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Manual of Petroleum Measurement Standards Chapter 17.8

Guidelines for Pre-loading Inspection of Marine Vessel Cargo Tanks and Their Cargo-handling Systems

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Special Notes

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Guidelines for Pre-loading Inspection of Marine Vessel Cargo Tanks and Their Cargo-handling Systems

1 Scope

These guidelines specify procedures for determining that the cargo tanks and associated cargo-handling system of marine vessels are in a suitably clean condition to receive the intended cargo. This applies to the loading of crude oil, petroleum products, and petrochemical cargoes. These guidelines recommend the extent of inspection that should be instituted for certain general types of cargoes and an example of a format that may be used for reporting the findings of tank inspections. Because of the wide variety of conditions that may exist when performing pre-loading tank inspections, this guideline is not intended to restrict the judgment of the person performing the inspection.

2 Normative References

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

API *Manual of Petroleum Measurement Standards (MPMS) Chapter 8.1, Standard Practice for Manual Sampling of Petroleum and Petroleum Products*

API *Manual of Petroleum Measurement Standards (MPMS) Chapter 17.1, Guidelines for Marine Inspection*

API *Manual of Petroleum Measurement Standards (MPMS) Chapter 17.4, Method for Quantification of Small Volumes on Marine Vessels (OBQ/ROB)*

3 Terms, Definitions, Acronyms, and Abbreviations

3.1 Terms and Definitions

For the purposes of this document, the following definitions apply.

3.1.1 cargo-handling system

All parts of a vessel's equipment used during the loading or unloading operations that may come in contact with the cargo.

3.1.2 first-foot sample test portion sample first-in sample)

A sample taken after approximately 0.3 m (1 ft) of cargo has been loaded into a vessel's tank.

3.1.3 pop the lines

The process of repeatedly opening and closing a bleeder valve on an empty line under pressure until no liquid appears to transfer.

3.1.4 qualified person

Someone who "by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project"

NOTE From 29 CFR 1926.32(m).

3.1.5

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stand pipes

Vertical sections of pipe or tubing extending from the gauging platform to near the bottom of tanks that are equipped with external or internal floating roofs, or on other tanks. Stand pipes may also be found on ships and barges.

3.1.6

wall wash test

The procedure for rinsing selected areas of the interior bulkheads of a cargo tank with an appropriate medium and testing the collected sample for the presence of material which might contaminate cargo to be loaded

3.2 Acronyms and Abbreviations

For the purposes of this document, the following acronyms and abbreviations apply.

ACS American Chemical Society

FOSFA Federation of Oils, Seeds and Fats Associations Ltd

HDPE High-density polyethylene

OBQ On board quantity

SDS Safety Data Sheet

4 General Information

The shipment of crude oil, petroleum products, and petrochemicals requires stringent quality control during the loading, transport, and discharge operations. It is important to determine whether the vessel's tanks, vessel lines, and the associated cargo-handling system are sufficiently clean so that the intended cargo will not be contaminated.

Cargoes of crude oil, petroleum, and petrochemicals have varying tolerances regarding the extent to which they are affected by on board quantities or residues after tank cleaning operations. These guidelines for pre-loading inspection of a vessel's cargo-handling system are intended to minimize the risk of contaminating the cargo to be loaded.

For vegetable oils and fats, refer to *FOSFA Qualifications and Operational Procedures for Ships Engaged in the Carriage of Oils and Fats in Bulk for Edible and Oleo-Chemical Use*

The procedures in this guideline shall be performed only by properly trained, experienced personnel using appropriate equipment and methods.

All procedures described and recommended in this publication shall be accomplished with strict adherence to the safety requirements that are specified in the *International Safety Guide for Oil Tankers and Terminals (ISGOTT)* or other specific requirements of vessel and terminal operators, and regulatory authorities.

Tank inspection activities performed on board a vessel shall be performed in the presence of, or with the permission of, the vessel's master, cargo officer, or other appropriate authority. For safety reasons, only appropriate and intrinsically safe equipment shall be used.

5 Safety and Health Consideration

5.1 General

Due consideration shall always be given to applicable safety and health procedures. Considerations should include—but are not limited to—possible electrostatic and other fire and explosion hazards, protection from potential dangers to personnel (e.g. various protective clothing and equipment requirements and work practices), and potential explosive, fire, toxic, and oxygen deficiency/enriched hazards associated with a cargo tank's environment. The physical characteristics of the cargo and existing operating conditions should be evaluated carefully, and applicable international, federal, state,

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and local regulations should be strictly observed. Safety procedures designated by the employer, the vessel's operator, and other concerned parties also shall be observed.

Since toxic vapors or oxygen deficient/enriched atmospheres cannot be detected safely by smell, visual inspection, or judgment, appropriate precautions shall be taken to ensure protection. When it is necessary, personnel shall have suitable respiratory protection, appropriate exposure monitoring, protective equipment, and emergency rescue equipment for the environment and the task prior to entering the tank or inspection site.

Extra care should be taken when moving around inside tanks as surfaces may be slippery and lighting may be poor. Tripping hazards and obstructions may also exist.

5.2 Physical Characteristics and Fire Considerations

Information regarding particular materials shall be obtained from the employer's, manufacturer's, or supplier's Safety Data Sheet (SDS). Personnel who handle petroleum-related substances, as well as other chemical materials, shall be familiar with their physical and chemical characteristics—including potential for fire, explosion, and reactivity—and with potential toxicity and health hazards and emergency procedures. Personnel should avoid potential sources of ignition and keep containers of materials closed, when not in use.

5.3 Special Safety Considerations—Entry into Confined Spaces

It is the responsibility of vessel personnel to identify confined spaces and to ensure that established procedures for safe entry are followed. Inspectors shall consult the qualified person to determine whether entry into such confined spaces is permitted and shall be accompanied by a representative of the vessel at all times (*ISGOTT*).

No one should enter a confined space unless an entry permit has been issued by a qualified person or certified marine chemist who has ascertained before entry that the tank atmosphere is in all respects safe for entry. Before issuing an entry permit, the qualified person shall at least ensure that:

- the appropriate atmosphere checks have been carried out;
- effective ventilation will be maintained continuously while personnel are in the confined space;
- lifelines and harnesses are ready for immediate use;
- approved and pre-tested breathing apparatus and resuscitation equipment are ready for use at the entry to the confined space;
- personnel protective equipment shall be worn as appropriate for the task;
- where possible, a separate means of access is available for use as an alternative means of escape in an emergency;
- a standby person shall be in constant attendance outside the confined space;
- a means of communication between the confined space entrant and standby person shall be established prior to entry and tested throughout the duration of the entry;
- prior to commencing confined space entry, the lines of communication for dealing with emergencies shall be clearly established and understood by all concerned.

6 Prior to Performing Pre-loading Inspection

6.1 Vessel Responsibilities

It is the vessel's responsibility to present its cargo-handling system(s) in a condition that is, in all respects, ready to load its intended cargo, and nothing in this document is intended to relieve the vessel of its responsibilities. Notwithstanding the above, vessel personnel have the following responsibilities regarding the cleanliness of nominated cargo-handling system and the inspection procedure:

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- Ensure that the tank lining or coating has been stipulated by the manufacturer as suitable for the intended cargo.
- Ensure that designated cargo-handling system is suitably clean and compatible with the intended cargo.
- Know the safety requirements unique to the extent of the inspection being performed and make sure that they are followed.
- Facilitate the inspection process and provide the necessary assistance and personnel to expedite the inspection procedure safely.
- Supply safe access to gauge hatches or other inspection access points, including removal of inspection flanges, and access hatches, where appropriate, to permit a detailed inspection of the interior of the cargo-handling system.
- Load cargo only into those tanks suitable for the intended cargo.
- When personnel tank entry is required, ensure that tanks are safe for entry.

