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Fuel dispensers for motor vehicles

机动车燃油加油机

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Table of Contents

Fuel dispensers for motor vehicles

1 Scope

This Standard specifies technical requirements, inspection items and inspection methods, inspection rules as well as requirements for marks, seals, packaging, transport and storage of fuel dispensers for motor vehicles (hereinafter referred to as the dispenser).

This Standard is applicable to design, manufacture and acceptance of the dispenser.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrigendum) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 191-2008, *Packaging - Pictorial Marking for Handling of Goods* (ISO 780:1997, MOD)

GB/T 3768-1996, *Acoustics - Determination of sound power levels of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane* (eqv ISO 3746:1995)

GB 3836.1, *Electrical apparatus for explosive atmosphere - General requirements* (GB 3836.1-2000, eqv IEC 60079-0:1998)

GB 3836.2, *Explosive atmospheres - Part 2: Equipment protection by flameproof enclosures "d"* (GB 3836.2-2000, eqv IEC 60079-1:1990)

GB 3836.3, *Explosive atmospheres - Part 3: Equipment protection by increased safety "e"* (GB 3836.3-2000, eqv IEC 60079-7:1990)

GB 3836.4, *Explosive atmospheres - Part 4: Equipment protection by intrinsic safety "I"* (GB 3836.4-2000, eqv IEC 60079-11:1999)

GB 3836.9, *Explosive atmospheres - Part 9: Equipment protection by type of protection "m"* (GB 3836.9-2006, IEC 60079-18:2004, IDT)

continuously for a certain period of time at the maximum flowrate rate.

3.21 revenue function

The coding device in the dispenser shall be able to generate the pulse signal correctly. The metering microprocessor transmits the measuring data to the monitoring microprocessor in a true, reliable and secure manner. The data is processed by the monitoring microprocessor before it is stored in the revenue control memory and simultaneously sent. When the above functions cannot be completed, the dispenser shall be automatically locked, that is, the refueling work cannot be performed.

3.22 anti-cheat functions

Functions that can prevent human malicious modification of parameters or modify the program to prevent cheating.

3.23 revenue interface

An interface on the dispenser that is used to communicate with revenue and metering equipment.

4 Technical requirements

4.1 Machine requirements

4.1.1 Measuring performance requirements

4.1.1.1 Flowrate ratio

The ratio of the maximum flowrate rate Q_{max} to the minimum flowrate rate Q_{min} shall not be less than 10:1.

4.1.1.2 Minimum measurement

For the dispenser that the maximum flowrate is not greater than 60L/min, its minimum measurement shall not exceed 5L.

For the dispenser that the maximum flowrate is greater than 60L/min, its minimum measurement shall be provided by its instruction manual.

4.1.1.3 Minimum specified volume deviation

For the dispenser that the maximum flowrate is not greater than 60L/min, its minimum specified volume deviation shall not exceed 0.01L.

For the dispenser that the maximum flowrate is greater than 60L/min, its

Under the following conditions, the dispenser shall perform normally within the specified limits:

a) Temperature: -25°C ~ 55°C;

b) Relative humidity: ≤95%;

c) Atmospheric pressure: 86kPa ~ 106kPa.

4.1.5 Pump inlet vacuum and outlet pressure (excluding submersible pump)

The pump inlet vacuum shall not be less than 54kPa.

The pump outlet pressure shall not exceed 0.3MPa.

4.1.6 Noise

The noise of the dispenser shall not exceed 80dB (sound level A).

4.1.7 Measure stability

After the dispenser runs continuously for 100h at the nominal flowrate, the average value of the indication error of each point and the repeatability of the measurement shall comply with the requirements of 4.1.1.4.

4.1.8 Explosion-proof performance

The explosion-proof structure and performance of the dispenser shall meet the requirements of GB 3836.1, GB 3836.2, GB 3836.3, GB 3836.4, GB 3836.9, GB 3836.15 and GB 50058-1992. And they shall obtain the explosion-proof certificate and inspection report issued by the inspection authority with corresponding qualifications.

