

## **Explanation of Chapter X Mass Flow Meter system**

### *General explanation*

From 1 January 2026, using an MFM system on board bunkering ships for bunkering residual distillates (bunker oil and diesel) and biofuels will be mandatory in the ports of Rotterdam and Antwerp-Bruges.

This MFM system has been made mandatory, firstly, because both ports have received complaints and signals from the bunker market, that there were serious quantity problems in the ports regarding the supply of bunkers. Complaints came not only from the buyers (shipowners) of the bunkers, but also from sellers and bunker surveyors. There were numerous examples.

Secondly, in addition to the complaints from the commercial parties involved in bunkering operations, the ports also received information from enforcement agencies that the parties involved in bunkering were also involved in illegal activities.

As ports, we want a transparent bunker market. To understand the full extent of the quantity problem, the ports commissioned an independent research firm to conduct interviews with stakeholder and conduct a survey. What the ports wanted to know was, firstly, whether there is actually a quantity problem at the ports in the supply of bunker and, secondly, what the solution is for any quantity problem. During the same period that the survey was conducted for the ports, the International Bunker Industry Association (IBIA) and the Baltic and International Maritime Council (BIMCO) also conducted a global survey on bunker quantity issues.

The results of the interviews and both surveys were clear. More than 80% of respondents indicated that there was a problem with bunker quantities at the ports. The results of the survey commissioned by the ports are similar to the findings of the survey conducted by IBIA and BIMCO in the first half of 2022, which revealed strong industry support for licences and more use of mass flow meters (MFMs). Both studies concluded, on the one hand, that there is a large-scale problem with bunker quantity in ports and, on the other, that introducing an MFM system is seen as the solution to address the quantity problem and make the bunker market transparent.

To concretise this obligation to have an MFM system, the ports took various steps in 2023, including looking at best practices in other ports, organising stakeholder meetings, speaking with individual parties in the bunkering industry, including sellers, suppliers, ship owners and bunker inspectors. The ports also spoke with (government) agencies involved in MFM systems, including manufacturers, installers, and certification and inspection bodies.

All the input combined resulted in the MFM system obligation as stipulated in Chapter X Mass Flow Meter system and explained article by article below.

### *Explanation article-by-article*

#### Article X.1      Definitions

##### ISO 22192:2021

This article includes several definitions. One important definition in this context is the reference to ISO standard 22192:2021 "Bunkering of marine fuel using the Coriolis mass flow meter (MFM) system, 2021 edition." By using and referring to this global standard as much as possible, the aim is

to create a framework for the use of an MFM system that is similar to the way this standard is used elsewhere in the world.

The ISO standard is available digitally and in hard copy from the International Organization for Standardization website (<https://www.iso.org/standard/72840.html>).

Not all clauses from ISO 22192:2021 are applicable to the installation and use of the MFM system in the port. This is due to the fact that the ISO standard is an industry standard, and (European) legislation stipulates things for parts of it. This is the case in particular for the requirements for an MFM system specified by the European Measuring Instruments Directive.

### MFM

In this licence, an MFM means a Coriolis mass flow meter. Other mass flow meters that do not operate according to the Coriolis principle are not permitted, as they do not fall within the scope of the requirements in the licence. In this licence, it is an MFM as described in clause 3.25 of ISO 22192:2021.

### MFM System

An MFM system does not consist only of an MFM, but of various components. See also Article X.3 which lists the requirements for an MFM system. As regards the concept of an MFM system, this is described in clause 3.26 of ISO 22192:2021.

### Bunkers

An MFM system is required for supplying bunker, which in this licence refers to residual distillates (bunker oil and diesel) and biofuels (biodiesel). Other (alternative) fuels are not within the scope of this licence. The relevant licence for these other fuels will specify the extent to which the use of an MFM system is mandatory.

### Bunker operations

Using an MFM system is mandatory on a bunkering ship that delivers bunker to a seagoing vessel. An MFM system is therefore not mandatory at stationary bunkering stations, for example. Nor is using an MFM system required on board the bunkering ship when loading at a terminal. However, an MFM system can be used bidirectionally, meaning that even when bunker is delivered to the bunkering ship, the MFM system can be used to measure the quantity of bunker received. However, this must be coordinated in advance with the installer/manufacturer of the MFM system. As this is beyond the scope of the licence, the Harbour Master of Rotterdam /Harbour Master's Office of Antwerp-Bruges does not assume any role or responsibility in this activity.

It is also not mandatory to use an MFM system on board bunkering ships when supplying bunker to other bunkering ships.

### Licence holder

The holder of the bunkering licence is the owner of the bunkering ship. In Antwerp, the ship owner is currently already the holder of the bunkering licence.