6.2 Key Meeting

Refer to API *MPMS* Chapter 17.1 for key meeting requirements.

At a minimum, the following items shall be discussed at the pre-loading key meeting:

- review of entry permits including the precautions to be taken when entering tanks or other confined spaces and of any restrictions placed upon the work permitted there;
- number and identity of personnel who will enter the tank;
- lockout/tagout procedure for valves leading to tanks to be entered as applicable for energy isolation;
- agreement on safety and emergency procedures that shall be followed;
- the assignment of a standby person for tank entry;
- whether any cargo on board will be moved while a tank is occupied by personnel;
- tank number, capacity, and intended cargo volume of each cargo tank;
- identification of the prior three cargoes in each tank;
- identification of the cargo to be loaded;
- identification of the type of tank surfaces or coatings;
- method used to clean the cargo tanks, lines, and pumps;
- sampling requirements, i.e. manifold, pump stack, first-foot sampling, or wall wash testing;
- type of tank inspection.

Additionally, the following items should be considered as part of the key meeting:

- contents and heating requirements of adjacent compartments or tanks;
- condition and compatibility of the inerting method;
- the need to load tanks in a certain sequence (loading plan);
- the condition of the vessel's pumps, strainers or filters, heating coils, heat exchangers, and sea chests;
- the line fullness and cleanliness condition of vessel lines.

7 Visual Inspection—Deck Level

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Visual inspection from deck level requires that elements of the cargo-handling system be physically opened to facilitate inspection. For vessels in an inert state, or tank(s) that cannot be physically opened, the practical method to determine the condition of the tank would be to perform an on-board quantity (OBQ) survey in accordance with API *MPMS* Chapter 17.4.

A deck level inspection is the least effective form of tank inspection. Significant amounts of OBQ can remain undetected in the vessel's lines, on bulkheads, and in other areas that are not visible or are not accessible to gauging equipment, and acceptance of tanks may be conditional on the analysis results of first-foot samples. Presence of inert gas limits the effectiveness of a visual inspection from deck level. (See the first paragraph of Section 7.)

Vessel personnel should open the tank valve for each tank nominated to receive cargo. The vessel's personnel should have the deck lines drained into one specified cargo tank per grade of cargo, if practical, or into slop tank(s). Tank suction and fill valves should be open for inspection to ensure that lines associated with the tank are well drained. Visually inspect and/or sound the interior of the cargo tank for any OBQ (liquid or nonliquid).

A visual inspection from deck level shall observe for the following from the observation point(s):

- evidence of any liquid,
- visible sheen on any viewable surfaces,
- obvious sources of contamination (Annex D),
- apparent odor of previous cargoes or cleaning material.

For all of these items, the inspection documentation should indicate the extent to which the observations could be made. If no findings are found, the tank can be accepted.

After completing the inspection, inspection personnel shall report results to the appropriate parties. The time of acceptance or rejection of the tank shall be recorded. (An example can be found in Annex B.1.)

If the tank(s) or cargo-handling system is rejected, vessel personnel are responsible to initiate whatever additional stripping and cleaning activities that are necessary. Vessel personnel shall notify inspection personnel when the vessel is ready for re-inspection. All re-inspections shall be documented. A new Cleanliness Inspection Checklist and Tank Inspection Report may be used.

If OBQ is found during the visual inspection, the quantity and type of the OBQ should be recorded and the appropriate parties notified. If the OBQ could contaminate the intended cargo to be loaded, then appropriate parties shall be notified promptly and the following actions should be considered:

- If sufficient quantity is observed, measure and sample the material in the cargo tank(s) if a sufficient quantity exists.
- Perform additional stripping or tank cleaning procedures.
- Designate alternative tanks to receive the cargo.
- Obtain a release from the responsible parties and proceed with loading.
- Other appropriate actions as agreed by all parties.

Refer to API *MPMS* Chapter 17.4 for additional information.

8 Visual Inspection—Tank Entry

8.1 General

Tank and cargo-handling system cleanliness testing and inspection procedures should be determined by the parties involved. Additional customer requirements may be used to determine cleanliness of tank and cargo-handling system prior to loading. The method agreed by the parties should establish the requirements for the inspection.

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8.2 Tank Entry Precautions

Before entering a confined space, section 5.3 and all safety requirements specified by the relevant documents and regulations shall be followed:

A standby person shall be always stationed at the tank hatch while personnel are in the tank. A standby person shall meet the following criteria:

- familiar with the tasks to be performed,
- capable of positively identifying all persons in the confined space at all times,
- capable of and responsible for maintaining communication with the persons who have entered a confined space and with the officer of the watch,
- capable of and responsible for initiating rescue operations by notifying the officer of the watch,
- dedicated to operating as a standby without conflicting duties.

At minimum, an entry permit shall contain the information detailed in the sample Confined Space Entry Permit (Table C.1).

8.3 Tank Entry Inspection

Prior to any tank entry inspection, all lines leading to the tank should be verified, to the extent possible, to be empty and free of potential contaminants (Annex D). A visual examination of accessible pipelines, including pump drains and manifolds, should be completed. Removal of any inspection flanges and access plates to facilitate the inspection of the interior of the cargo-handling system shall be performed by the vessel personnel where not in place for energy isolation. Cargo space shall be segregated by blinding or isolating all connecting pipelines and all valves on pipelines serving spaces shall be secured. The tank atmosphere shall be tested and permitted for safe entry after any changes in valve settings (Annex C). Heating coils should be either drained or blown, and blinded, or tested for tightness.

The following inspection shall be performed and recorded upon tank entry.

- All tank surfaces—including internal pumps, sumps, heating coils, and all pipe surfaces—that can be accessed without staging or equipment should be examined for possible sources of contamination (Annex D).
- Tank coating should be examined for signs of deterioration, such as blistering, flaking, or areas where the metal beneath the coating is visible. Knowledge and experience of the visual inspection and estimation of cargo tank coatings and determination of coating type and condition or integrity (% of total coating in place or % breakdown of the coating in place) may be required to ensure that the tank inspection result meets the requirements and expectation of the parties for whom the inspection is being performed. Tank coating condition should be detailed in the inspection documentation and may be included in the Cleanliness Inspection Checklist (Annex B.1).
- All internal piping, pump housing, etc. shall be opened and inspected, where appropriate.

Caution—To avoid possible release of hazardous materials, blisters in the tank coating should be investigated with caution. Piles of rust or debris on the tank floor should be left undisturbed and noted. Removal of such scale, rust, or detached tank coating should be done by vessel personnel.

Prior to loading some chemical cargoes, it is recommended to pop-the-lines with dry air, carbon dioxide, nitrogen, or other acceptable gases from manifold to tank to verify that the lines associated with the cargo-handling system are liquid free.

NOTE This may not be allowed at all installations.

8.4 Wall Wash Testing

If wall wash testing is required, follow the wall wash testing procedures in Annex A.

8.5 Reporting Tank Entry Inspection Results

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After completing the tank entry inspection, inspection personnel shall report results to the appropriate parties.

When cargo-handling system inspection procedures have been completed, inspection personnel shall prepare written documentation of inspection results, which may be included on a Cleanliness Inspection Checklist(s) and Tank Inspection Report(s). Vessel personnel shall confirm that the tank inspection has been completed. The time of acceptance or rejection with reasons of the tank shall be recorded. (See example in Annex B.1.)

