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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Anti-blast design standards for petrochemical buildings

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1 General

1.0.1 This standard is formulated in order to unify the anti-blast design of petrochemical buildings, achieve safety, reliability, advanced technology, and economical rationality.

1.0.2 This standard applies to the anti-blast design of newly built, expanded and reconstructed petrochemical buildings.

1.0.3 The anti-blast design of petrochemical buildings shall not only comply with the provisions of this standard, but also meet the provisions of the relevant current national standards.

2.1.1 blast resistant building

In order to protect the safety of personnel and facilities in the building and reduce the impact of external explosion accidents on production and operation, it is necessary to carry out anti-blast design of the building according to the explosion shock wave parameters determined by the explosion safety assessment.

2.1.2 air shock wave shock wave

A longitudinal wave with a strong discontinuity of air parameters formed by an explosion in the air, referred to as a shock wave.

2.1.3 Shock wave overpressure positive pressure of shock wave

The pressure value exceeding the ambient atmospheric pressure in the shock wave compression zone acts in the normal direction on the surface of the object surrounded by the shock wave.

2.1.4 dynamic pressure

When the shock wave propagates in the air, it has the effect of the rapid movement of the gas molecules in the shock wave, and has a clear directionality.

2.1.5 reflected overpressure

When the shock wave encounters an obstacle in the direction of propagation, the overpressure increase generated by reflection on the surface.

2.1.6 stagnation pressure

When the reflected pressure of the front wall is completely dissipated, the shock wave overpressure and dynamic pressure acting on the front wall.

2.1.7 peak incident overpressure peak incident side-on overpressure

The shock wave propagates outward from the center of the explosion in free air, and reaches the overpressure of the shock wave when it reaches the surface of the building closest to the center of the explosion.

2.1.8 ductility ratio

Indicates the ability of a structural member to absorb energy, which is equal to the ratio of the elastic-plastic deformation of the member to the elastic limit deformation.

2.1.9 primary structural member

The structural components on which the limit state of the structural bearing capacity depends, the damage of the components will affect the other components supported by them and the overall structural stability of the building. It mainly includes frame columns, frame beams, load-bearing walls, roof girders or steel structure trusses, etc.

2.1.10 secondary structural member

The load-bearing components supported by the main structural components and the non-load-bearing components outside the building that are directly subjected to the

overpressure of the explosion shock wave. It mainly includes non-load-bearing exterior walls, exterior wall panels, roof panels, and roof secondary beams.

2.1.11 reinforced masonry component

Reinforced block masonry, combined brick masonry and masonry components reinforced with stiffening materials such as anti-blast coatings.

2.1.12 blast resistant door

Special building doors that resist explosion shock waves from outside the building, including anti-blast doors for personnel passages, anti-blast doors for equipment passages, and anti-blast fire rescue doors.

2.1.13 blast resistant access door

The anti-blast protective door used for personnel to enter and exit the building normally.

2.11.14 Blast resistant equipment door

Anti-blast protective doors for large equipment entering and exiting buildings.

2.1.15 blast resistant fire-fighting and rescue service door

Anti-blast protective doors for fire rescue.

2.1.16 blast resistant window

Special fixed external windows for buildings that resist blast shock waves from outside the building.

2.1.17 Isolation front room air lock

A built-in compartment that prevents the explosion shock wave overpressure from entering the room on the personnel passage.

2.1.18 blast resistant valve

Installed on the opening of an explosion-resistant building, it is a valve that can resist the explosion shock wave from outside the building.

2.1.19 manned building (room)

Buildings (rooms) with fixed or permanent personnel working in the production process.

3 basic rules

3.0.1 The anti-blast requirements of anti-blast buildings, the peak incident overpressure of the blast shock wave and the time of positive pressure action shall be determined through the explosion safety assessment.

3.0.2 Newly-built manned buildings should not be arranged in areas where the peak incident overpressure of the blast shock wave is greater than 48kPa.

3.0.3 In addition to complying with the current national standard "Petrochemical Enterprise Design Fire Protection Standard" GB 50160 and "Building Design Fire Protection Code" GB 50016, the plane layout of newly-built anti-blast buildings shall comply with the relevant provisions of GB 50016 when the blast shock wave peak incident overpressure is greater than 6.9kPa, the following provisions shall still be complied with.

1 Buildings should be set up independently;

2 The safety exit of the building should not directly face the device or equipment with explosion hazard. When multiple outlets are set, they should be set in different directions.

3.0.4 After the explosion-resistant building is subjected to a design blast load, the performance of the building and structural components shall meet the following requirements.

1 Buildings may have local component damage, but it should not affect the overall stability of the structure;

2 The building can continue to be used, and general repair or replacement should restore its integrity;

3 The main structural components should not be seriously damaged;

3.0.14 In the anti-blast design of existing buildings, when only a part of the anti-blast design needs to be designed, the impact of the anti-blast design part after the non-blast-resistant design part is destroyed in the explosion should be taken into account.

3.0.15 The setting of awnings and outdoor stairs of newly-built anti-blast buildings shall comply with the following regulations.

1 All stressed components shall be checked against explosion;

2 When the peak incident overpressure of the blast shock wave is greater than 3.0kPa, the awning and outdoor stairs shall be of reinforced concrete structure;

3 When the peak incident overpressure of the blast shock wave is greater than 6.9kPa, no cantilevered awning, outdoor stairs should be installed, and roof inspection ladders should not be installed. When setting up the roof maintenance ladder, the connection with the main body of the building should be strengthened.

3.0.16 In the anti-blast design of existing buildings, when there are auxiliary components such as awnings and stairs on the outside, anti-blast reinforcement measures should be