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Technical standard of fueling station

汽车加油加气加氢站技术标准

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Technical standard of fueling station

1 General provisions

1.0.1 This standard is formulated, in order to implement relevant national guidelines and policies in the design and construction of fueling stations, unify technical requirements, achieve safety and applicability, advanced technology, economical rationality.

1.0.2 This standard is applicable to the design and construction of newly built, expanded, reconstructed automobile oil fueling stations, gas stations, oil and gas combined fueling stations, oil and hydrogen combined fueling stations, gas and hydrogen combined fueling stations, oil and gas and hydrogen combined fueling stations.

1.0.3 The design and construction of vehicle oil fueling, gas fueling, hydrogen fueling stations shall not only comply with this standard, but also comply with the relevant current national standards.

2 Terms and abbreviations

2.1 Terms

2.1.1 Fueling station

It is a place for fueling motor vehicles with vehicle fuel, including gasoline, diesel, LPG, CNG, LNG, hydrogen, liquid hydrogen. It is a generic term of oil fueling station, gas fueling station, oil and gas combined fueling station, oil and hydrogen combined fueling station, gas and hydrogen combined fueling station, oil and gas and hydrogen combined fueling station

2.1.2 Oil fueling station

A place which has oil storage facilities AND uses fuel dispensers to refuel motor vehicles with gasoline (including methanol gasoline, ethanol gasoline), diesel and other vehicle fuels.

2.1.3 Gas fueling station

It is a place which has gas storage facilities AND uses a gas dispenser to refill motor vehicles with vehicle gas, such as LPG, CNG or LNG.

transportation; CNG and hydrogen can be supplied by long-tube trailers or tube-bundle containers or pipeline delivery.

3.0.2 The scale of automobile oil fueling, gas fueling and hydrogen fueling stations shall be determined according to resource conditions, market demand, surrounding environment and other factors. Oil fueling stations, gas fueling stations, hydrogen fueling stations can be jointly built, in accordance with Article 3.0.12 ~ Article 3.0.23 of this standard.

3.0.3 The portable fueling device shall not be used in places other than the enterprise's own use, temporary or specific places; it shall be built separately. The design and installation of oil fueling stations, which use portable fueling devices, shall comply with the current industry standard "Technical specification for portable filling device in automobile filling station" SH/T 3134 and the relevant provisions of Article 6.4 of this standard.

3.0.4 The design of ethanol gasoline facilities in oil fueling stations shall not only comply with the provisions of this standard, but also comply with the relevant provisions of the current national standard "Code for design of automobile ethanol gasoline storage and transportation" GB/T 50610.

3.0.5 Electric vehicle charging facilities can be set up in vehicle oil fueling, gas fueling and hydrogen fueling stations. The design of electric vehicle charging facilities shall not only comply with the provisions of this standard, but also comply with the relevant provisions of the current national standard "Design code for electric vehicle charging station" GB 50966.

3.0.6 For the CNG fueling stations, LNG fueling stations, urban natural gas master stations and storage and distribution stations, LNG gasification stations, as well as the CNG and LNG and urban natural gas receiving combined master stations, the design and construction shall not only comply with the provisions of this standard, but also comply with the relevant provisions of the current national standard "Code for design of city gas engineering" GB 50028.

3.0.7 For the CNG fueling and natural gas transmission pipeline combined stations, the design and construction shall not only comply with the provisions of this standard, but also comply with the relevant provisions of the current national standard "Standard for urban water conservation evaluation" GB 50183.

3.0.8 Vehicle oil fueling, gas fueling and hydrogen fueling stations can be set up to operate non-oil business facilities, in accordance with relevant national provisions.

