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**Technical requirements for lectotype of refrigerated and
insulated vehicles**

冷藏保温车选型技术要求

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Technical requirements for lectotype of refrigerated and insulated vehicles

1 Scope

This standard establishes the classification, vehicle requirements, compartment requirements, special configuration requirements, vehicle lectotype, and vehicle body marking requirements of refrigerated and insulated vehicles.

This standard applies to the lectotype of refrigerated and insulated vehicles for road transportation.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 6420-2017 Freight trailer series pedigree

GB 7258 Technical specifications for safety of power-driven vehicles operating on roads

GB 8624 Classification for burning behavior of building materials and products

GB 20891 Limits and measurement methods for exhaust pollutants from diesel engines of non-road mobile machinery (CHINA III, IV)

GB/T 21145 Mechanical transport refrigeration units

GB 29753 Safety requirements and test methods for refrigerating van for transporting food and biological products on road

JT/T 1325 Technical requirements and inspection methods for driving temperature recorders

QC/T 252 Type test regulations for special automobile

QC/T 449 Technical conditions and test methods of insulated and refrigerated vehicles

3 Terms and definitions

The terms and definitions specified in GB 29753 and the followings apply to this document.

3.1 Refrigerated and insulated vehicles

Cargo transportation vehicles that are equipped with temperature-regulating equipment and compartments with the function of maintaining a predetermined temperature range, including refrigerated-and-insulated trucks and refrigerated-and-insulated trailers.

3.2 Cooling capacity

When the refrigeration unit is in cooling operation, the total amount of heat removed from the confined space and area per unit time under specified conditions.

Note: The unit is watt (W).

3.3 Cargo hold

The compartment unit that can carry cargo on a refrigerated and insulated vehicle.

4 Classification

4.1 When the ambient temperature is 30 °C, according to the temperature range of the average temperature maintained in the cargo compartment of the refrigerated and insulated vehicle, GB 29753 and the actual demands, the refrigerated and insulated vehicles for transporting perishable food are divided into 7 categories: A, B, C, D, E, F, and J. The specific classification is shown in Table 1.

Table 1 -- Classification of refrigerated and insulated vehicles for transporting perishable food

Classification of refrigerated-insulated vehicles	A	B	C	D	E	F	J
Avg. temperature in compartment / °C	12~0	12~-10	12~-20	≤0	≤-10	≤-20	≤-30

4.2 When the ambient temperature is 30 °C, according to the temperature range of the average temperature maintained in the cargo compartment of the refrigerated and insulated vehicle, GB 29753 and the actual demands, the refrigerated and insulated vehicles for transporting biological products are divided into two categories: G and H. The specific classification is shown in Table 2.

- f) After the average temperature in the cargo compartment reaches the requirements in Table 1 or Table 2, and the specified working temperature is reached, continue to drive the vehicle at the normal speed for 4 hours;
- g) Measure the internal temperature of the cargo compartment every 5 minutes, and record the temperature changes.

5.4 The maximum gross mass and curb weight of the refrigerated and insulated trailer shall comply with the regulations on the maximum allowable gross mass and the whole refrigerated vehicle's curb weight in Table 9 of GB/T 6420-2017. The load capacity utilization coefficient of the heavy-duty, large-scale, medium-duty, light-duty and mini refrigerated and insulated trucks shall respectively not be less than 0.8, 0.5, 0.4, 0.3, and 0.3.

Note: The load capacity utilization coefficient is the ratio of the vehicle's rated load capacity (including the mass of cab occupants) to the vehicle's curb weight.

6 Requirements for the compartment

6.1 Material requirements for the compartment

6.1.1 The space between the inner and outer panels of the compartment panels shall be filled with thermal insulation materials with low water absorption, low air permeability, low thermal conductivity, good corrosion resistance and flame retardancy. The thermal insulation materials should be environmentally friendly and recyclable. The flame retardancy shall be in accordance with the requirements of GB 8624. The thermal insulation material shall have good temperature stability, and its water absorption, air permeability, and anti-corrosion properties shall not be reduced when used at an ambient temperature of -50 °C~70 °C.

6.1.2 The plates used as the inner and outer panels of the compartment panels shall be made of impermeable, easy-to-clean, rust-proof, and anti-corrosion materials.

6.1.3 The door of the compartment shall be made of impermeable, easy-to-clean, and sturdy material.

6.1.4 Light-colored materials such as white, silver, and light cyan should be used for the outer surface of the compartment.

6.2 Requirements for the leak-proofness of the compartment

6.2.1 The compartment shall have good waterproofness, and there shall be no leakage at the top, side walls, compartment doors, and the connection between the refrigeration unit and the compartment panel.

6.2.2 The compartment shall have drainage holes whose diameters shall be less than 35 mm. For refrigerated and insulated trucks engaged in international road transportation, protective devices that meet the following requirements shall be installed at the ends of the drainage holes:

- When using a metal plate for protection, the thickness of the metal plate shall be greater than or equal to 1 mm, and the aperture of the metal plate shall be less than or equal to 3 mm;
- When using a metal net, or a metal plate with the thickness less than 1 mm for protection, the aperture of the metal net or the metal plate shall not be greater than 3 mm, and a metal grille with an aperture of no more than 10 mm shall be used outside the metal mesh or the metal plate for protection.

6.2.3 The door seal (gasket) of the compartment door shall be well sealed; a special device with an air pressure balance function should be installed and used, and the door opening (operation) shall be convenient and reliable.