9 Sampling

9.1 General

Sampling, as part of a vessel pre-loading inspection, is intended to validate the effectiveness of cleaning or assist with determination of the source of contamination should there be an issue. Sampling schemes should be determined by the parties involved and may not always be required. Reference API *MPMS* Chapter 8.1 for sampling methods.

9.2 Vessel Manifold Sample

If a manifold sample is required, the sample should be obtained at the vessel manifold immediately upon and concurrent with the start of loading unless not permitted by local regulations.

9.3 Vessel Line Sample

If a vessel line sample is required, it should be taken concurrently with the first entry of cargo into the tank at the point nearest the cargo line drop into the tank. On some vessels, this is called the pump stack sample.

9.4 First-foot Sample

First-foot samples can be taken to determine whether any contaminants within the vessel's loading systems have survived cleaning regimes.

If a first-foot sample is requested, loading of the first foot should be through all relevant loading lines and shall be taken when approximately 0.3 m (1 ft) of cargo has been loaded into the tank. The sample should be examined or tested to determine conformity with cargo specifications. If the sample indicates potential contamination, contact the principals for further instructions.

Caution—Special attention is required while taking samples. Care shall be taken to allow an appropriate relaxation period prior to sampling some products to prevent the discharge of an electrostatic spark. Metal equipment shall be grounded. Under no circumstances should samples of any product be taken until pumping has stopped.

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Bibliography

ASTM D329³, *Standard Specification for Acetone*

ASTM D1152, *Standard Specification for Methanol (Methyl Alcohol)* ASTM D1193, *Standard Specification for Reagent Water*

ASTM D1209, *Standard Test Method for Color of Clear Liquids (Platinum-Cobalt Scale)* ASTM D1722, *Standard Test Method for Water Miscibility of Water-Soluble Solvents*

ISGOTT/OCIMF⁴, *International Safety Guide for Oil Tankers and Terminals*

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³ ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, www.astm.org.

⁴ Oil Companies International Marine Forum, 29 Queen Anne's Gate, London, SW1H 9BU, United Kingdom,

Annex A (normative) Wall Wash Procedures

A.1 General Wall Wash Procedures

A.1.1 Reagent Selection

Reagent grade chemicals should be used in all tests unless otherwise indicated. All reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society (ACS) or equivalent, where such specifications are available.

Typical reagents include:

- a) methanol—ACS reagent grade with very low concentrations of chlorides (refer to ASTM D1152);
- b) acetone—ACS reagent grade (refer to ASTM D329);
- c) high-purity water—unless otherwise indicated, references to water shall be understood to mean reagent water as defined by ASTM D1193.

Other reagents or products may be used with agreement of all parties provided it is first ascertained that the material is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

Chlorides in high-purity methanol should not exceed 0.01 mg/kg. This information should be provided by the supplier or determined by the analyst prior to use. A control chart for the concentration of chlorides in the methanol reagent should be established and maintained to track quality.

Typical wall wash specifications for Reagent Grade Methanol are listed in Annex E.

A.1.2 General Procedures

Reagents used for wall washing may adversely affect the atmosphere of the tank. The SDS should be reviewed prior to handling the reagent to determine the appropriate personal protective equipment to be used.

Use the following chart (Table A.1) to determine the minimum number of areas to be selected for wall washing in any tank. Each wall of the tank shall be wall washed regardless of the number of wash area.

Table A.1—Wall Washing Tanks

Tank Capacity	Minimum No. Areas to Wash
<500 M ³ (3000 bbl)	5
500–1000 M ³ (3000 bbl to 6300 bbl)	7
>1000 M ³ (>6300 bbl)	9

Tank bottoms (floors) often do not require wash testing. However, if wash testing is required, use the blotter method (see A.3).

A.2 Funnel Wall Wash Procedure

A.2.1 Equipment

The following equipment is required prior to starting the wall wash procedure:

- appropriate protective safety equipment,

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- intrinsically safe flashlight,
- high-density polyethylene (HDPE) squeeze bottle,
- wall wash funnel,
- clean sample collection bottles with chemical-resistant caps,
- shoe covers,
- sufficient wall wash reagent,
- bucket and heaving line.

A.2.2 Funnel Wall Wash Procedure

The wall wash method is the most common method for identifying contamination on the walls of a cargo tank. The following procedure shall be used for the wall wash method.

- Wall wash funnel, bottles, and bottle caps shall be clean and rinsed with reagent to prevent contamination of the sample.
- Pour approximately 1 L (or 1 qt) of reagent into a 1 L (or 1 qt) HDPE squeeze bottle.
- The tank shall be dry before conducting the wall wash tests.
- Choose sites on each tank wall (bulkhead).
- Start applying reagent on the sites chosen, as high as possible, while standing on the floor with the squeeze bottle approximately 15 cm (6 in.) from the wall. Approximately 100 mL should be applied at each wash site (Figure A.1).
- Funnel should be tight-fitting to the wall allowing minimal reagent bypass.
- Collect the reagent with the wall wash funnel into a clean glass bottle with the funnel placed at approximately 1 m (3 ft) below the stream. Do not scrape the tank wall with the funnel when collecting the reagent to avoid possible contamination of samples with suspended matter (Figure A.1).

NOTE Special care shall be taken not to scrape zinc tank coatings with the edge of the funnel due to the high probability of sample contamination.

Caution—Perspiration contaminates the samples. Do not permit perspiration to drop into the sample bottle.

- The process shall be repeated at the number of sites specified in Table A.1. Approximately 250 mL of reagent shall be collected. If approximately 250 mL is not collected from the number of sites specified in Table A.1, continue wall washing at additional sites until approximately 250 mL is collected.
- Include “nontypical” areas, such as discolored patches, lining breaks, and exposed metal. If the nontypical areas are less than 20 % of the tank surface, include them in the areas normally tested. If they are more than 20 % of the tank surface, wall wash these areas in a separate bottle and test them separately.
- Include a sample of the reagent used in the wall wash procedure. This is the analytical “blank.” If the wall wash sample fails, this reagent shall be analyzed and the results of the “blank” shall be subtracted from each tank’s wall wash sample’s results.

- Prepare a wall wash blank sample as follows.

NOTE The following steps should be performed after leaving the tank.

- Rinse a sample bottle with a small amount of the wash liquid.
- Add at least 250 mL of wash liquid from the squeeze bottle.
- Rinse the plastic cap with wash liquid and securely cap the bottle containing the blank sample.
- Immediately label the blank sample with appropriate tag.

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- Samples shall be delivered to the appropriate laboratory for customer required analysis.
- The laboratory shall be informed in advance if analysis is required on wall wash samples.

