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PEOPLE'S REPUBLIC OF CHINA**

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Standard for design of natural gas liquefaction plant

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1 General

1.0.1 This standard is formulated in order to implement relevant national laws, regulations, guidelines and policies, unify the design principles and technical requirements of natural gas liquefaction plants, and achieve advanced technology, safety and reliability, reasonable economy, energy conservation and environmental protection.

1.0.2 This standard is applicable to the engineering design of newly built, expanded or reconstructed natural gas liquefaction plants on land.

1.0.3 The engineering design of the natural gas liquefaction plant shall not only implement this standard, but also comply with the provisions of the current relevant national standards.

2.0.1 liquefied natural gas

A cryogenic liquid fluid whose main component is methane and which may contain small amounts of ethane, propane, nitrogen, or other components normally found in natural gas.

2.0.2 natural gas liquefaction plant

Production enterprises that convert gaseous natural gas into liquefied natural gas generally include units such as natural gas (raw gas) pretreatment, liquefaction, storage, loading and unloading, and gasification.

2.0.3 collecting basin

Structures used to collect leaked Class A liquid refrigerants, auxiliary products and liquefied natural gas.

2.0.4 production area

An area consisting of process units or facilities that use, produce flammable substances and may emit flammable gases.

2.0.5 Device storage tank (group) storage tanks within process plant

During the normal production process of the device, it does not directly participate in the

process, but the process requires storage tanks (groups) arranged in the device to meet the needs of balanced production or supplementary refrigerant. It mainly includes refrigerant storage tanks and auxiliary product storage tanks.

2.0.6 Process equipment process equipment

A general term for various pretreatment, liquefaction, and gasification equipment required to realize the process.

2.0.7 process plant area

An area consisting of one or more independent process equipment.

2.0.8 feed gas

Raw materials for natural gas liquefaction plants, such as natural gas, coal bed methane and other gases with methane as the main component.

2.0.9 feed gas preprocessing

In order to meet the requirements of liquefaction process and products, the process of removing impurities in raw gas, such as acid gas removal, dehydration, heavy hydrocarbon removal, benzene removal, mercury removal, deoxygenation, nitrogen removal, etc.

2.0.10 acid gas acid gas

The acid gas released from the feed gas is mainly composed of hydrogen sulfide and carbon dioxide.

2.0.11 refrigerant refrigerant

In the refrigeration system, the medium that provides cooling capacity through its own state change.

2.0.12 cold box cold box

It is composed of plate-fin heat exchanger or coiled tube heat exchanger and gas-liquid separator and other equipment, and is a low-temperature heat exchange equipment that has undergone heat insulation and cold preservation.

2.0.13 heated vaporizer heated vaporizer

Equipment that vaporizes liquefied natural gas and refrigerants through fuel combustion, electric energy or waste heat.

2.0.14 integral heated vaporizer

A heating gasifier in which the heat source and the gasification heat exchanger are integrated. Such gasifiers include submerged combustion gasifiers.

2.0.15 remote heated vaporizer remote heated vaporizer

The main heat source is separated from the gasification heat exchanger, and the heating gasifier uses heat medium fluid (such as water, steam, isopentane, ethylene glycol, etc.) as the heat transfer medium.

2.0.16 ambient vaporizer

A gasifier that draws heat from a natural heat source, such as the atmosphere, sea water, or geothermal water.

2.0.17 single containment tank

Single-wall storage tanks with insulation or tanks consisting of an inner tank and an outer tank. The inner tank can meet the requirements of storing low-temperature frozen liquid, and the outer tank is mainly used as a support and protective insulation layer, and can withstand the pressure of gas purging, but it cannot store the low-temperature frozen liquid leaked from the inner tank.

4 Regional planning 4.0.1 The regional planning of the natural gas liquefaction plant shall be reasonably arranged according to the characteristics and fire hazards of the plant itself and adjacent plants or facilities, combined with conditions such as terrain, wind direction, gas source and transportation.

4.0.2 Natural gas liquefaction plants should be far away from urban residential areas and social public welfare facilities, and should be located on the upwind side of the minimum frequency wind direction adjacent to urban residential areas and social public welfare facilities.

4.0.3 The natural gas liquefaction plant site selection should avoid the following areas or areas.

- 1 Seismogenic faults and areas with seismic fortification intensity of 9 degrees and above;
- 2 Drinking water source protection areas; forest and agricultural protection and development planning areas designated by the state; nature reserves, scenic spots and historical relics protection areas;
- 3 Landslides, landslides, mud-rock flows, quicksand, serious ground subsidence or subsidence and other geological disaster-prone areas and key prevention and control areas, within the surface limits of mining collapse and dislocation areas;

4 Flood storage and detention areas, areas that may be submerged after the dam or embankment breaks;

5 areas that endanger the airspace protection zone of the airport;

6 Mineral deposit areas or mineral resource reserve areas with mining value;

7 Sections with severe self-weight collapsible loess sections, newly accumulated loess sections with large thickness and saturated loess sections with high compressibility and other sections with poor engineering geological conditions;

8 Windy areas in mountainous or hilly areas.

4.0.4 When the natural gas liquefaction plant is arranged along the river bank, it should be located downstream of important buildings (structures) such as towns adjacent to the river, important wharves, important bridges, shipyards, and storage areas.

4.0.5 Regional oil and gas pipelines are not allowed to pass through the natural gas liquefaction plant area, and roads and regional overhead power lines are strictly prohibited from passing through the natural gas liquefaction plant production area.

4.0.6 Flammable liquid storage tanks (groups) should not be arranged close to rivers and flood drainage ditches. When it is necessary to arrange due to conditions, reliable measures should be taken to prevent flammable liquids from flowing into rivers and flood drainage ditches.

4.0.7 The fire separation distance for the area layout of the natural gas liquefaction plant shall not be less than the provisions in Table 4.0.7.

4.0.8 The fire separation distance of elevated flares shall be calculated and determined according to the allowable radiant heat intensity of outsiders or equipment in the natural gas liquefaction plant. The safety layout requirements for the range of different radiant heat intensity ranges of flare emissions should comply with the relevant provisions of the current national standard "Code for Layout Design of Petrochemical Plants" GB 50984.

4.0.9 When the natural gas liquefaction plant is built adjacent to petroleum and natural gas chemical and coal chemical enterprises, the fire separation distance shall not be less than the provisions in Table 4.0.9.

4.0.10 The natural gas liquefaction plant shall be located in an area not threatened by floods, tides or waterlogging, and when unavoidable, reliable flood control and waterlogging measures shall be taken.

5 General layout of the factory

5.1 General provisions 5.1.1 The general layout of the factory should be based on the characteristics of the production process, the fire hazard, the relationship between the devices, and in combination with the terrain, wind direction and surrounding environment,