4.1.9 Structure and appearance

The structure and appearance shall meet the following requirements:

a) The surface coating of the whole machine shall be glossy and uniform, without defects such as peeling and cracking. The exposed parts such as chrome parts and signs shall not be smeared. The surface coating and plating shall not have obvious mechanical damage;

b) The same shape joint edge between parts in the whole machine and the edge of the joint between the door and window, the side panel and the top cover shall be neat and symmetrical. There shall be no obvious misplacement. The exposed parts and decorative parts shall not have defects such as damage, peeling and rust;

b) The total accumulated amount of fuel quantity and amount in the revenue control memory shall not be changed or cleared;

c) There shall be marking function. Before initialization (fuel for exit-factory commissioning and installation commissioning as well as fuel for the first on-site verification), it shall mark the details of fuel quantity. After initialization, this function shall automatically disappear;

d) The initialization contents include: exit-factory number, nozzle position number, taxpayer registration number, oil product, date and time; the first on-site verification after initialization and installation shall be conducted simultaneously;

e) The dispenser shall be designed to ensure that the monitoring microprocessor can lock the dispenser, that is, when the monitoring microprocessor is not working properly., the dispenser cannot work either;

f) Conduct testing though the initialization software unified by the State Administration of Taxation, in accordance with relevant requirements of Annex C and Annex E in JJG 443-2006;

g) After initialization, it shall be able to calibrate the date and time after tax authority approves. The calibration method is the same as the one before initialization. Fill in the Instruction Manual of manufacturer;

h) In the case of accidental power failure of the dispenser, the data of the refueling shall be stored in the revenue control memory;

i) When the revenue function fails, the dispenser shall be automatically locked to ensure that it is unable to enter the refueling state. Its control port circuit shall meet the requirements of Annex B of JJG 443-2006.

4.1.16 Anti-cheat function

It can read the serial numbers of monitoring microprocessor and coding device used by the dispenser.

4.2 Component requirements

4.2.1 Measurement transducer of flowrate

4.2.1.1 The appearance shall be subject to good surface treatment. There shall be no visible defects such as burrs, scratches, cracks, rust or mildew.

4.2.1.2 A flowrate direction mark shall be on the obvious part of the casing.

4.2.1.3 The outer surface shall have a nameplate, indicating:

4.2.2.3 When the refueling quantity is abnormal (±0.6% deviation from the normal pulse equivalence), after accumulated five refueling operations, the coding device shall stop sending he number of pulses to the control main board. The coding device shall record and save information about the anomaly.

4.2.2.4 There shall be a reliable sealing mechanism between the coding device and the measurement transducer of flowrate.

4.2.3 Control main board

4.2.3.1 The monitoring microprocessor shall be mutually authenticated with the coding device. When the mutual verification fails, the dispenser shall not be able to work.

4.2.3.2 It shall be able to identify the rotating direction of measurement transducer of flowrate.

4.2.3.3 The signal transmission between the control main board and the indicating device shall be reliable. There shall be no plug on the connecting cable.

4.2.3.4 There shall be a sealing mechanism reserved between the control main board and the casing.

4.2.4 Indicating device

The indicating device of the dispenser shall meet the following requirements:

- Display unit price, charge amount, transaction volume quantity;
- The display volume quantity shall be the volume quantity under working conditions; the unit of volume quantity is liter;
- The counting value range shall comply with the provisions of 4.1.3;
- The readings displayed by the indicating device shall be correct, clear and easy to read;
- When more than two indicating devices display a same measured value, the values displayed on two indicating devices shall be consistent;
- During measurement, the indicating device cannot go back to zero.

4.2.5 Gas separator

4.2.5.1 When the dispenser is working at the maximum flowrate and the lowest pressure, the gas separator shall be able to exclude gases that are mixed in the liquid oil. Make the maximum permissible error of the dispenser meet the requirements of 4.1.1.4.

startup, shutdown, automatic zero return and other actions no less than 9 times. Each part and component shall not be loosened; work properly, flexibly, coordinately and reliably.