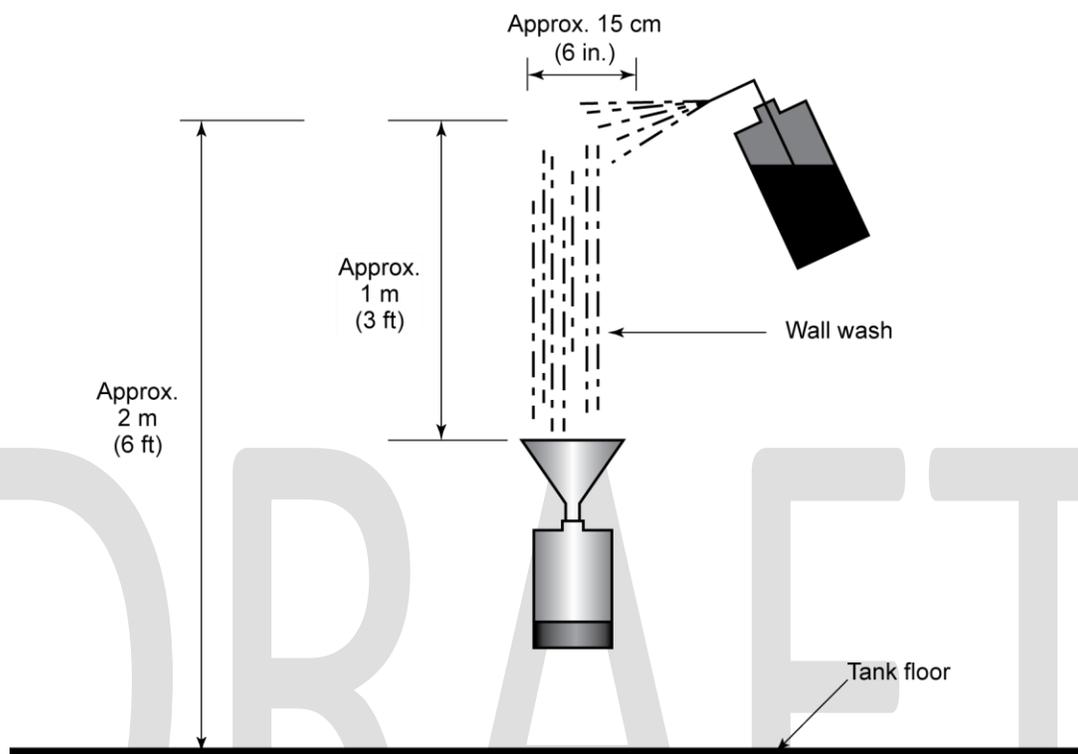


Figure A.1—Wall Wash Procedures

A.3 Blotter Method Procedure

A.3.1 General

Since filter papers are not consistent in chemical composition, the blotter wall wash procedure should be used only when it is not practical to use the funnel wall wash procedure.

A.3.2 Equipment

The following equipment is required prior to starting the blotter wall wash:

- use appropriate protective safety equipment prior to starting the wall wash procedure,
- intrinsically safe flashlight,
- HDPE squeeze bottle,
- clean wide mouth sample collection bottles with chemical-resistant caps,
- shoe covers,
- laboratory filter papers,

Caution—Since all filter papers in the same container may not be free of contaminants, or may not have the same level of contaminants, the result of laboratory tests of samples could be adversely affected by the filter papers.

- sufficient wall wash reagent,
- bucket and heaving line,

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- forceps or tweezers for handling filter papers.

A.3.3 Blotter Method Procedure

The following equipment is required prior to starting the blotter method.

- Wide mouth sample bottle and caps shall be clean and rinsed with reagent to prevent contamination of the sample.
- Hold a piece of laboratory filter paper with forceps or tweezers against the surface of the wall a few inches above the floor. Use the squeeze bottle to apply about 50 mL of reagent onto the test site, about 1 m (3 ft) above the floor, in a stream about 0.1 m (4 in.) wide. Allow the reagent to run down the wall and be absorbed by the filter paper being held near the floor.

Caution—Do not rub or wipe the filter paper on the tank wall.

- As the test papers are saturated, carefully fold and place them in the wide-mouth bottle.

Caution—Perspiration contaminates the samples. Do not permit perspiration to drop into the sample bottle or onto the filter papers.

- For tank bottom washing, wash the tank bottom by placing a filter paper on a spot wetted with the reagent. Then lift the filter paper with forceps or tweezers carefully, fold it, and place into the wide-mouth bottle.

Caution—Do not take tank bottom samples where there has been foot traffic.

- Samples shall be labeled immediately following collection.
- Include a sample of the reagent and filter paper used in the blotter wall wash procedure. This is the analytical “blank.” If the blotter method sample fails, this reagent and filter paper shall be analyzed and the results of the “blank” shall be subtracted from each tank’s blotter method sample’s results.

Prepare a blotter blank sample as follows.

NOTE The following steps should be performed after leaving the tank.

- Rinse a wide-mouth bottle with a small amount of the wash liquid.
- Take an unused filter paper from the box and place it into the rinsed wide-mouth bottle.
- Add wash liquid from the squeeze bottle. Rinse the plastic cap with wash liquid and securely cap the bottle containing the blank sample and filter paper.
- Immediately label the blank sample with appropriate tag.
- Samples shall be delivered to the appropriate testing site for customer-required analysis.

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Annex B (informative)

Inspection Checklists and Reports

Cleanliness Inspection Checklist				
Vessel Name (barge or ship)		Port / Location:		Tank Entry Inspection only
Cargo:	Tanks inspected:	Date:		Standpipe(s) extend to bottom? (Y / N)
Deck level inspection? (Y / N)	Tank Entry inspection? (Y / N)	Original or follow-up inspection?		Stand pipe(s) (preferated / unpreferated)
<i>Tank Entry inspection requires all deck level inspection items</i>				
Verification Steps		Yes, No, N/A	Observed, Not Observed, N/A	Observations / Notes
		Vessel Rep.	Inspector	
Visual Inspection from Deck Level Items				
Cargo load and/or discharge lines blown / popped from manifold into tank				
Cargo stripping lines blown / popped into cargo tanks				
Cargo tank valves open and lines drained				
Cargo stripping valves open and lines drained				
Port & starboard cargo manifold valves open and pipeline visually inspected				
Port & starboard vapor return valves open and pipeline visually inspected				
Load, discharge, pump can suction, check valve bypass valves open (U.S. inland barges only)				
Vapor return line low point drain liquid free				
No apparent odor of previous cargoes or cleaning material				
Stand pipe(s) (if equipped) and vapor control valve(s) viewable interior surface visibly free of any				
Tank Entry Inspection Items				
No apparent odor of previous cargoes or cleaning material at any point during the				
Free of any visible sources of contamination on internal surfaces including, but not limited to, sump,				
Free of any visible sources of contamination on internal components including, but not limited to,				
Tank coating visibly free of any apparent deterioration (i.e. not cracked, stained, blistered, peeling,				
Below deck cargo pipeline internally inspected, where accessible, and found visibly free of any				
Cargo pump can and filter screen inspected and found free of visible sources of contamination (inspection plate should be removed by vessel prior to inspection)				
Additional Comments:				
Print Name		Signature		Date
Inspector				
Vessel Rep.				
Notes:				
<p>1) The above items are intended to reflect the condition of the cargo-handling system to the extent possible, at the time of inspection, and are not intended to indicate acceptance or rejection of the cargo-handling system.</p> <p>2) Potential sources of contamination are identified in Annex D.</p> <p>3) Presence of contamination or any items of concern uncovered during the inspection process should be immediately brought to the attention of the appropriate parties.</p> <p>4) If a WWT is required, it should not be performed until the above verification steps are found to be acceptable.</p>				

Figure B.1 – Cleanliness Inspection Checklist

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Tank Inspection Report

Vessel: _____	Cargo: _____	Port: _____	Terminal: _____
---------------	--------------	-------------	-----------------

Tank Number	Tank Coating	Last Cargo	Second Last Cargo	Third Last Cargo	Date Inspected	Time Completed Inspected	Deck Level Inspection (YES/NO)	Tank Entry Inspection (YES/NO)	WWT Required (YES/NO)	WWT Method	WWT Reagent	WWT Pass/Fail	First Foot Taken (YES/NO)	Visual Cleanliness Accepted/Rejected	Reason for Rejection

