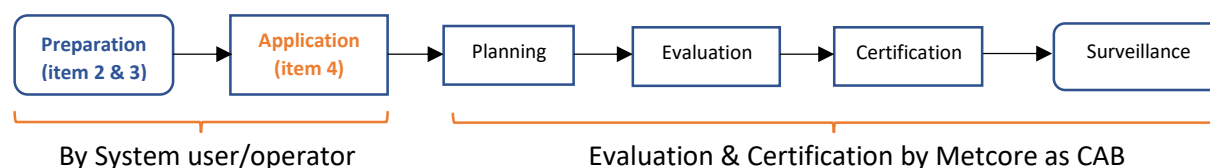


A Guide for Meter Selection and Installation Requirements

1. General objective

This guide serves to provide the mass flow meter (MFM) system user/operator with the selection and installation requirements, in the preparation stage for certification. It includes the pre-selection screening and site installation set-up in meeting the operational objectives. The details featured in this guide has taken reference from various standards of SS 648, ISO 22192 & OIML recommendation (R) 117.

Illustrated below is a brief mass flow metering system (MFM system) certification process.



Although Metcore Certification Schemes and evaluation program are independent of the aforesaid standards and recommendation, it compliment the needs of system user/operator of ensuring these requirements are in-compliance. It is especially useful in the event there is a non-existence of national regulatory requirements.

2. Preparation: Selecting the appropriate MFM

System user/operator will need to liaise with the meter vendor over the appropriate meter type for measurement of liquid, and on most cases for custody transfer applications. **To maintain impartiality, Metcore as Singapore Accreditation Council's accredited conformity assessment body (CAB), will not be involved in the selection or consultancy of the mass meter.** Meter selection however should be facilitated by the meter vendor directly with the following considerations:

2.1 Information to be related to the meter vendor

- a) Installation site and set-up;
- b) Actual process applications;
- c) Mechanical and electrical installation.

2.2 Pattern evaluation and calibration of the meter

- a) MFM usually consist of the flow-transmitter and measurement sensor (or transducer) are constructed to provide a Coriolis effect for measurement of liquid products;
- b) Meter type should be of OIML R117 evaluated and is of approved type (if applicable) by the national legal metrology body;
- c) Subject to calibration by an ISO/IEC 17025 flow laboratory accredited by SAC or an ILAC MRA signatory accredited body;
- d) Calibration should be conducted in bi-direction (forward and reverse) with 5 evenly spread flowrate points (3 runs each) within the certified minimum and maximum flowrates; and
- e) Water calibration is acceptable, accompany with a letter (with supporting docs/reports) by a National Metrology Institute or an OIML Issuing Authority for OIML R117 under the OIML-CS.

2.3 Associated measuring devices

- a) The ancillary or associated measuring devices are typically supporting instruments of the complete module of a measuring system supplied by the meter vendor;
- b) The devices include (not limited to) pressure sensor, temperature sensor, flow computer, level indicator, and printer, data logger and terminal display; and
- c) These devices with measurement capability (i.e. pressure and temperature sensors) should be tested and issued with test reports to ensure their suitability for its intended purposes.

2.4 Operating requirements

- a) Owner/operator must ensure continuous power supply to the metering system at all times;
- b) A maintenance program must be in place to ensure each device are operating within condition recommended by the meter vendor or supplier;
- c) MFM and its measuring system may require to be evaluated by the national legal metrology body, and/or subject to compliance with the regional directive. For example, the European measuring instruments directive or MID; and
- d) Meter vendor engaged must ensure during the commissioning of the MFM and its measuring system, critical parameters are validated (with checklists and reports) to represent its readiness for metering system tests (i.e. acceptance tests, master meter verification).

3. Preparation: MFM System and Piping Installation Set-up

Suitable location for the installation of the MFM and its system devices, and piping modification shall be determined. The following must be taken into consideration:

3.1 Location of MFM and devices

- a) Location of manifolds, loading lines, cargo pumps, flow boom, spectacle blank, existing valves;
 - b) Piping arrangement;
 - c) Meter location (to be as close to the transfer point, if possible) and its ancillary devices; and
 - d) Other factors / relevant installations that may affect the integrity.
- Above may require re-locations or modifications to maintain and system security

3.2 Schematic diagram of pipeline installations

Any pipeline modification must be factored into the schematic diagram. For bunker tankers, the modified drawing shall be approved by Classification Society or equivalent organisation recognised by the application authority (i.e. National Maritime Regulatory Authority), prior to any modification.

3.3 Physical security of MFM system and pipelines (*Upon commencement of certification process*)

- a) The sealing plan shall be established by Metcore personnel during the technical evaluation stage; and
- b) Upon completion of further modification (if needed), Metcore shall secure the sealing points in accordance with the established sealing plan.

4. Application: Submission for Certification

Planning for evaluation of the MFM system and piping installations shall only commence after application for certification is received. The evaluation team shall be assigned to follow up on the site assessment of the MFM system and pipeline installations. The MFM system test would need to be established (during the planning stage) to ensure its fulfilment of the system measurement accuracy requirement. The system verification would typically by:

- Meter in, meter out acceptance tests, as described in SS 648 or OIML R117 Annex K.3; *and/or*
- Meter verification using the master meter as a traceable reference standard.

Interested party may also approach Metcore directly on the process information relating to certification. A quotation can also be issued to determine the financial consideration.

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