5.3.2.3 The hydraulic oil circuit shall have no leakage during operation, and there is no abnormal noise.

5.3.3 Flowrate test

5.3.3.1 Test instrument

A stopwatch of which the division is 0.1s.

5.3.3.2 Test method

After the dispenser is started up, start the nozzle. Make the test medium to circulate for 2min throughout the system then put the nozzle back. Pick up and start the nozzle again to the maximum flowrate position. Record the value displayed by the 1min counting system and it shall be the flowrate of the dispenser to be tested. This flowrate shall not exceed ±10% of the nominal flowrate.

5.3.4 Indication value error test

5.3.4.1 General rules

This test shall be conducted after the whole machine operation test is completed.

5.3.4.2 Test instrument

The requirements for the test instrument are as follows:

a) Standard metal gauge (hereinafter referred to as the gauge), which can be equipped with air bubble elimination catheter. The volume of the gauge shall be no less than 1000 times the minimum specified volume deviation of the dispenser, and not less than 1min of emissions under the measured flowrate. The maximum permissible error shall be not less than ±0.05%;

b) Thermometer: measuring range is -25°C ~ 55°C, minimum division value is 0.2°C;

c) Level instrument: accuracy is 0.05mm/m.

5.3.4.3 Test points

Test points are set according to the following two situations:

a) During the whole machine type inspection, the test points are performed

specified in 5.3.4.3. Inject the test medium into the gauge. Meanwhile, use a thermometer to measure the temperature of the test medium at the nozzle outlet. When the gauge is fulfilled with the test medium, close the nozzle. Read and record the indication value of the dispenser and the charge amount displayed on the dispenser. The fulfilling of the test medium shall be completed at one time as soon as possible;

e) After the foams and bubbles of the test medium in the gauge disappear, read the indication value of the gauge. Measure the test medium temperature in the gauge at the same time;

f) The standard gauge values use liter (L) as unit, taking three digits after the decimal place;

g) Each flowrate test point repeats the above d), e) and f) items. Complete all the tests according to each point in three times.

5.3.4.5 Indication value error and repeatability calculation

According to formula (1) ~ formula (4) in JJG 443-2006, calculate the indication value error of each test point. Take the average value as the indication value error of this point. Take the maximum value among the indication value errors of each point as the indication value error of the dispenser. The value shall meet the requirements of 4.1.1.4.

5.3.5 Charge amount error

At the indication value error test point Q(1), record relevant data. According to formula (5) and formula (6) in JJG 443-2006, calculate the charge amount error of the dispenser. The value shall meet the requirements of 4.1.1.6.

5.3.6 Minimum measured quantity test

Conduct the test according to the provisions of Annex A.1.3 in JJG 443-2006. The indication value error of the minimum measured quantity of the dispenser shall meet the requirements of 4.1.1.4.

5.3.7 Flowrate interruption test

Conduct the test according to the provisions of Annex A.1.4 in JJG 443-2006. During the refueling process of the dispenser, when the oil circuit suddenly closes, the volume indication value error and charge amount error shall meet the requirements of 4.1.1.5.

5.3.8 Anti-cheat check

Connect the dedicated POS machine to the revenue interface. Read the serial numbers of monitoring microprocessor and coding device in the dispenser and

requirements of 4.1.15.2e).

5.3.12.5 Anti-cheat function testing

The testing methods for anti-cheat function are as follows:

- Replace the control main board that cannot perform mutual verification with the coding device. Refuel and its results shall meet the requirements of 4.2.2.1;

- Replace the coding device that cannot perform mutual verification with the control main board. Refuel and its results shall meet the requirements of 4.2.2.1;

- Replace the control main board that has not been initialized. Refuel and its results shall meet the requirements of 4.2.2.2;

- Replace the measuring microprocessor that deviates from normal pulse equivalent by ±0.6%. The results shall meet the requirements of 4.2.2.3.