Currently, the Port of Rotterdam still has a system whereby the bunkering operator has a licence and the bunkering ships that the bunkering operator deploys for the bunkering operations fall under the scope of its licence (regardless of whether the bunkering ships are owned).

If an owner owns multiple bunkering ships, a licence will list multiple bunkering ships that are covered by the licence and the conditions set forth therein.

## Article X.2      Scope

### First paragraph

The first paragraph of Article X.2 stipulates that a bunkering ship delivers bunker to a seagoing vessel with an MFM system that is also suitable for the specific delivery of this bunker. This means that the delivered bunker must always be within the parameters suitable for the relevant MFM system. The main parameters will be pump speed, type of bunker and viscosity of the bunker. The main parameters will be pump speed, type of bunker and viscosity of the bunker. The MFM system will therefore have to be selected in proper consultation with the manufacturer or installer.

### Second paragraph

The second paragraph states that the requirement for an MFM system on board a bunkering ship is not mandatory for bunkering ships with a cargo capacity of up to 300 tons. These are N-open tankers built and equipped for transporting and delivering marine propellants to other vessels as referred to in Article 1.2.1 of the ADN (the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways /Accord européen relatif au transport des marchandises dangereuses par voies de navigation intérieures).

There are 3 reasons why this type of bunkering ship does not need to have an MFM system on board. First of all, these bunkering ships are usually already equipped with PD (positive displacement) meters. Secondly, the ports have not received any complaints about these bunkering ships when it comes to delivering bunker. Finally, these bunkering ships only supply a small portion of their total bunker to seagoing vessels, primarily supplying inland navigation.

## Article X.3      MFM system requirements

### Part a

This article sets out the requirements for the MFM system on board the bunkering ship. First of all, it is important to read part a in conjunction with Article X.1 and in particular the definition of an MFM and an MFM system. The MFM system must therefore work according to the Coriolis principle, and comply with clause 3.25 of ISO 22192:2021.

The MFM system also has to comply with and consist of the components referred to in clause 3.26 of ISO 22192:2021. This includes the mass flow meter itself, as well as all the associated instruments and pipelines.

### Part b

The MFM system must comply with various legislation to work as accurately as possible. Not only must the correct mass be measured, but the MFM system also has to take into account, for example, gas elimination and correct the amount of mass being measured accordingly. In order to comply with this, the MFM system must comply with the Metrology Act for the Netherlands and the Royal Decree on Measuring Instruments of 15 April 2016 for Belgium in conjunction with the Measuring Instruments Directive (MID) and the International Recommendation R117:2019 of the International Organization of Legal Metrology for dynamic measuring systems for liquids other than water. For the sake of clarity, this must be the 2019 version of OIML R117. This is because the 2019 version has a separate chapter that lays down rules on taking gas elimination into account.

Within the Measuring Instruments Directive (MID), MFM systems fall under Annex VII 'Measuring systems for the continuous and dynamic measurement of quantities of liquids other than water (MI-005)'.

OIML R117 edition 2019 includes the following chapters and appendices that provide specific frameworks and requirements for test procedures for measurement systems required for bunkering:

- Chapter 5.10 of International Recommendation OIML R 117-1 (2019) 'Dynamic measuring systems for liquids other than water, part 1 - Metrological and technical requirements' which provides frameworks for measuring systems required for bunkering; and
- Appendix K of the International Recommendation OIML R 117-2 (2019) 'Dynamic measuring systems for liquids other than water, part 2 - Metrological controls and performance tests' which describes the tests that must be performed for the measuring systems required for bunkering.

#### Part c

The MFM system must be installed as a continuous bunker measuring system on a bunkering ship intended to supply fuel. The MFM system must be certified and placed on the market by a notified body as referred to in Article 27.

#### Part d

The MFM system also needs to be certified by a notified body as referred to in Article 27 of the Measuring Instruments Directive (MID) as the "Bunker Metering System". Notified bodies can be found at: [Notified bodies \(europa.eu\)](https://eur-lex.europa.eu/legal-content/en/TOC/?uri=CELEX:32008L0086)

#### Part e

Finally, the MFM system must be equipped with a memory device/data logger. The purpose of data logging is to assess the quality of the complete bunkering operation. All data generated by the MFM system must be available for the receiving party or its representative and to the Harbour Master of Rotterdam/Harbour Master's Office of Antwerp-Bruges. The data must be available for at least three months and until the dispute is resolved.

### Article X.4      Inspection procedure

#### First paragraph

The first paragraph stipulates that the MFM system has to undergo an annual inspection. In other words, the inspection carried out on an MFM system must never be older than 1 year ago. If this is the case, the MFM system cannot be used and a bunkering ship is not permitted to deliver bunker.

