

JJG

INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

JJG 1033-2007

Verification Regulation of Electromagnetic Flowmeters (English Translation)

Issued on: November 21, 2007

Implemented on: February 21, 2008

Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of PRC. Verification Regulation of

Table of Contents

1 Scope...	5
2 Normative references...	5
3 Terms...	5
4 Overview...	6
4.1 Working principle...	6
4.2 Structure and use...	6
5 Measurement performance requirements...	7
5.1 Accuracy grade...	7
5.2 Fiducial error...	7
5.3 Error expression method and selection principle...	7
5.4 Repeatability...	7
6 General technical requirements...	8
6.1 Accompanying documents...	8
6.2 Marking...	8
6.3 Appearance...	9
6.4 Tightness...	9
6.5 Protection function...	9
7 Measuring instrument control...	9
7.1 Verification conditions...	9
7.2 Verification items and verification methods...	12
7.3 Handling of verification results...	18
7.4 Verification cycle...	19
Appendix A Type evaluation outline...	20

1 Scope

This Regulation applies to the type evaluation, initial verification, subsequent verification, in-use inspection of electromagnetic flowmeters (hereinafter referred to as flowmeters), which are installed in closed pipelines. It is not applicable to flowmeters for measuring blood, liquid metal, iron ore slurry and open channel flow measurement, nor is it applicable to the verification of insertion electromagnetic flowmeters and electromagnetic water meters.

2 Normative references

The provisions contained in the following standards and regulations constitute the provisions of this Regulation through reference.

JJF 1004-2004 Metrological terms and their definitions for flow rate

GB/T 18659-2002 (idt ISO 9104.1991) Measurement of fluid flow in closed conduits - Methods of evaluating the performance of electromagnetic flow - Meters for liquids

GB/T 18660-2002 (idt ISO 6817.1992) Measurement of conductive liquid flow in closed conduits - Method using electromagnetic flowmeters

JB/T 9248-1999 Electromagnetic flowmeters

It shall be noted that the current valid versions of the above references shall be used.

3.1 Primary device (sensor)

A device used to generate a signal proportional to the flow rate. The primary device mainly includes the following units.

3.2 Secondary device (converter)

A circuit device, that converts the induced electromotive force taken from the primary device into a standard output signal proportional to the flow rate.

3.3 Meter characteristic coefficient

A parameter that can change the metering performance of the flowmeter by modifying its value.

3.4 Flow conditioner

A component that can reduce vortices and improve velocity distribution.

4.1 Working principle

In a closed pipe, a magnetic field perpendicular to the flow direction is set up. The flow rate is calculated by measuring the induced electromotive force generated by the movement of the conductive liquid in the magnetic field.

5.1 Accuracy grade

The accuracy grade and maximum allowable error of the flow meter within the specified flow range shall comply with the provisions of Table 1. The relative indication error is used for the flow meter error expression.

5.2 Fiducial error

For the error expression of the flow meter used for instantaneous flow indication, the fiducial error can also be used. Its maximum allowable error series shall comply with the provisions of Table 1. The accuracy grade is no longer given in the expression of its verification results, but its maximum allowable error is used; FS shall be marked after the maximum allowable error, such as $\pm 0.5\%FS$.

5.4 Repeatability

The repeatability of the flowmeter shall not exceed 1/3 of the absolute value of the maximum allowable error, which is specified for the corresponding accuracy grade.

6.1 Accompanying documents

The flowmeter shall be accompanied by an instruction manual, which shall state the technical conditions and the metering performance of the flowmeter. The flowmeter that is periodically calibrated shall also have a verification certificate for the previous verification.

6.2 Marking

6.2.2

The flow meter shall have obvious flow direction markings.

6.3 Appearance

6.3.1

The appearance of the newly manufactured flow meter shall be well treated and shall not have burrs, scratches, cracks, rust, mildew spots, coating and plating shall not have peeling or flaking.

6.3.2

The welding of the connection part of the flow meter body shall be smooth and clean; there shall be no false welding or desoldering.

6.3.3

The sealing surface shall be flat and free of damage.

6.4 Tightness

The flowmeter shall be kept at the maximum test pressure for 5 minutes under the test installation conditions, there shall be no leakage at the connection of the flowmeter and its upstream and downstream straight pipe segments.

6.5 Protection function

The flowmeter shall have a protection function for the modification of the flow characteristic coefficient, which can avoid accidental changes or record the historical modification process.

7 Measuring instrument control

Measuring instrument control includes type evaluation, initial verification, subsequent verification, and in-use inspection. Appendix A is the outline of type evaluation.

7.1.2 Verification liquid

7.1.2.1

The verification liquid can generally be clean water without air, fibers, magnetic particles and other visible particles. If other liquids are used, their type (including commercial name), viscosity, density, conductivity shall be stated in the verification certificate.

7.1.2.2

During the verification, the liquid shall always fill the test pipe and flow in a single phase, stable and vortex-free manner.

7.1.3 Verification environmental conditions

7.1.3.1

Atmospheric environmental conditions shall generally meet the following requirements.

7.1.4 Installation conditions

7.1.4.1

Length of straight pipe segment on the upstream and downstream sides of the flowmeter

Determine the length of the straight pipe segment on the upstream and downstream sides of the flowmeter, according to the requirements of the flowmeter instruction manual.

7.1.7 Flowmeter output signal

The flowmeter output signal shall be correctly collected in accordance with the provisions of the flowmeter manual. For flowmeters with multiple signal outputs, the method required by the inspection applicant or the method recommended in the manual shall be used first. If both are particularly required, it is recommended to use the pulse output of the flowmeter for verification.

7.1.8 The grounding of the flowmeter shall be operated in accordance with the requirements of the flowmeter manual; the verification liquid and the primary device shall be