs, vertical cylindrical storage tanks, tubular heater, other steel equipment which are used in the area where the basic seismic acceleration not exceeding 0.40 g or seismic fortification intensity of 9 degrees or less.

1.0.3 For the petrochemical equipment which is subjected to the seismic design according to this standard, when it is impacted by the fortification earthquakes equivalent to the seismic fortification intensity of the area, the body, bracing member, anchoring structure shall not be damaged.

1.0.4 The design parameters of ground motion or the seismic fortification intensity shall be determined in accordance with the relevant provisions of the current national standard "Seismic ground motion parameter zonation map of China" GB 18306. For the construction site where the seismic safety evaluation is completed, it shall carry out the seismic fortification according to the approved design parameters of ground motion or the seismic fortification intensity.

1.0.5 The seismic design of petrochemical steel equipment shall, in addition to complying with this standard, also comply with the relevant current national standards.

2.1.1 Seismic design

A specialized design for equipment that requires seismic fortification, including seismic calculations and seismic measures.

2.1.2 Seismic fortification intensity

The seismic intensity which is approved according to the authority as specified by the state as a basis for seismic fortification of a region.

2.1.3 Seismic action

The dynamic effects of equipment caused by ground motion, including horizontal seismic action and vertical seismic action.

2.1.4 Seismic effect

Internal forces or deformations generated by the equipment under seismic action.

2.1.5 Design parameters of ground motion

The time-history curve of acceleration of ground motion, the response spectrum of acceleration, the peak acceleration which are used for seismic design.

2.1.6 Design basic acceleration of ground motion

The design value of the acceleration of ground motion which exceeds the probability of 10% in the 50-year design base period.

2.1.7 Characteristic period of ground motion

In the seismic influence factor curve for seismic design, the period value corresponding to the starting point of the falling segment which reflects the factors such as seismic magnitude, epicentral distance, site category, and other factors.

2.1.8 Seismic influence factor

The statistical mean of the ratio of the maximum acceleration response to the gravitational acceleration of a single-mass point elastic system under seismic action.

m_{eq} - The equivalent total mass of equipment;

m_i, m_j - Respectively, the masses concentrated on the particles i, j ;

m_{eqv} - The vertical equivalent mass of equipment;

m_i - The mass concentrated at the particle i ;

m_j - The mass concentrated at the particle j ;

S_j - The effect produced by the horizontal seismic action of the vibration-mode j ;

S_h - Horizontal seismic effect;

X_{ji} - The horizontal relative displacement of the particle i of the j th vibration-mode.

2.2.2 Performance and resistance of materials.

E_t - The modulus of elasticity of the material at the design temperature;

R_{el} - The yield strength of material;

σ - The stress value under the action of load combination;

$[\sigma]$ - The allowable seismic stress of the material;

$[\sigma]_t$ - The allowable stress of the material at the design temperature;

$[\sigma]_b$ - The allowable seismic tensile stress of the material;

$[\sigma]_{bc}$ - The allowable seismic compressive stress of the material;