6.3 Requirements for air circulation in the compartment

6.3.1 The compartment shall have a good cold air circulation system. For refrigerated and insulated trucks with an internal length of greater than 8000 mm, from the cold air outlet of the refrigeration unit, cold air diversion devices should be installed on the top, side walls, and floor of the compartment. The refrigerated and insulated trucks for transporting biological products shall be equipped with diversion grooves in the compartment and the depth of the diversion grooves shall be as follows: on the side walls, rear wall and floor, they shall be greater than or equal to 50 mm; on the front wall, they shall be greater than or equal to 100 mm. For other refrigerated and insulated trucks, the internal floors, side walls, front and rear walls of the compartment should be installed with diversion grooves.

6.3.2 The loading height limit line shall be marked inside the compartment, and the height of the limit line shall not be higher than the lower edge of the air-conditioning outlet of the refrigeration unit.

6.3.3 When the vehicle is fully loaded, the temperature difference between the temperature measurement points in the compartment shall be within ± 2 °C.

6.3.4 The maximum size of the vents of refrigerated and insulated vehicles shall be less than 400 mm. For refrigerated and insulated vehicles engaged in international road transportation, the protective devices that meet the following requirements shall be installed at the ends of the vents:

- When using a metal grid, the aperture of the grid shall be less than or equal to 20 mm;

and the minimum heat transfer capacity that matches the compartment volume of the common types of refrigerated and insulated vehicles.

7.2 Driving temperature recorder

7.2.1 The refrigerated and insulated vehicle shall be installed with a driving temperature recorder that meets the requirements of JT/T 1325. The driving temperature recorder shall be fixed and reliable, and its display device shall be installed in a position where the driver can easily see it.

7.2.2 At least 2 temperature sensors shall be installed on the vehicles with the length of the compartment or cargo hold less than or equal to 6000 mm; one shall be installed directly below the air return port of the refrigeration unit and 30 mm~100 mm above the loading height limit line; the other shall be installed at the top of the rear wall of the compartment, in the horizontal middle position, and its longitudinal distance from the inside of the rear door shall be less than 800 mm.

7.2.3 At least 3 temperature sensors shall be installed on the vehicles with the length of the compartment or cargo hold greater than 6000 mm and less than or equal to 9600 mm. The first one shall be installed directly below the air return port of the refrigeration unit and 30 mm~100 mm above the loading height limit line; the second one shall be installed at the top of the compartment, in the horizontal middle position and 1/2 of the longitudinal distance of the compartment; the third one shall be installed at the top of the rear wall of the compartment, in the horizontal middle position, and its longitudinal distance from the inside of the rear door shall be less than 800 mm.

7.2.4 At least 4 temperature sensors shall be installed on the vehicles with a compartment or cargo hold longer than 9600 mm. The first one shall be installed directly below the air return port of the refrigeration unit and 30 mm~100 mm above the loading height limit line; the second one shall be installed at the top of the compartment, in the horizontal middle position, and its distance from the compartment's front part shall be 1/3 of the longitudinal length of the compartment; the third shall be installed at the top of the compartment, in the horizontal middle position, and its distance from the compartment's front part shall be 2/3 of the longitudinal length of the compartment; the fourth shall be installed at the top of the rear wall of the compartment, in the horizontal middle position, and its longitudinal distance from the inside of the rear door shall be less than 800 mm.

7.2.5 The installation of the temperature sensor of the refrigerated and insulated vehicle using a cold air diversion device equipped on the top of the compartment shall meet the following requirements:

- The installation position and quantity on the front and rear walls of the compartment shall comply with the provisions of 7.2.3 and 7.2.4;

--- The temperature sensors at other positions shall be installed in symmetrical positions on the left and right sides of the compartment.

7.2.6 The driving temperature recorder and its sensors shall be subject to metrological verification/calibration as required.

7.3 Requirements for heating devices

The refrigerated and insulated trucks used in cold areas also shall be equipped with the heating function and able to meet the temperature requirements for transporting goods.

7.4 Requirements for non-mechanical refrigeration units

The non-mechanical refrigeration device shall be reliable, durable and able to reach the corresponding temperature level of the refrigerated truck and achieve the effect of refrigerated transportation. According to the actual structural needs, the load capacity utilization coefficient shall be greater than or equal to 95% of similar vehicles.

7.5 Others

7.5.1 Meat-hanging slides and hooks shall be pre-installed on the top of the compartment for chilled meat refrigerated and insulated trucks. For other special refrigerated and insulated trucks, cargo bolting devices should be installed in the compartment. Applicable standard brackets, hooks and other devices should be selected according to the type of cargo.

7.5.2 The refrigerated and insulated vehicle should be equipped with devices that facilitate the loading, unloading, and protection of goods, such as standardized unit load devices, and lifting tail plates for vehicles.

7.5.3 The rear doors and side doors of refrigerated and insulated vehicles for transporting biological products shall be equipped with air isolation devices, which should be made of thick canvas materials; other refrigerated and insulated vehicles should be installed with this device.

8 Requirements for vehicle lectotype and vehicle body marking

8.1 New energy vehicles also shall be considered for refrigerated and insulated vehicles in urban logistics and distribution.

8.2 The selection of refrigerated and insulated trucks for perishable food shall be reasonably determined by referring to the contents of Appendix B, by considering the needs of the transported goods, and in accordance with Table 1. Refrigerated and insulated trucks for transporting biological products shall be selected in accordance with the provisions of the State Drug Administration and relevant standards.

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