5.3.13 Explosion proof performance check

Check the explosion proof certificate of the whole machine and test report as well as related accessories. Compare and check whether the electrical explosion proof elements used by the whole machine are consistent with the approved explosion proof materials. The results shall meet the requirements of 4.1.8.

5.3.14 Environmental adaptability test

5.3.14.1 General rules

The dispenser shall be subject to the following three environmental tests, of which two tests of 5.3.14.2 and 5.3.14.3 shall be solid liquid test while 5.3.14.4 may be the test of control main board component. The dispenser shall not become dangerous or unsafe due to above tests.

5.3.14.2 Low temperature test

Conduct the test according to the provisions of A.1.8.1 in JJG 443-2006. In an environment where the temperature is -25°C, the duration is 2h. The results shall meet the requirements of 4.1.4 and 4.1.1.4.

5.3.14.3 High temperature test

Conduct the test according to the provisions of A.1.8.2 in JJG 443-2006. In an environment where the temperature is 55°C, the duration is 2h. The results shall meet the requirements of 4.1.4 and 4.1.1.4.

5.4.2.2 Performance test

5.4.2.2.1 According to the provisions of Annex A.1.5 in JJG 443-2006, conduct the oil-gas separation test, to ensure the separator has good oil-gas separating ability, in accordance with the requirements of 4.2.5.2.

5.4.2.2.2 According to the provisions of 5.3.3, conduct the flowrate test. The results shall meet the requirements of 4.2.5.1.

5.4.3 Pump

5.4.3.1 Pressure withstand test

Make access a pressure 1.5 times the pump outlet pressure to the pump oil inlet. After the pressure is stable, maintain 3min. Observe the casing and each sealing surface where there shall be no leakage.

5.4.3.2 Oil inlet vacuum test

5.4.3.2.1 Test devices include vacuum test bench and vacuum gauge.

5.4.3.2.2 During the test, connect the vacuum gauge at the inlet of the pump. Start the motor, after the oil enters, close the valve. When the vacuum gauge is stable, read the vacuum value. The vacuum value shall meet the requirements of 4.2.6b).

5.4.3.3 Oil outlet pressure test

5.4.3.3.1 The test instrument is pressure gauge.

5.4.3.3.2 Connect the pressure gauge at the outlet during the test. Start the motor to drive the pump to work. Observe the indication value of the pressure gauge. At the same time, adjust the pump's variable mechanism to make the pressure gauge indication value meet the requirements of 4.2.6b).

5.4.3.4 Flowrate test

Conduct the flowrate test according to the provisions of 5.3.3. The results shall meet the requirements of 4.2.6a).

5.4.3.5 Noise testing

Conduct the testing according to the provisions of 5.3.11. The results shall meet the requirements of 4.2.6d).

5.4.4 Oil hose test

5.4.4.1 Hose internal volume change test

parts.

6.2.4 The preparation of the maintenance instructions shall comply with the provisions of GB 9969.1.

6.3 Determination rules

6.3.1 When the dispenser is inspected for exit-factory inspection items, after it complies with the requirements of this Standard and relevant technical conditions, it shall be regarded as accepted.

6.3.2 When the dispenser is inspected for type inspection items, after it complies with the requirements of this Standard and relevant technical conditions, the prototype shall be regarded as accepted.

7 Marks, seals, packaging, transport and storage

7.1 Marks

7.1.1 Nameplates shall be fixed in the obvious positions of the whole machine and each explosion proof electrical component. The writing on nameplate shall be clear and correct, and it shall not fall off during the use of the dispenser.

7.1.2 The whole machine nameplate shall contain the following information:

- manufacturer’s name;
- product name and model;
- year, month of manufacture;
- exit-factory number;
- flowrate range;
- maximum permissible error;
- minimum measured quantity;
- power voltage;
- explosion-proof certificate number and explosion-proof mark of the whole machine;
- CMC mark and manufacturing license number of measuring instrument.

7.1.3 The content and mark of each explosion-proof electrical equipment nameplate shall meet the requirements of GB 3836.1.

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