

**TR 80:2020+C1:2022**  
(ICS 01.140.30; 17.020; 47.020)

**TECHNICAL REFERENCE**

# **Code of practice for meter verification using master mass flow meter**

Incorporating Corrigendum No. 1

## **TR 80:2020+C1:2022**

(ICS 01.140.30; 17.020; 47.020)

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## Foreword

This Technical Reference was prepared by the Working Group on Meter Verification Using Master Mass Flow Meter set up by the Technical Committee on Bunkering under the purview of CSC.

The objective of this standard is to set qualifying requirements for master mass flow meter (MFM) in the bunkering context and establish meter verification requirements and procedure using master MFM to:

- 1) verify the duty MFM after acceptance test and approval for custody transfer; and
- 2) track the meter stability<sup>1</sup> of the duty meter used in MFM system at regular intervals during its commercial service.

Regular meter verification provides another option to MFM users other than regular re-calibration as it is a more efficient, less costly and less time-consuming process to monitor the measurement performance of the MFM over time in compliance with metrological requirements for custody transfer.

SS 648, "Code of practice for bunker mass flow metering", specifies the acceptance test process for the MFM system and the requirement for regular re-calibration of the MFM. Both processes are time-consuming and costly, and have issues of considerable downtime interrupting operations and affecting profitability. Onsite re-calibration on board is also not feasible.

This new TR, which is intended to complement the requirements of SS 648 and SS 660, "Code of practice for bunker cargo delivery from oil terminal to bunker tanker using mass flow meter", aims to resolve the above issues by having an authorised party check the duty MFM through meter verification using a master MFM according to the requirements and procedures specified in this TR.

This TR is a provisional standard made available for application over a period of three years. The aim is to use the experience gained to update the TR so that it can be adopted as a Singapore Standard. Users of the TR are invited to provide feedback on its technical content, clarity and ease of use. Feedback can be submitted using the form provided in the TR. At the end of the three years, the TR will be reviewed, taking into account any feedback or other considerations, to further its development into a Singapore Standard if found suitable.

In preparing this standard, reference was made to the following publication:

Joint Committee for Guides in Metrology (JCGM) 200:2012, International vocabulary of metrology – Basic and general concepts and associated terms (VIM) 3<sup>rd</sup> Edition

Some of the definitions in Clause 3 were reproduced and/or adapted from the above publication with kind permission from Bureau International des Poids et Mesures, and from SS 648 : 2019, "Code of practice for bunker mass flow metering", as indicated in brackets after the definitions. All rights are reserved.

Acknowledgement is made for the use of information from the above publication.

Acknowledgement is also made to Metcore International Pte Ltd for their kind assistance in the development of this Technical Reference and for their permission to reproduce/adapt their meter verification procedures.

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<sup>1</sup> Meter stability

Property of a measuring instrument whereby its metrological properties remain constant over time.

Note 1 to entry: Stability may be quantified in several ways:

Example 1: In terms of a time duration over which a metrological property changes by a stated amount.

Example 2: In terms of the change of a property over a stated time. [Source: JCGM 200]

This standard is expected to be used by vendors of Coriolis MFM, bunker suppliers, bunker surveyors, bunker tanker operators, ship owners, managers, operators, bunker buyers, oil companies, oil terminals, and the relevant authorities.

Attention is drawn to the possibility that some of the elements of this Technical Reference may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

**NOTE**

- 1. Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions. Where SSs are deemed to be stable, i.e. no foreseeable changes in them, they will be classified as “mature standards”. Mature standards will not be subject to further review unless there are requests to review such standards.*
- 2. An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore and the Singapore Standards Council shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR. Although care has been taken to draft this standard, users are also advised to ensure that they apply the information after due diligence.*
- 3. Compliance with a SS or TR does not exempt users from any legal obligations.*

# Code of practice for meter verification using master mass flow meter

## 0 Introduction

Master Coriolis mass flow meter (master meter) is used to verify the accuracy of a meter under test (i.e. duty meter or duty mass flow meter (MFM)) at verification flow rates by looking at the closeness of measurement readings of the duty meter and the reference master meter. The measurement of the master meter is traceable to the SI unit of mass (i.e. kilogram).

## 1 Scope

This Technical Reference (TR) covers:

- a) the criteria and metrological requirements to qualify for a master meter and the maintenance of its master meter status.
- b) the requirements and procedures for meter verification using master MFM to verify and check the stability and performance of a duty meter installed on a bunker tanker or at a terminal.

## 2 Normative references

The following referenced documents are indispensable for the application of this TR. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories
SS 648	Code of practice for bunker mass flow metering