#### Second paragraph

The inspection of the MFM system consists of a zero point verification as described in Annex D of ISO 22192:2021. If the zero point verification does not meet the conditions of Annex D of ISO 22192:2021, the Harbour Master of Rotterdam/Harbour Master's Office of Antwerp-Bruges must be notified immediately. The MFM system can no longer be used to deliver bunker either from that moment on.

#### Third paragraph

For the sake of clarity, the third paragraph explicitly states that the zero point verification must fall within the requirements of Annex D of ISO 22192:2021. If the zero point verification has been performed in accordance with the requirements of Annex D, then the issued certificate is valid for a maximum of 1 year.

#### Fourth paragraph

The zero point verification (inspection) must be performed by a party that also has the relevant accreditation for inspecting MFM systems intended for use in bunkering operations, as stipulated in the licence. There must be relevant accreditation for these MFM systems under ISO 17020, ISO 17025 or ISO 17065.

#### Fifth paragraph

The fifth paragraph stipulates that the licence holder has to keep the documents from the zero point verification on board. These documents can either be kept on board physically or digitally. In any case, the documents must show that a zero point verification has taken place and that the MFM system meets the requirements as stated in the licence. In addition, there must be proof on board the bunkering ship of the party that performed the zero point verification and that this party also has the relevant accreditation to perform this zero point verification. This party must have the relevant accreditation under ISO 17020, ISO 17025 or ISO 17065 for an MFM system, as stipulated in the licence.

#### Sixth paragraph

When an MFM system is certified, the copies of the corresponding certificates specified in the fifth paragraph must be forwarded immediately with the Harbour Master of Rotterdam/Harbour Master's Office of Antwerp-Bruges. It will be announced at a later date how this can be done (digitally).

#### Seventh paragraph

If an MFM system fails to meet the requirements set forth in the licence, it obviously cannot be used. The seventh paragraph explicitly includes this restriction. If bunkering operations are nevertheless carried out, the Harbourmaster of Rotterdam/Harbour Master's Office of Antwerp-Bruges will take enforcement action.

### Article X.5      Operational conditions for the use of the MFM system

#### First paragraph

Bunker is a potentially dangerous substance for humans and the environment. It must therefore be handled with maximum attention to safety, health and the environment. In this context, bunkering operations must therefore comply with the general requirements of clause 4 of ISO 22192:2021 and its Annex A. Annex A of ISO 22192:2021 also refers to the bunker checklist included in Annex L. However, in the ports of Rotterdam and Antwerp-Bruges, the ISGOTT (International Safety Guide for Oil Tankers and Terminals) bunker checklist is used and the ISGOTT bunker checklist is therefore referred to instead of the bunker checklist in Annex L. The ISGOTT bunker checklist must therefore be used.

#### Second paragraph, opening sentence

The second paragraph stipulates that the complete bunkering operation must comply with the requirements of clause 9 and its annexes (referred to in clause 9) of ISO 22192:2021. This includes the necessary documents as well as the procedures to be followed.

There are several exceptions to the principle that clause 9 of ISO 22192:2021 must be met during a bunkering operation. First of all, the following clauses are exempted from ISO 22192:2021:

- Clause 9.1: This clause specifies the scope of clause 9. However, the ISO 22192:2021 standard is an industry standard and not a law. Since parts of (European) legislation apply to the

installation and use of an MFM system, it is not possible to declare ISO 22192:2021 applicable in its entirety. Clause 9.1 is therefore exempted.

- Clause 9.3: This clause specifies rules for the bunker surveyor. Although the bunker surveyor plays an important role in the bunkering process, the ports lack a legal framework to set rules if a bunker surveyor is used in a bunkering operation. As such, this clause is not made mandatory.
- Clause 9.4.2, part g: this clause regulates what documents must be on board the bunkering ship. Part g refers to the obligation to have an "MFM system approval letter from an accredited body for custody transfer" on board. This document does not need to be on board since, as regards the installation of the MFM system, the Measuring Instruments Directive (MID) is followed rather than ISO 22192:2021. As regards this licence, this is governed by X.3 part d.
- Clause 9.6.4.3: This clause states that if a seal of the MFM system is broken or missing, it must be reported and the MFM system cannot be used. Reference to this clause is not necessary, as the ports have included their own provision in Article X.6 on what to do in the event that the licence conditions are not met.
- Clause 9.7.1.3: Clause 9.7.1.3 also explains what to do if an MFM system is not working correctly. As indicated above, the ports have their own procedures for this, see Article X.6 of the licence.
- Clause 9.7.2.12: this clause prohibits another bunkering ship from coming alongside while bunker is being supplied to a seagoing vessel. Another bunkering vessel coming alongside (double banking) is a frequent occurrence in ports and is not considered an activity that can impair bunkering with an MFM system. In view of this, this restriction is not reprinted in the bunkering licence.

