

Petroleum and Petrochemical Bulletin

FREE WATER DETERMINATION

**Bulletin 09-01
Rev. 2**

Following publication of the of API Chapter 17.11/EI HM52 *Measurement and sampling of cargoes on board tank vessels using closed and restricted equipment*, Second Edition August 2016, the member companies of the International Federation of Inspection Agencies wish to update their position regarding free water determination.

IFIA member companies continue to receive instructions from clients (or their loss control representatives) as to the water determination method to be used (Electronic or manual), and preferences for water paste type and brand. This is generally expressed without the agreement of all concerned parties. It has even been noticed that certain representatives issue differing instructions dependant on their position in the trading chain.

There are many examples of water finding pastes on the market and no standards organization has designated “approved” water paste, Ultimately the end user must select the paste for the job based upon the following considerations from existing API standards;

1. **API MPMS Chapter 3.1A Tank Gauging, Section 6.1 - WATER-INDICATING PASTE PROCEDURE, Section 6.1.1 General** - *There are many brands of water indicating pastes available that change color on contact with free water. It has been found that, although all pastes react to free water, they may differ.*
2. **API MPMS Chapter 3.1A Tank Gauging, Section 4.4.2 - Water Indicating Paste** - *Water gauging pastes are used with gauge bars and bobs and tapes to indicate the petroleum and free water interface. The paste should not readily react with the petroleum or emulsions, but should change color upon contact with free water.*
Note: Water pastes that indicate an emulsion by spotting are acceptable; however, water pastes that show emulsions as a complete color change, within the immersion times specified in Section 6, should not be used.
3. **API MPMS Chapter 3.1A Tank Gauging, Section 6.1.2 - Selection of Paste** - *The selection of a suitable water-finding paste should be such that it:-*
 - *gives a clear and unambiguous color change when in contact with free water;*
 - *has an acceptably rapid reaction time under operating conditions;*
 - *does not exhibit ‘creep’;*
 - *has a consistency suitable for use at ambient and operating liquid temperatures.*

Revisions/Reaffirmations

Rev. 0 May 2009
Rev. 1 Jan 2014
Rev 2 June 2017

4. **API MPMS Chapter 3.1A Tank Gauging, Section 6.1 - WATER-INDICATING PASTE PROCEDURE, Section 6.1.1 General** - *It is recommended to use two different pastes on the bar at the beginning of gauging. After it has been established which paste works best for the given product, the other may be discontinued.*

5. **API MPMS Chapter 17.11 / HM 52 Measurement and Sampling of Cargoes on Board Tank Vessels Using Closed and Restricted Equipment, Section 7.1.1** - *When vessels are fitted with vapor control valves, PMUs can be used to measure bulk liquid and free water levels and also temperature.*

6. **API MPMS Chapter 17.11 / HM 52 Measurement and Sampling of Cargoes on Board Tank Vessels Using Closed and Restricted Equipment, Section 7.1.3 j)** - *To measure the free water level, slowly unwind the tape until the probe reaches the bottom of the tank. Slowly raise the probe to determine (if there is a water interface). If a water interface is detected, raise/lower the probe into the cargo to recheck the interface level. Once the interface level is verified, record the free water ullage reading to the nearest tape graduation, 1 mm (1/8 in. for customary unit tapes) at the reference gauge point. This is the cargo/free water interface as measured by the PMU. Persistent differences between measurements can indicate movement of the tank contents. If cargo movement in a tank is unavoidable, at least five measurements shall be obtained in minimal time, recorded, and then averaged.*

7. **API MPMS Chapter 17.11 / HM52 Measurement and Sampling of Cargoes on Board Tank Vessels Using Closed and Restricted Equipment, Section 7.1.3)** *NOTE: Alternate methods of water determination may be used; such as the dip rod/water gauge bar (see Figure 5.5), which, when used in conjunction with water-finding paste, can be used for determination of free water. Refer to API MPMS Chapter 3.1A/EI HM 4.*

API MPMS Chapter 17.11 / HM52 - *Measurement and Sampling of Cargoes on Board Tank Vessels Using Closed and Restricted Equipment*, Second Edition, August 2016 does not recommend the use of water paste on the probe of a PMU, as was the case with Edition 1, and refers the reader to API MPMS Chapter 3.1A/EI HM 4, which requires the use of a measurement unit with a traditional bob or water gauging bar when water paste is used. Measurements made using paste applied to a PMU probe will therefore not conform to API standards.

Note: API MPMS Chapter 17.2 (Second Edition May 1999, Reaffirmed Sept. 2009 and currently under revision) refers to applying water finding paste to a PMU, in section 6.1.2.2(i) and Appendix B10, which contradicts API MPMS Chapter 17.11. As API MPMS Chapter 17.11 was published much later than API MPMS Chapter 17.2, IFIA recommends that its member companies follow the requirements of the most recent publication, which is API MPMS Chapter 17.11.

It is the position of IFIA member companies that instructions received from clients during job nomination regarding the free water method and/or paste that is to be used, will be confirmed with other concerned parties to the nomination. If this cannot be achieved, the member company will be obliged to proceed in strict accordance with the standards quoted above, under the conditions of a), b) or c) below.

- a) *When the manual method for free water determination is used, two pastes will be added to the bob or water gauging bar on the first tank gauged. Without agreement of all parties, the selection of the brand of paste will be made by the IFIA member company's representative.*

- b) *When electronic measurements are made these will be carried out in accordance with API MPMS Chapter 17.11 (see 6. above)*
- c) *When both manual and electronic measurements are requested the highest continuous clear water cut obtained, be it by either of the two pastes, or steady interface indication from the electronic PMU probe, will be used as the indicator of the oil/ water interface level.*

It is clear that the intent of the second edition of the API MPMS Chapter 17.11 / HM52 Standard precludes the use of water paste unless it is applied to a graduated bob or water gauging bar. Therefore, where both manual and electronic measurements are requested, additional time will be required for the inspection; to allow the initial use of a PMU and subsequent checks with water paste and bob or water gauging bar.

Note: **If US Customs and Border Protection (US CBP) are involved, be it import, export, or FTZ movement, then a), b) or c) must apply without exception.

**The licensing requirements of the US CBP for Commercial Gaugers (19CFR151) specify strict adherence to API MPMS standards. It should also be noted that licensed commercial gaugers are "required to notify both the port director and the executive director (of Customs) of any attempt to impede, influence, or coerce gauger personnel in the performance of their duties" under this same regulation.

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