

JJG

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Verification regulation of liquid positive displacement flowmeter

(English Translation)

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1 Scope

This Regulation applies to type evaluation, initial verification, subsequent verification, and in-service inspection of liquid positive displacement flowmeter (hereinafter referred to as flowmeter).

2 Cited references

Provisions contained in following standards and regulations become provisions of this Regulation by citing.

GB 3836.1-2000 Electrical apparatus for explosive gas atmospheres - Part 1. General requirements GB 3836.2-2000 Electrical apparatus for explosive gas atmospheres - Part 2.

Flameproof enclosure d GB 3836.3-2000 Electrical apparatus for explosive gas atmospheres - Part 3. Increased safety e GB/T 17288-2009 Liquid hydrocarbons - Volumetric measurement by displacement meter systems GB/T 17612-1998 Measurement of liquid flow in closed conduits - Weighing method JJF 1001-1998 General Terms in Metrology and Their definitions JJF 1004-2004 Metrological Terms and Their Definitions for Flow Rate JB/T 9242-1999 General technical specifications for positive displacement flowmeter JB/T 10564-2006 Basic parameters for flow measuring instruments OIML R120-1996 Standard capacity measures for testing measuring systems or liquids other than water it shall pay attention to use current valid versions of above cited references.

3.1 Liquid positive displacement flowmeter

Meter composed of chamber with a known volume and moving parts that are driven by liquid. It is used to measure fluid flow based on the number of times that the chamber is repeatedly filled-discharged of liquid.

3.2 Coefficient K

Number of pulses that is emitted by flowmeter when liquid of unit volume flows through the flowmeter.

3.3 Meter factor

Coefficient that flowmeter indicating value is corrected after verification. The value of which is the ratio of standard device indicating value and flowmeter indicating value, expressed by symbol F.

4.1 Working principles

Liquid will generate a certain pressure between flowmeter inlet and outlet when passing through flowmeter. Moving parts will move this pressure difference and discharge the liquid from inlet to outlet. In this process, chamber of flowmeter is repeatedly filled with liquid.

Volume of this chamber is definite under given conditions; accumulated volume flow rate may be obtained as long as the number of movements of moving parts is measured.

4.2 Classification

Flowmeters referred in this Regulation include the following ones.

- a) Waist wheel (also known as roots) flowmeter
- b) Oval gear flowmeter
- c) Sliding vane flowmeter
- d) Rotary piston flowmeter
- e) Reciprocating piston flowmeter
- f) Disc flowmeter
- g) Screw flowmeter
- h) Double-rotor flowmeter
- i) Other types of positive displacement meters
- c) Manufacturing serial number

- d) Manufactured measuring instrument license logo and number
- e) Nominal diameter
- f) Flow range
- g) Maximum working pressure
- h) Accuracy class
- i) Explosion-proof grade and explosion-proof certificate number (applicable to explosion-proof meter)
- j) Protection grade (used for outdoor installation)
- k) Manufacture year and month and other relevant technical indicators.

6.2.3 Flowmeter shall have seal-applied mechanism.

6.2.4 If flowmeter has supporting auxiliary mechanism, the auxiliary mechanism shall have

following marks.

- a) Manufacturer's name and (or) factory logo
- b) Name and model
- c) Manufacturing number
- d) Supporting flowmeter number (only applicable to dedicated auxiliary mechanism), etc.

6.3 Appearance

6.3.1

Flowmeter shall look good; sealing surface shall be smooth and without damage.

6.3.2

Marks shall be correct, distinct and clear.

6.3.3

Protective glass of indicating mechanism with a dial shall be free of bubbles, cracks, apparent scratches, and other defects that may affect readings and appearances.

6.3.4 Indicating mechanism of having digital wheels shall have clear figures, correct

position and normally operating character wheel; and cannot have clamping stagnation phenomenon.

6.3.5 Indicating mechanism with electrical display shall have regular eye-catching numbers

verification at any point of test piping system and flowmeter shall be higher than the saturated vapor pressure. For easily vaporized liquid, there shall be a certain back-pressure at downstream of flowmeter. Recommended back-pressure is 2 times flowmeter pressure loss at maximum flow rate plus 1.25 times saturated vapor pressure of liquid for verification at maximum verification pressure.

7.1.6.1 Liquid for verification shall be clean and free of particles, fibers and other substances.

7.1.6.2 Test pipeline shall be full of liquid; shall not be mixed with gases.

7.1.6.3 During one-time verification, temperature variation of verification medium shall not

exceed $\pm 0.5^{\circ}\text{C}$.

7.1.7 Viscosity of liquid

7.1.7.1

Viscosity of liquid shall be consistent with the viscosity of actually measured by flowmeter to the greatest extent. When other liquids are adopted, error of flowmeter from the difference between liquid for verification and actually measured viscosity of liquid generally shall not exceed 1/3 of maximum permissible error of flowmeter.

7.1.7.2

If the viscosity of working fluid of flowmeter is not greater than 2 mPa · s, or accuracy class is not higher than grade 0.5 (including grade 0.5), and viscosity of liquid for work is not greater than 5 mPa · s; under the premise without causing flowmeter corrosion and damage, it is allowed to use water for verification.

7.1.7.3 If the viscosity of working liquid of flow meter is (5~50) mPa · s, the viscosity of liquid

for verification shall not be less than 5 mPa · s, and the difference with the viscosity of working fluid of flow meter shall be generally not greater than 9 mPa · s.

7.1.7.4 If the viscosity of working liquid of flowmeter is greater than 50 mPa · s, then the viscosity of liquid for verification is only required to be not less than 50 mPa · s.