The opening statement to the second paragraph also specifies that there are several exceptions/amendments with respect to the sections in clause 9, namely:

Second paragraph, part a

Clause 9.4.1.2 and annex O refer to both received and supplied bunker. The licence only stipulates that records need to be kept of the bunker supplied. Furthermore, if used bi-directionally, an MFM system will normally keep both records (supplied and received), but under the licence it is therefore not mandatory to do this, since ports do not have a legal framework to make recording the bunker received mandatory.

Second paragraph, part b

Clause 9.4.1.4 refers to the 'accredited body' in connection with being able to display the 'meter totalizer log' data. Here, 'accredited body' refers to the Harbour Master of Rotterdam/Harbour Master's Office of Antwerp-Bruges.

Second paragraph, part c

Clause 9.4.1.5 refers to the 'accredited body' in connection with keeping the 'meter totaliser log' on board for a minimum period of three months. Here, 'accredited body' refers to the Harbour Master of Rotterdam/Harbour Master's Office of Antwerp-Bruges.

Second paragraph, part d

Clause 9.6.1 refers to clause 5. The reference to clause 5 is not possible from a legal perspective, as the legal provisions of the Measuring Instruments Directive (MID) apply here.



#### First paragraph, part b

If an MFM system no longer meets the requirements of this licence or the requirements set forth in the mandatory clauses of ISO 22192:2021 or annexes, then no new bunkering operations can start. If bunkering operations nonetheless take place, this will constitute a breach of the conditions of the licence, which is criminal conduct which will be prosecuted.

If there is a situation where the MFM system does not meet the above requirements, the licence holder can apply for an exemption from the Harbour Master of Rotterdam/Harbour Master's Office of Antwerp-Bruges. There may be conditions to this exemption by the Harbour Master of Rotterdam/Harbour Master's Office of Antwerp-Bruges, including that bunkering is permitted without an MFM system. This exemption will be detailed at a later date by the ports.

Furthermore, it is expected that the possibility to request an exemption will only be used in very rare cases; experience with MFM systems at the Port of Singapore shows that there are virtually no problems with MFM systems and that they are very robust and reliable.

#### First paragraph, part c

If an MFM system no longer meets the conditions of this licence or the requirements as set forth in the mandatory clauses of ISO 22192:2021 or annexes, and the bunkering operation has already started, the following applies: First of all, the already commenced bunkering operation must be stopped as soon as it is identified that the MFM system is no longer functioning in accordance with the conditions and requirements in this licence. The bunkering operation can only be resumed thereafter on condition that an alternative measurement method is used. This alternative measurement method must be agreed to in writing by the receiving seagoing vessel. If this is the case, the bunkering can be completed using the agreed alternative measurement method.

However, any new bunkering cannot be started unless an exemption request has been submitted to and granted by the Harbour Master of Rotterdam/Harbour Master's Office of Antwerp-Bruges. See the explanation and procedure under part b.

Again, the MFM system is very reliable and given the experience in the Port of Singapore with the MFM system, an exemption will be an exceptional situation.

#### Second paragraph

In the event of a dispute regarding quantities, the second paragraph stipulates, in addition to the provisions in clause 9.9.2 of ISO 22192:2021, that the Harbour Master of Rotterdam/Harbour Master's Office of Antwerp-Bruges must be notified immediately of such dispute. The method of (digitally) reporting disputes about quantities is still being decided on.

In any event, the Harbour Master of Rotterdam/Harbour Master's Office of Antwerp-Bruges are not part of any disputes about quantities and play no role in settling a dispute. Indeed, such disputes are between the supplying and receiving parties.

#### Article X.7 Required documentation

For the sake of clarity, this article explicitly states that the required documentation of Articles X.3, X.4 and X.5 will be accepted both digitally and in hard copy. It should be noted that the ports prefer to receive digital versions of the document. Details of how documentation can be provided will be announced.

The ports will also consider the extent to which documentation shared with one port can also be used by the other in order to keep the administrative burden as low as possible for the licence holder.

Article X.8      Entry into force

The obligation to perform bunkering with an MFM system will apply from 1 January 2026. The expectation is that more and more bunkering ships will be equipped with an MFM system in the coming period until 1 January 2026. The ports strongly encourage voluntarily using an MFM system before then. Firstly, because using it will allow the crew to gain experience with the MFM system, and secondly, because using the MFM system will increase confidence in the bunker market. An ambitious but realistic implementation deadline has been set. Between now and 2026, licence holders will have sufficient time to purchase and install an MFM system, in order to perform bunkering with it by 1 January 2026. The ports will also actively monitor and enforce whether an MFM system is on board, and whether it is being used correctly, from 1 January 2026.