3.0.9 The grading of oil fueling stations shall comply with the provisions in Table 3.0.9.

- 1** The numbers in brackets in the Table are the safety distance -- between the buried LPG storage tanks and buildings (structures) outside the station.
 - 2** Outdoor transformation and distribution substation refers to the outdoor transformation and distribution substation, which has a power system voltage of 35 kV ~ 500 kV and each transformer capacity above 10 MV • A, as well as the outdoor step-down substation, which has a total transformer oil volume of industrial enterprises greater than 5 t. Outdoor substations or transformers of other specifications shall be determined, according to the production plant of category C items.
 - 3** The distance -- between the liquefied petroleum gas equipment and the entrances and exits, doors and windows of the basement of the categories I, II, III protection objects outside the station -- shall be increased by no less than 50%, according to the safety distance of the categories I, II, III protection objects in this Table.
 - 4** When the wall of a civil building of grade I and grade II fire resistance facing the gas station is a solid wall, which has no door and without openings, THEN the distance - - between the LPG equipment and the civil building -- shall not be less than the 70% of the safety distance specified in this Table.
 - 5** For gas fueling stations, which have integrally assembled above-ground LPG storage tanks with a capacity less than or equal to 10 m³, the distance -- between the tank and the buildings (structures) outside the station -- shall not be less than 80% of the safety distance between the above-ground tanks for the grade III stations in this Table, and shall not be less than 11 m.
 - 6** The distance -- between the LPG storage tank and the independent civil building with a construction area not exceeding 200 m² outside the station -- shall not be lower than 80% of the safety distance of the category III protective objects in this Table, meanwhile it shall not be less than the safety distance of the grade III station.
 - 7** The grade I station, grade II station, grade III station in the Table include the grade of the combined station.
 - 8** H is the pole height or tower height of overhead communication lines and overhead power lines.
- 4.0.6** The safety distance -- between CNG fueling stations, CNG process equipment in various combined stations and buildings (structures) outside the stations -- shall not be less than the provisions in Table 4.0.6.

the fire distance of the corresponding equipment in this Table.

2 The fire distance -- between hydrogen long-tube trailers, tube bundle containers and buildings (structures) outside the station -- shall be determined according to the fire distance of hydrogen storage vessels in this Table.

3 The grade I station, grade II station, grade III station in the Table include the grade of combined stations.

4 Where there is a solid protective wall in compliance with Article 10.7.15 of this standard, between the hydrogen process equipment in the Table and the buildings (structures) outside the station, THEN, the corresponding safety distance (except for important public buildings) shall not be less than 50% of the safety distance specified in this Table, meanwhile it shall be not less than 8 m. The safety distance -- between hydrogen storage wells, hydrogen compressor rooms (chambers), hydrogen dispenser, liquid hydrogen unloading points and urban roads -- shall not be less than 5 m.

5 When the working pressure of the hydrogen equipment in the Table is greater than 45 MPa, the safety distance -- between the hydrogen equipment and the buildings (structures) outside the station (excluding overhead communication lines and overhead power lines) -- shall be increased by no less than 20% according to the safety distance in this Table.

6 When the distance -- between the liquid hydrogen process equipment and the location with open flame or sparks -- is less than 35 m, a solid wall which has a height of not less than 2.2 m shall be set between the two.

7 The numbers in brackets in the Table are the safety distance -- between the liquid hydrogen storage tank and the buildings (structures) outside the station.

8 H is the pole height or tower height of overhead communication lines and overhead power lines.

4.0.9 In Table 4.0.4 ~ Table 4.0.8 of this standard, the starting and ending points for the calculated spacing of equipment or buildings (structures) shall comply with the provisions of Appendix A of this standard.

4.0.10 In Tables 4.0.4 ~ 4.0.8 of this standard, the division of protection categories for important public buildings and civil buildings shall comply with the provisions of Appendix B of this standard.

4.0.11 In Table 4.0.4 ~ Table 4.0.8 of this standard, the definitions of "open flame location" and "spark emitting location", as well as the division of "category A, B, C, D, E items" and "category A, B, C liquid" shall comply with the relevant provisions of the current national standard "Code of design on building fire protection and prevention" GB 50016.

4.0.12 The overhead power lines shall not cross the operation area of the vehicle oil fueling, gas fueling and hydrogen fueling station. Overhead communication lines shall not cross the operation area of hydrogen fueling facilities, in gas fueling stations and hydrogen fueling combined stations.

4.0.13 The flammable medium pipelines not related to the vehicle oil fueling, gas fueling, hydrogen fueling station shall not cross the land area of the vehicle oil fueling, gas fueling, hydrogen fueling station.

5 Layout of station

5.0.1 Vehicle entrances and exits shall be set separately.

5.0.2 The parking spaces and roads in the station area shall comply with the following requirements:

1 The width of the lane or parking space, in the station, shall be determined according to the vehicle type. The width of single-lane or single-vehicle parking spaces, in the primary CNG fueling station, shall not be less than 4.5 m; the width of double-lane or double-vehicle parking spaces shall not be less than 9 m. The width of the lane or parking space, single-vehicle lane or single-vehicle parking space, for the oil fueling, gas fueling and hydrogen fueling stations for other types of vehicles shall not be less than 4 m; the width of the double-lane or the double-vehicle parking space shall not be less than 6 m.

2 The turning radius of the road within the station shall be determined according to the driving vehicle type, which should not be less than 9 m.

3 The parking space in the station shall be on a flat slope; the slope of the road shall not be greater than 8%, meanwhile it should be sloped towards the station.