Tank Number	Stated Method of Cleaning

Figure B.1 - Tank Inspection Report

Annex C (informative)

Sample Permit/Report

Table C.1—Confined Space Entry Permit (Sample Format; Other Formats Are Permitted)

1	Vessel	Space to be entered	Date/time
2	Previous contents	Purpose of entry	Permit expires
3	Oxygen content (%)	Oxygen meter: Mfrs. Serial No.	Date meter calibrated
4	Combustible gas (% LEL)	Gas meter: Mfrs. Serial No.	Date meter calibrated
5	Toxicity (ppm, toxin, exposure limit, reading)	Toxicity test method	Mfrs. Serial No.
6	Toxicity (ppm, toxin, exposure limit, reading)	Toxicity test method	Mfrs. Serial No.
7	Toxicity (ppm, toxin, exposure limit, reading)	Toxicity test method	Mfrs. Serial No.
8	Toxicity (ppm, toxin, exposure limit, reading)	Toxicity test method	Mfrs. Serial No.
9	Date and time of tests (line 3-8 above)	Remarks:	
10	Confined space preparation procedure (e.g. washing)		
11	Confined space isolation (e.g. blanks, lockout/tagout)		
12	Ventilation procedures used:		
13	Confined space ventilation commenced (date/time):		
	1. Shall be continuous when person is in compartment. 2. Shall be stopped for atmospheric testing.		
14	Illumination provided (Yes/No):		
15	Standby person at confined space entrance:		
	Name 1. Standby person equipped with (Circle if applicable) 2 SCBAs Communication equipt. Rescue equipt.		
16	Communication established between person entering confined space and (Name)		
17	THIS CONFINED SPACE HAS BEEN EVALUATED AND (IS) (IS NOT) SAFE FOR ENTRY		
18	Qualified Person (name and signature):	Master or Chief Officer (name and signature):	
19	MY SIGNATURE BELOW VERIFIES THAT I HAVE READ AND UNDERSTAND THE CONTENTS OF THIS PERMIT, THAT I HAVE HAD SUFFICIENT TRAINING IN CONFINED SPACE ENTRY, AND I AGREE TO WEAR ALL NECESSARY PROTECTIVE CLOTHING AND USE ALL NECESSARY PROTECTIVE EQUIPMENT.		
20	Print Name:	Signature:	
21	Print Name:	Signature:	
22	Print Name:	Signature:	

Annex D **(informative)**

Potential Sources of Contamination

Potential sources of contamination can include, but are not limited to, the following:

- contaminates in vessel lines and cargo-handling system,
- prior cargoes or prior cargo residues,
- cleaning material residues,
- pump suctions including deep well pump casings,
- vent and inert gas lines,
- residue on heating coils,
- unbroken blisters in coated tanks,
- flaking or broken blisters of the tank coating,
- discoloration of tank coating,
- sea water residues,
- condensation,
- water,
- odor,
- polymerized materials,
- rust,
- debris/particulate matter,
- additive residue.

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Annex E **(informative)**

Typical Wall Wash Analysis

The wall wash samples typically should be analyzed for the following if no other guidance is given:

- appearance visual;
- color (ASTM D1209);
- hydrocarbons (ASTM D1722);
- chloride (SMA 68-62).

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Manual of Petroleum Measurement Standards Chapter 17.8

Guidelines for Pre-loading Inspection of Marine Vessel Cargo Tanks and Their Cargo-handling Systems

THIRD EDITION, XXXX 202X

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Special Notes

DRAFT

Guidelines for Pre-loading Inspection of Marine Vessel Cargo Tanks and Their Cargo-handling Systems

1 Scope

These guidelines specify procedures for determining that the cargo tanks and associated cargo-handling system of marine vessels are in a suitably clean condition to receive the intended cargo. This applies to the loading of crude oil, petroleum products, and petrochemical cargoes. ~~The extent of pre-loading inspection will vary depending on the nature of the cargo to be loaded.~~ These guidelines recommend the extent of inspection that should be instituted for certain general types of cargoes and an example of a format that may be used for reporting the findings of tank inspections. Because of the wide variety of conditions that may exist when performing pre-loading tank inspections, this guideline is not intended to restrict the judgment of the person performing the inspection.

32 Normative References

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

API Manual of Petroleum Measurement Standards (MPMS) Chapter 8.1, *Standard Practice for Manual Sampling of Petroleum and Petroleum Products*

API Manual of Petroleum Measurement Standards (MPMS) Chapter 17.1, *Guidelines for Marine Inspection*

API Manual of Petroleum Measurement Standards (MPMS) Chapter 17.4, *Method for Quantification of Small Volumes on Marine Vessels (OBQ/ROB)*

~~API Manual of Petroleum Measurement Standards (MPMS) Chapter 17.11, *Measurement and Sampling of Cargoes On Board Tank Vessels Using Closed and Restricted Equipment*~~

~~ASTM D320⁴, *Standard Specification for Acetone*~~

~~ASTM D1152, *Standard Specification for Methanol (Methyl Alcohol)* ASTM D1193, *Standard Specification for Reagent Water*~~

~~ASTM D1209, *Standard Test Method for Color of Clear Liquids (Platinum-Cobalt Scale)* ASTM D1722, *Standard Test Method for Water Miscibility of Water-Soluble Solvents* ISGOTT/OCIMF², *International Safety Guide for Oil Tankers and Terminals*~~

53 Terms, Definitions, Acronyms, and Abbreviations

5.13.1 Terms and Definitions

For the purposes of this document, the following definitions apply.

5.1.43.1.1

cargo-handling system

~~All parts of a vessel's equipment used during the loading or unloading operations that may come in contact with the cargo wedge table.~~ All parts of a vessel's equipment used during the loading or unloading

¹-ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, www.astm.org.

²-Oil Companies International Marine Forum, 29 Queen Anne's Gate, London, SW1H 9BU, United Kingdom, www.ocimf.com.

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operations that may come in contact with the cargo.

5.1.23.1.2

first-foot sample

~~(also, test portion sample
-or first-in sample)~~

A sample taken after approximately 0.3 m (1 ft) of cargo has been loaded into a vessel's tank.

5.1.33.1.3

pop the lines

~~The process of repeatedly opening and closing a bleeder valve on an empty line under pressure until no liquid appears to transfer. The process of repeatedly opening and closing a bleeder valve on an empty line under pressure until no liquid appears.~~

5.1.43.1.4

qualified person

~~A trained and experienced individual who is knowledgeable about work in confined spaces and capable of supervising work in confined spaces. A qualified person is familiar with the following:~~

- ~~— the tasks to be performed;~~
- ~~— the potential hazards that may be encountered in confined spaces, including oxygen content, concentration of flammable materials in the atmosphere, and toxic materials;~~
- ~~— the safety and health requirements for confined space work;~~
- ~~— the entry permit program in place;~~
- ~~— the procedures for rescue operations.~~

3.1.6

standby person

~~A person who meets the following criteria:~~

~~as defined by the U.S. Occupational Safety and Health Administration (OSHA) is s~~Someone who “by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project”

NOTE From 29 CFR 1926.32(m).

