

JJF

**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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**Program of Pattern Evaluation of Coriolis Mass Flow Meters
(English Translation)**

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1 Scope

This Program applies to the pattern evaluation of Coriolis mass flow meters (hereinafter referred to as flow meters).

2 Normative references

This Rules refers to the following documents.

JJG 1038-2008, Verification Regulation of Coriolis Mass Flow Meters

JJF 1001-2011, General Terms in Metrology and Their Definitions

JJF 1004-2004, Metrological Terms and Their Definitions for Flow Rate

JJF 1094-2002, Evaluation of the Characteristics of Measuring Instruments

GB/T 2423.1, Environmental testing for electric and electronic and electronic products -- Part 2. Test methods -- Tests A. Cold temperature (idt IEC 60068-2-1)

GB/T 2423.2, Environmental testing for electric and electronic products -- Part 2.

Test methods -- Tests B. Dry heat (idt IEC 60068-2-2)

GB/T 2423.3, Environmental testing for electric and electronic products -- Part 2.

Testing method test Cab. Damp heat steady state (idt IEC 60068-2-78)

GB/T 2423.10, Environmental testing -- Part 2. Test methods -- Test Fc. Vibration (sinusoidal) (idt IEC 60068-2-6)

GB 3836.1, Explosive atmospheres -- Part 1. Equipment -- General requirements

GB 3836.2, Explosive atmospheres -- Part 2. Equipment protection by flameproof enclosures "d"

GB 3836.3, Explosive atmospheres -- Part 3. Equipment protection by increased safety "e"

GB 3836.4, Explosive atmospheres -- Part 4. Equipment protection by intrinsic safety "i"

GB 4208, Degrees of Protection Provided by Enclosure (IP Code)

GB/T 13609, Sampling method of natural gas

GB/T 13610, Analysis of natural gas composition -- Gas chromatography

GB/T 17626.2, Electromagnetic compatibility -- Testing and measurement techniques -- Electrostatic discharge immunity test (idt IEC 61000-4-2)

GB/T 17626.4, Electromagnetic compatibility -- Testing and measurement techniques -- Electrical fast transient/burst immunity test (idt IEC 61000-4-2)

GB/T 17626.5, Electromagnetic compatibility -- Testing and measurement techniques -- Surge immunity test (idt IEC 61000-4-5)

GB/T 17626.11, Electromagnetic compatibility -- Testing and measurement techniques -- Part 11. Voltage dips, short interruptions and voltage variations immunity tests for

equipment with input current up to 16 A per phase (idt IEC 61000-4-11)

GB/T 17747.2, Natural gas -- Calculation of compression factor -- Part 2.

Calculation using molar-composition analysis

GB 17820, Natural gas

GB/T 20728-2006, Measurement of fluid flow in closed conduits -- Guidance to the selection installation and use of Coriolis meters (idt ISO 10790.1999)

GB 50251, Design code for gas transmission pipeline engineering

SY/T 6659-2006, Measurement of Natural Gas by Coriolis Meter

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies to this Rules.

3 Terms

In addition to the terms and definitions specified in JJF 1094 and JJF 1004, this Program also uses the following terms and definitions.

3.1

zero offset

Before zero adjustment, the instantaneous mass flow rate of the flow meter is measured when the medium inside the flow meter is stationary. This value can be reduced or eliminated by zero adjustment.

3.2

zero stability

After zero adjustment, when the medium inside the flowmeter is stationary, the instantaneous flow rate value of the zero offset is continuously read 30 times at uniform time intervals within 5 min. The average value of the absolute flow rate value each time is taken as the zero stability of the flowmeter.

3.3

pulse per unit (also known as k coefficient)

The number of pulses emitted by the flow meter when a unit mass of fluid passes through it.

3.4

calibration factor

The coefficients related to mass flow rate measurement are obtained through sensor calibration. This factor is unique to each sensor. It is incorporated into the transmitter to ensure the flow meter's metrological performance. Calibration factors are further divided into flow calibration factors and density calibration factors, each composed of one or more parameters.

4 Overview

A flow meter utilizes the Coriolis force generated when fluid flows within a vibrating tube to measure the fluid's mass flow rate, either directly or indirectly. A flow meter consists of a sensor and a transmitter. The sensor primarily comprises a vibrating tube and a drive component. The transmitter mainly consists of a measurement and output unit. It receives signals from the sensor and outputs or displays the mass flow rate measurement results as DC current, pulses, or digital signals.

5.1 Units of measurement

Flow meters shall use legal units of measurement.

5.2 Accuracy level

The accuracy level of the flow meter and its corresponding maximum allowable error shall meet the requirements of Table 1. If the accuracy level is not listed in Table 1, its maximum allowable error shall still meet the principle of corresponding accuracy level and maximum allowable error in Table 1.

Table 1 -- Accuracy level of flow meter

5.3 Sealed structure

For flow meters that are not allowed to be adjusted by the user, protective measures shall be in place. Any human interference that can affect the accuracy of the flow meter will leave a mark on the flow meter.

5.4 Installation marks

The flow meter shall have a clear and permanent flow direction mark.

5.5 Technical documents to be submitted by the applicant

The applicant shall provide two copies of the following technical documents.

- Application for "Type Approval of Measuring Instruments", commissioned by the government's metrology administration department;
- Product standards;