

Petroleum and Petrochemical Bulletin

SAMPLING AND TESTING CARGOES BLENDED ON BOARD MARINE VESSELS

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TIC Council member companies are often assigned to inspect cargoes of petroleum that are blended on board marine vessels at the loading port with the intention to meet certain contractual quality specifications of buyers and sellers. These cargoes are usually blended from two or more shore tanks, each containing a different component. The target composition of the final blend is typically based on a composite of shore tank samples, proportionally blended in a loading port laboratory. Shippers and receivers then rely on agitation of the cargo during proportional transfer into each of the vessel's tanks to mix all the components to contract quality specifications.

TIC Council members' experience has consistently indicated that, for many physical reasons, thorough mixing of these components does not always occur as intended. Therefore, when the blended cargo reaches the discharge port, manual samples taken from the vessel do not yield the same test results that were obtained at the loading port.

The American Petroleum Institute (API), in its Manual of Petroleum Measurement Standards (MPMS), has recognized the difficulties of obtaining representative samples from cargoes that are not uniform throughout their profile and cross-section in a tank.

- API MPMS Chapter 8.1 / ASTM D4057-19, sections 9.2.7 to 9.2.11 address non-homogeneity and section 9.5.3, states "running and all-levels samples may not necessarily be representative because the tank volume may not be proportional to the depth and the rate of filling is proportional to the square root of the depth of immersion".
- API MPMS Chapter 17.1 (Sixth Edition, June 2014), section 9.2.1 states "Due to incomplete mixing, sampling limitations and other operational restrictions, vessel tank samples often will not be representative of proportional hand-blended samples that were tested at the port of loading."
- The introduction to API MPMS Chapter 17.11/EI HM52 (Second Edition, August 2016) states in the introduction, "It should be noted that when taking vessel samples, it may not be possible to obtain representative samples of non-homogenous cargoes due to the inherent nature of the cargo and the sampling restrictions."

All work performed by TIC Council member companies is subject to regulatory audit for conformance to industry standards. Therefore, consistent with recognized industry standards, TIC Council member companies take the following position:

1. All manual samples, shore tank and vessel tank, will be taken in accordance with latest methods prescribed in API MPMS Chapter 8.1 or ISO 3170.
2. Laboratory analysis of all samples will be performed using standard industry test procedures, usually as specified by the American Society for Testing and Materials (ASTM) or the Energy Institute IP Standard Test Methods.
3. If analysis results indicate a possible problem with a cargo; blending, sampling and testing procedures will be carefully reviewed, and findings promptly reported to the client(s).
4. Test method precision limits (repeatability and reproducibility) will not be used to adjust the analysis results of any sample except as specifically authorized in ASTM method D3244.

Revisions/Reaffirmations

Rev. 0	1999
Rev. 1	July 2015
Rev. 2	Dec 2020

Exceptions to the above position will be considered only when the TIC Council member company inspecting the cargo is instructed otherwise in writing by all parties to the custody transfer.

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