- ~~— familiar with the tasks to be performed,~~
- ~~— capable of positively identifying all persons in the confined space at all times,~~
- ~~— capable of and responsible for maintaining communication with the persons who have entered a confined space and with the officer of the watch,~~
- ~~— capable of and responsible for initiating rescue operations by notifying the officer of the watch,~~
- ~~— dedicated to operating as a standby without conflicting duties.~~

5.1.403.1.5

stand pipes

~~Vertical sections of pipe or tubing extending from the gauging platform to near the bottom of tanks that are equipped with external or internal floating roofs, or on other tanks. Stand pipes may also be found on ships and barges. A vertical section of pipe extending from the top of a marine vessel tank through which measurements and samples of tank contents can be obtained.~~

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5.1.143.1.6

wall wash test

~~The procedure for washing selected areas such as the interior bulkheads, tank bottoms, and sumps of cargo tanks with an appropriate medium and testing the wash liquid for the presence of material which might contaminate cargo to be loaded. The procedure for washing selected areas, such as the interior bulkheads, tank bottoms, and sumps of cargo tanks, with designated reagent and, subsequently, testing the wash liquid for the presence of material that might contaminate cargo to be loaded.~~

The procedure for rinsing selected areas of the interior bulkheads of a cargo tank with an appropriate medium and testing the collected sample for the presence of material which might contaminate cargo to be loaded

wipe test

~~5.3 — The procedure of physically wiping random interior areas and steam coils of the vessel's tanks with absorbent white rags. This procedure is used to test the tank's coating for possible color contamination. The procedure of physically wiping any interior surface (bulkheads, steam coils, etc.) of the vessel's tanks with absorbent white rags. This procedure is used to test the wiped surfaces for possible color contamination.~~

5.43.2 **Acronyms and Abbreviations**

For the purposes of this document, the following acronyms and abbreviations apply.

ACS American Chemical Society

FOSFA Federation of Oils, Seeds and Fats Associations Ltd

HDPE High-density polyethylene

OBQ ~~on~~ On board quantity

SDS Safety Data Sheet

64 **General Information**

The shipment of crude oil, petroleum products, and petrochemicals requires stringent quality control during the loading, transport, and discharge operations. Consequently, it is important to determine whether the vessel's tanks, vessel lines, and the associated cargo-handling system are sufficiently clean so that the intended cargo will not be contaminated.

Cargoes of crude oil, petroleum, and petrochemicals have varying tolerances regarding the extent to which they are affected by on board quantities or residues after tank cleaning operations. These guidelines for pre-loading inspection of a vessel's cargo-handling system are intended to minimize the risk of contaminating the cargo to be loaded.

For vegetable oils and fats, refer to *FOSFA Qualifications and Operational Procedures for Ships Engaged in the Carriage of Oils and Fats in Bulk for Edible and Oleo-Chemical Use*

The procedures in this guideline shall be performed only by properly trained, experienced personnel using appropriate equipment and methods.

All procedures described and recommended in this publication shall be accomplished with strict adherence to the safety requirements that are specified in the *International Safety Guide for Oil Tankers and Terminals (ISGOTT)* or other specific requirements of vessel and terminal operators, and regulatory authorities.

~~The shipment of crude oil, petroleum products, and petrochemicals requires stringent quality control during the loading, transport, and discharge operations. Consequently, it is important to determine whether the vessel's tanks, vessel lines, and the associated cargo-handling system are sufficiently clean so that the intended cargo will not be contaminated.~~

~~Cargoes of crude oil, petroleum, and petrochemicals have varying tolerances regarding the extent to~~

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~~which they are affected by on board quantities or residues after tank cleaning operations. These guidelines for pre-loading inspection of a vessel's cargo handling system are intended to minimize the risk of contaminating the cargo to be loaded.~~

~~For vegetable oils and fats, refer to FOSFA Qualifications and Operational Procedures for Ships Engaged in the Carriage of Oils and Fats in Bulk for Edible and Oleo-Chemical Use.~~

Tank inspection activities performed on board a vessel shall be performed in the presence of, or with the [e-express](#) permission of, the vessel's master, cargo officer, or other appropriate authority. For safety reasons, only appropriate and intrinsically safe equipment shall be used.

75 Safety and Health Consideration

7.15.1 General

Due consideration shall always be given to applicable safety and health procedures. Considerations should include—but are not limited to—possible electrostatic and other fire and explosion hazards, protection from potential dangers to personnel (e.g. various protective clothing and equipment requirements and work practices), and potential explosive, fire, toxic, and oxygen deficiency/enriched hazards associated with a cargo tank's environment. The physical characteristics of the cargo and existing operating conditions should be evaluated carefully, and applicable international, federal, state, and local regulations should be strictly observed. Safety procedures designated by the employer, the vessel's operator, and other concerned parties also shall be observed.

Since toxic vapors or oxygen deficient/enriched atmospheres cannot be detected safely by smell, visual inspection, or judgment, appropriate precautions ~~shall~~ be taken to ensure protection. When it is necessary, personnel ~~shall~~ have suitable respiratory protection, appropriate exposure monitoring, protective equipment, and emergency rescue equipment for the environment and the task prior to entering the tank or inspection site.

Extra care should be taken when moving around inside tanks as surfaces may be slippery and lighting may be poor. Tripping hazards and obstructions may also exist.

~~The referenced ISGOTT, API, and or other applicable publications should be consulted for safety information.~~

7.25.2 Physical Characteristics and Fire Considerations

Information regarding particular materials ~~shall~~ be obtained from the employer's, manufacturer's, or supplier's Safety Data Sheet (SDS). Personnel who handle petroleum-related substances, as well as other chemical materials, ~~should~~ be familiar with their physical and chemical characteristics—including potential for fire, explosion, and reactivity—and with potential toxicity and health hazards and emergency procedures. Personnel should avoid potential sources of ignition and keep containers of materials closed, when not in use.

7.35.3 Special Safety Considerations—Entry into Confined Spaces

It is the responsibility of vessel personnel to identify confined spaces and to ensure that established procedures for safe entry are followed. Inspectors shall consult the qualified person to determine whether entry into such confined spaces is permitted and shall be accompanied by a representative of the vessel at all times (ISGOTT).

No one should enter a confined space unless an entry permit has been issued by a qualified person or certified marine chemist who has ascertained before entry that the tank atmosphere is in all respects safe for entry. Before issuing an entry permit, the qualified person shall at least ensure that:

- the appropriate atmosphere checks have been carried out;
- effective ventilation will be maintained continuously while personnel are in the confined space;
- lifelines and harnesses are ready for immediate use;

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- approved and pre-tested breathing apparatus and resuscitation equipment are ready for use at the entry to the confined space;
- personnel protective equipment shall be worn as appropriate for the task;
- where possible, a separate means of access is available for use as an alternative means of escape in an emergency;
- a standby person shall be in constant attendance outside the confined space;
- a means of communication between the confined space entrant and standby person shall be established prior to entry and tested throughout the duration of the entry;
- prior to commencing confined space entry, the lines of communication for dealing with emergencies shall be clearly established and understood by all concerned.

86 **Prior to Performing Pre-loading Inspection**

8.46.1 **Vessel Responsibilities**

It is the vessel's responsibility to present its cargo-handling system(s) in a condition that is, in all respects, ready to load its intended cargo, and nothing in this document is intended to relieve the vessel of its responsibilities. Notwithstanding the above, vessel personnel have the following responsibilities regarding the cleanliness of nominated cargo-handling system and the inspection procedure:-

- Ensure that the tank lining ~~and~~/or coating has been stipulated by the manufacturer as suitable for the intended cargo.
- Ensure that designated cargo-handling system is ~~deemed to be~~ suitably clean and compatible with the intended cargo.
- Know the safety requirements unique to the extent of the inspection being performed and make sure that they are followed.
- Facilitate the inspection process and provide the necessary assistance and personnel to expedite the inspection procedure safely.
- Supply safe access to gauge hatches or other inspection access points, including removal of inspection flanges, and access hatches, ~~etc.~~, where appropriate, to permit a detailed inspection of the interior of the cargo-handling system.
- Load cargo only into those tanks suitable for the intended cargo.
- When personnel tank entry is required, ensure that tanks are safe for entry.