4 Asphalt pavement shall not be used for the parking lot and road pavement in the work area.

5.0.3 There shall be a boundary mark between the operation area and the auxiliary service area.

5.0.4 In the oil, gas and hydrogen combined fueling station, diesel tanks should be arranged between gas storage facilities or hydrogen storage facilities and gasoline tanks.

5.0.5 In the operation area of oil fueling, gas fueling, hydrogen fueling station, there shall be no "open flame location" or "spark emitting location".

5.0.6 The layout of diesel tail gas treatment fluid filling facilities shall meet the following requirements:

- 1 The equipment that does not meet the explosion-proof requirements shall be arranged outside the explosion danger zone, meanwhile the distance from the boundary line of the explosion danger zone shall not be less than 3 m;
- 2 The equipment that meets the explosion-proof requirements can be treated as a diesel dispenser in the plane layout;
- 3 When the liquid storage tank (cylinder) or portable equipment of diesel tail gas treatment fluid is arranged on the fueling island, the capacity shall not exceed 1.2 m³, meanwhile the liquid storage tank (cylinder) or portable equipment shall be 100 mm from the edge of both sides of the island and within 1.2 m of the island end.

5.0.7 Electric vehicle charging facilities shall be arranged in the auxiliary service area.

5.0.8 The transformer and distribution rooms or outdoor transformers of oil fueling, gas fueling and hydrogen fueling stations shall be arranged, outside the working area. The starting calculation point of the substation and distribution room shall be openings, such as doors and windows.

5.0.9 The station house shall not be arranged in the explosion danger zone. When the station house is partly located in the operation area, the building area, etc. shall comply with the provisions of Article 14.2.10 of this standard.

5.0.10 When non-oil business buildings or facilities are provided in the vehicle oil fueling, gas fueling and hydrogen fueling station, they shall not be arranged in the operation area. The fire distance from the flammable liquid or flammable gas equipment in the station shall comply with the relevant provisions of Article 4.0.4 ~ Article 4.0.8 of this standard, on the category III protective objects. When open flame equipment is installed in facilities, such as commercial catering, car service, driver's lounge in the station, it shall be equivalent to "open flame location" or "spark emitting location".

5.0.11 The explosion hazardous area in the automobile oil fueling, gas fueling and hydrogen fueling station shall not exceed the station area enclosure wall and the available land boundary.

5.0.12 An incombustible solid wall should be set, between the process equipment of the vehicle oil fueling, gas fueling and hydrogen fueling station and the buildings (structures) outside the station. The height of the wall should not be lower than 2.2 m, as relative to the terrain inside and outside the station. When the distance -- between the process equipment of the vehicle oil fueling, gas fueling and hydrogen fueling station and the buildings (structures) outside the station -- is greater than 1.5 times the safety distance in Table 4.0.4 ~ Table 4.0.8 of this standard, meanwhile it is more than 25 m, it may set a non-solid enclosure wall. The side facing the vehicular entry and exit roads may or may not have a non-solid enclosure wall. For the external buildings (structures)

V_t - Storage tank volume (m^3).

6.1.8 Static elimination objects installed in the tank shall be grounded. The grounding resistance shall meet the relevant requirements in Article 11.2 of this standard.

6.1.9 There shall be a penetration gap -- between the inner wall and the outer wall of the double-layer oil tank, that meets the requirements of leak detection.

6.1.10 For double-layer steel oil tanks, double-layer oil tanks with inner steel and outer glass fiber reinforced plastics, double-layer oil tank with non-metallic anti-seepage linings such as glass fiber reinforced plastics, it shall provide a leak detection standpipe AND meet the following requirements: Regulation:

- 1 The detection standpipe shall be steel pipe; the diameter should be 80 mm; the wall thickness should not be less than 4 mm;
- 2 The detection standpipe shall be located on the longitudinal centerline of the oil tank top;
- 3 The bottom nozzle of the detection standpipe shall be connected with the gap between the inner and outer walls of the oil tank; the top nozzle shall be equipped with a dust cover;
- 4 The detection standpipe shall meet the requirements of manual detection and on-line monitoring; meanwhile it shall ensure that any leakage in any part of the inner and outer walls of the oil tank can be found.

6.1.11 Steel manhole covers shall be used for oil tanks.

6.1.12 When the oil tank is installed under the non-vehicle road, the soil thickness above the tank roof shall not be less than 0.5 m. When it is installed under the roadway, the tank roof should not be less than 0.9 m below the concrete pavement. The surrounding of the steel oil tank shall be backfilled with neutral sand or fine soil; its thickness shall not be less than 0.3 m. For the oil tank whose outer layer is made of glass fiber reinforced plastic material, the backfill shall meet the requirements of the product specification.