8.26.2 **Key Meeting**

(Refer to API *MPMS* Chapter 17.1 for key meeting requirements.)

At a minimum, the following items shall be discussed at the pre-loading key meeting:

- review of entry permits including the precautions to be taken when entering tanks or other confined spaces and of any restrictions placed upon the work permitted there;
- number and identity of personnel who will enter the tank;
- lockout/tagout procedure for valves leading to tanks to be entered as applicable for energy isolation;
- agreement on safety and emergency procedures that shall be followed;
- the assignment of a standby person for tank entry;
- whether any cargo on board will be moved while a tank is occupied by personnel;
- tank number, capacity, and intended cargo volume of each cargo tank;

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- identification of the prior three cargoes in each tank;
- identification of the cargo to be loaded;
- identification of the type of tank surfaces or coatings;
- method used to clean the cargo tanks, lines, and pumps;
- sampling requirements, i.e. manifold, pump stack, first-foot sampling, or wall wash testing;
- type of tank inspection.

Additionally, the following items should be considered as part of the key meeting:

- contents and heating requirements of adjacent compartments or tanks;
- condition and compatibility of the inerting method;
- the need to load tanks in a certain sequence (loading plan);
- the condition of the vessel's pumps, strainers or filters, heating coils, heat exchangers, and sea chests;
- the line fullness and cleanliness condition of vessel lines.

97 Visual Inspection—Deck Level

Visual inspection from deck level requires that elements of the cargo-handling system be physically opened to facilitate inspection. For vessels in an inert state, or tank(s) that cannot be physically opened, the practical method to determine the condition of the tank would be to perform an ~~on-board~~on-board quantity (OBQ) survey in accordance with API *MPMS* Chapter 17.4.

A deck level inspection is the least effective form of tank inspection. Significant amounts of OBQ can remain undetected in the vessel's lines, on bulkheads, and in other areas that are not visible or are not accessible to gauging equipment, and acceptance of tanks may be conditional on the analysis results of first-foot samples. Presence of inert gas ~~will limit~~s the effectiveness of a visual inspection from deck level. (See the first paragraph of Section 7.)

Vessel personnel should open the tank valve for each tank nominated to receive cargo. ~~Request that t~~he vessel's personnel should have the deck lines drained into one specified cargo tank per grade of cargo, if practical, or into slop tank(s). Tank suction and fill valves should be open for inspection to ensure that lines associated with the tank are well drained. Visually inspect and/or sound the interior of the cargo tank for any OBQ (liquid or nonliquid).

~~For the purpose of a~~A visual inspection from deck level, ~~the criteria of clean dry and odor free shall observe for mean~~the following from the observation point(s):

- ~~no~~no evidence of any liquid,
- ~~no~~no visible sheen on any viewable surfaces,
- ~~no~~no obvious sources of contamination (Annex D),
- ~~no~~no apparent odor of previous cargoes or cleaning material.

For all of these items, the inspection documentation should indicate the extent to which the observations could be made. If no findings are found, the tank can be accepted.

NOTE A

After completing the inspection, inspection personnel shall report results to the appropriate parties. The time of acceptance or rejection of the tank shall be recorded. (An example can be found in Annex B. 12.)

If the tank(s) or cargo-handling system is rejected, vessel personnel are responsible to initiate whatever additional stripping and/or cleaning activities that are necessary. Vessel personnel ~~are responsible to~~shall notify inspection personnel when the vessel is ready for re-inspection. All re-inspections shall be

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documented. A new Cleanliness Inspection Checklist and Tank Inspection Report may be used.

If OBQ is found during the visual inspection, the quantity ~~and type and nature~~ of the OBQ should be ~~recorded and agreed upon by~~ the appropriate parties ~~notified~~. If the OBQ could contaminate the intended cargo to be loaded, then appropriate parties shall be notified promptly and the following actions should be considered:-

- If sufficient quantity is observed, measure ~~and sample~~ the ~~amount of~~ material in the cargo tank(s), ~~and if a sufficient quantity exists, sample the material.~~
- Perform additional stripping or tank cleaning procedures.
- Designate alternative tanks to receive the cargo.
- Obtain a release from the responsible parties and proceed with loading.
- Other appropriate actions as agreed by all parties.

Refer to API MPMS Chapter 17.4 for additional information.

108 Visual Inspection—Tank Entry

10.48.1 General

Tank and cargo-handling system cleanliness testing and inspection procedures should be determined by the parties involved. ~~Below are examples, common in industry, to determine suitable cleanliness.~~ Additional customer requirements may be used to determine cleanliness of tank and cargo-handling system prior to loading. The method agreed by the parties should establish the requirements ~~for the inspection.~~

10.28.2 Tank Entry Precautions

~~Before entering a confined space, Section 5.35.3 and all safety requirements specified by the relevant documents and regulations shall be followed before entering any vessel tank.~~

A standby person shall be ~~always~~ stationed at the tank hatch ~~at all times~~ while personnel are in the tank. ~~A standby person will~~ shall meet the following criteria:

- familiar with the tasks to be performed,
- capable of positively identifying all persons in the confined space at all times,
- capable of and responsible for maintaining communication with the persons who have entered a confined space and with the officer of the watch,
- capable of and responsible for initiating rescue operations by notifying the officer of the watch,
- dedicated to operating as a standby without conflicting duties.

At minimum, an entry permit shall contain the information detailed in the sample Confined Space Entry Permit (Table C.1).

10.38.3 Tank Entry Inspection

Prior to any tank entry inspection, all ~~pipe~~ pipelines leading to the tank should be verified, to the extent possible, to be empty and free of potential contaminants (Annex D). ~~A~~ visual examination of accessible pipelines, including pump drains and manifolds, should be completed. Removal of any inspection flanges and access plates to facilitate the inspection of the interior of the cargo-handling system shall be performed by the vessel personnel where not in place for energy isolation. Cargo space shall be segregated by blinding or isolating all connecting pipelines and all valves on pipelines serving spaces shall be secured. The tank atmosphere shall ~~be~~ should be tested and permitted for safe entry after any changes in valve settings (Annex C). Heating coils should be either drained or blown, and blinded, or tested for tightness.

The following inspection shall be performed and recorded upon tank entry.

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— All tank surfaces—including internal pumps, sumps, heating coils, and all pipe surfaces—that can be accessed without staging or equipment should be examined for possible sources of contamination (Annex D).

— Tank coating should be examined for signs of deterioration, such as blistering, flaking, or areas where the metal beneath the coating is visible. Knowledge and experience of the visual inspection and estimation of cargo tank coatings and determination of coating type and condition or integrity (% of total coating in place or % breakdown of the coating in place) may be required to ensure that the tank inspection result meets the requirements and expectation of the parties for whom the inspection is being performed. ~~Tank Coating~~ condition should be detailed in the inspection documentation and may be included in the Cleanliness Inspection Checklist (Annex B.1).

— All internal piping, pump housing, etc. shall be opened ~~and for inspection~~, where appropriate.

Caution—To avoid possible release of hazardous materials, blisters in the tank coating should be investigated with caution. Piles of rust or debris on the tank floor should be left undisturbed and noted. Removal of such scale, rust, or detached tank coating should be done by vessel personnel.