6.1.13 When the buried oil tank has the possibility of floating due to groundwater or rainwater, it shall take measures to prevent the oil tank from floating.

6.1.14 Manholes of buried oil tanks shall be provided with operating wells. The manhole wells located under the roadway shall adopt the special airtight manhole cover and well seat under the roadway of gas stations.

6.1.15 Anti-overfilling measures shall be taken for unloading oil tanks. When the oil reaches 90% of the oil tank capacity, it shall be able to trigger the high liquid level alarm device. When the oil reaches 95% of the oil tank capacity, it shall be able to

automatically stop the oil from continuing to enter the tank. The high level alarm device shall be located in a place, where the staff can easily observe it.

6.1.16 For a fueling station which is equipped with an oil vapor recovery system, the oil tank in the station shall be equipped with a liquid level monitoring system, which has high liquid level alarm function. The liquid level monitoring system of a single-layer oil tank shall still have a leak detection function; the leak detection resolution should not be greater than 0.8 L/h.

6.1.17 The anti-corrosion design of the outer surface of the steel oil tank, which is in contact with the soil, shall comply with the relevant provisions of the current industry standard "Design standard for anticorrosion coating of equipment and piping in petrochemical industry" SH/T 3022; meanwhile the anti-corrosion grade shall not be lower than the reinforced grade.

6.2 Oil dispenser

6.2.1 Oil dispensers shall not be installed indoors.

6.2.2 The fueling gun shall be a self-sealing fueling gun. The flow rate of the gasoline fueling gun shall not exceed 50 L/min.

6.2.3 A safe break valve should be installed on the fueling hose.

6.2.4 For oil dispensers, which are supplied with positive pressure (submersible pump), a shear valve shall be installed on the oil supply pipeline at the bottom. When the oil dispenser is hit or caught fire, the shear valve shall be able to close automatically.

6.2.5 When an oil dispenser with multiple oil products is used, the gun placing position on the fuel dispenser shall be marked with the text of each fuel product; the fueling gun shall be color coded.

6.3 Pipeline system

6.3.1 Gasoline and diesel oil tank must be unloaded in a closed way. Gasoline tank cars shall have an unloading oil vapor recovery system.

6.3.2 Each oil tank shall be provided with an oil unloading pipe and an oil unloading interface. Each oil unloading interface and oil vapor recovery interface shall be clearly marked.

6.3.3 The oil unloading interface shall be equipped with a quick connector and a sealing cover.

6.3.4 The design of the vapor recovery system for oil unloading at gas stations shall

meet the following requirements:

- 1 The gasoline tank car shall adopt a balanced closed oil vapor recovery system, for unloading oil to the oil tank in the station;
- 2 Each gasoline tank car can share a primary pipe for recovery of unloading oil vapor; the nominal diameter of the primary pipe for vapor recovery should not be less than 100 mm;
- 3 Self-closing quick connectors and caps should be used for the interface of the oil vapor recovery pipeline, for unloading oil. When non-self-closing quick connectors are used, valves and caps shall be installed on the connecting pipeline, which is close to the quick connectors.

6.3.5 The fueling station should adopt the fueling process of one pump supplying multiple dispensers (guns), where a submersible pump is installed in the oil tank. When a self-priming fuel dispenser is used, each fuel dispenser shall be individually equipped with an oil inlet pipe and a bottom valve in the tank, according to the fuel type.

6.3.6 The fueling station shall adopt a fueling vapor recovery system.

6.3.7 The design of the fueling vapor recovery system shall meet the following requirements:

- 1 Vacuum-assisted oil vapor recovery system shall be adopted;
- 2 An oil vapor recovery pipeline shall be installed, between the gasoline dispenser and the oil tank. Multiple gasoline dispensers can share one primary oil vapor recovery pipe; the nominal diameter of the primary oil vapor recovery pipe shall not be less than 50 mm;
- 3 The fueling oil vapor recovery system shall take measures, to prevent the oil vapor from flowing backward to the fueling nozzle;
- 4 The fuel dispenser shall have the function of recovering oil vapor; its gas-liquid ratio should be set at 1.0 ~ 1.2;
- 5 At the connection between the bottom of the fuel dispenser and the oil vapor recovery standpipe, a wire connected tee for testing liquid resistance and system tightness shall be installed; a ball valve with a nominal diameter of 25 mm and a plug shall be installed, on the short bypass pipe.

6.3.8 The connection pipe arrangement of the oil tank shall meet the following requirements:

- 1 The connecting pipe shall be made of metal;
- 2 The connecting pipe shall be arranged on the top of the oil tank, wherein the oil

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