~~NOTE~~ Prior to loading some chemical cargoes, it is recommended to pop/~~blow~~ the lines with dry air, carbon dioxide, nitrogen, or other acceptable gases from manifold to tank to verify that the lines associated with the cargo-handling system are liquid free.

NOTE This may not be allowed at all installations.

~~10.4~~ **Wipe Testing**

~~A wipe test may be performed on any tank surface.~~

~~10.58.4~~ **Wall Wash Testing**

If wall wash testing is required, follow the wall wash testing procedures in Annex A.

~~10.68.5~~ **Reporting Tank Entry Inspection Results**

After completing the tank entry inspection, inspection personnel shall report results to the appropriate parties.

When cargo-handling system inspection procedures have been completed, inspection personnel shall prepare written documentation of inspection results, which may be included on a Cleanliness Inspection Checklist(s) and Tank Inspection Report(s). Vessel personnel shall confirm that the tank inspection has been completed. The time of acceptance or rejection with reasons of the tank shall be recorded. (See example in Annex B.12.)

~~11.9~~ **Sampling**

~~11.49.1~~ **General**

Sampling, as part of a vessel pre-loading inspection, is intended to validate the effectiveness of cleaning or assist with determination of the source of contamination should there be an issue. Sampling schemes should be determined by the parties involved and may not always be required. (Reference API MPMS Chapter 8.1 for sampling methods.)

~~11.29.2~~ **Vessel Manifold Sample**

If a manifold sample is required, the sample should be obtained at the vessel manifold immediately upon and concurrent with the start of loading unless not permitted by local regulations.

~~11.39.3~~ **Vessel Line Sample**

If a vessel line sample is required, it should be taken concurrently with the first entry of cargo into the tank at the point nearest the cargo line drop into the tank. On some vessels, this is ~~called~~ considered the pump stack sample.

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11.49.4 First-foot Sample

First-foot samples ~~can be taken are necessary to~~ determine whether any contaminants within the vessel's loading systems have survived cleaning regimes ~~that might have a detrimental effect on the cargo to be loaded.~~

If a first-foot sample is requested, loading of the first foot should be through all relevant loading lines and ~~should~~ be taken when approximately 0.3 m (1 ft) of cargo has been loaded into the tank. The sample should be examined or tested to determine conformity with cargo specifications. If the sample indicates potential contamination, contact the principals for further instructions. ~~(Reference ISGOTT.)~~

Caution—Special attention is required while taking samples. Care shall be taken to allow an appropriate relaxation period prior to sampling some products to prevent the discharge of an electrostatic spark. Metal equipment shall be grounded. Under no circumstances should samples of any product be taken until pumping has stopped. ~~(Reference ISGOTT.)~~

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ASTM D1209, Standard Test Method for Color of Clear Liquids (Platinum-Cobalt Scale) ASTM D1722, Standard Test Method for Water Miscibility of Water-Soluble Solvents

ISGOTT/OCIMF⁴, International Safety Guide for Oil Tankers and Terminals

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³ ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, www.astm.org.

⁴ Oil Companies International Marine Forum, 29 Queen Anne's Gate, London, SW1H 9BU, United Kingdom.

Annex A (normative) Wall Wash Procedures

A.1 General Wall Wash Procedures

A.1.1 Reagent Selection

Reagent grade chemicals should be used in all tests unless otherwise indicated. ~~It is intended that a~~All reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society (ACS) or equivalent, where such specifications are available.

Typical reagents include ~~the following~~:

- a) methanol—ACS reagent grade with very low concentrations of chlorides (refer to ASTM D1152);
- b) acetone—ACS reagent grade (refer to ASTM D329);
- c) high-purity water—unless otherwise indicated, references to water shall be understood to mean reagent water as defined by ASTM D1193.

Other reagents or products may be used with agreement of all parties provided it is first ascertained that the material is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

Chlorides in high-purity methanol should not exceed 0.01 mg/kg. This information should be provided by the supplier or determined by the analyst prior to use. A control chart for the concentration of chlorides in the methanol reagent should be established and maintained to track quality.

Typical wall wash specifications for Reagent Grade Methanol are listed in Annex E.

A.1.2 General Procedures

Reagents used for wall washing may adversely affect the atmosphere of the tank. The SDS should be reviewed prior to handling the reagent to determine the appropriate personal protective equipment to be used.

Use the following chart (Table A.1) to determine the minimum number of areas to be selected for wall washing in any tank. Each wall of the tank shall be wall washed regardless of the number of wash area.

Table A.1—Wall Washing Tanks

Tank Capacity	Minimum No. Areas to Wash
<500 M ³ (3000 bbl)	5
500–1000 M ³ (3000 bbl to 6300 bbl)	7
>1000 M ³ (>6300 bbl)	9

Tank bottoms (floors) often do not require wash testing. However, if wash testing is required, use the blotter method (see A.3).

A.2 Funnel Wall Wash Procedure

A.2.1 Equipment

The following equipment is required prior to starting the wall wash procedure:

- appropriate protective safety equipment,

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- intrinsically safe flashlight,
- high-density polyethylene (HDPE) squeeze bottle,
- wall wash funnel,
- clean sample collection bottles with chemical-resistant caps,
- shoe covers,
- sufficient wall wash reagent,
- bucket and heaving line.

A.2.2 Funnel Wall Wash Procedure

The wall wash method is the most common method for identifying contamination on the walls of a cargo tank. The following procedure shall be used for the wall wash method.

- Wall wash funnel, bottles, and bottle caps shall be clean and rinsed with reagent to prevent contamination of the sample.
- Pour approximately 1 L (or 1 qt) of reagent into a 1 L (or 1 qt) HDPE squeeze bottle.
- The tank shall be dry before conducting the wall wash tests.
- Choose sites on each tank wall (bulkhead).
- Start applying reagent on the sites chosen, as high as possible, while standing on the floor with the squeeze bottle approximately 15 cm (6 in.) from the wall. Approximately 100 mL should be applied at each wash site (Figure A.1).
- Funnel should be tight-fitting to the wall allowing minimal reagent bypass.
- Collect the reagent with the wall wash funnel into a clean glass bottle with the funnel placed at approximately 1 m (3 ft) below the stream. Do not scrape the tank wall with the funnel when collecting the reagent to avoid possible contamination of samples with suspended matter (Figure A.1).

NOTE Special care shall be taken not to scrape zinc tank coatings with the edge of the funnel due to the high probability of sample contamination.

Caution—Perspiration ~~will contaminate~~ the samples. Do not permit perspiration to drop into the sample bottle.

- The process shall be repeated at the number of sites specified in Table A.1. Approximately 250 mL of reagent shall be collected. If approximately 250 mL is not collected from the number of sites specified in Table A.1, continue wall washing at additional sites until approximately 250 mL is collected.
- Include “nontypical” areas, such as discolored patches, lining breaks, and exposed metal. If the nontypical areas are less than 20 % of the tank surface, include them in the areas normally tested. If they are more than 20 % of the tank surface, wall wash these areas in a separate bottle and test them separately.
- Include a sample of the reagent used in the wall wash procedure. This is the analytical “blank.” ~~the event that~~ ~~if~~ the wall wash sample fails, this reagent ~~will~~ ~~shall~~ be analyzed and the results of the “blank” ~~will~~ ~~shall~~ be subtracted from each tank’s wall wash sample’s results.
- Prepare a wall wash blank sample as follows.

NOTE The following steps should be performed after leaving the tank.

- Rinse a sample bottle with a small amount of the wash liquid.
- Add at least 250 mL of wash liquid from the squeeze bottle.
- Rinse the plastic cap with wash liquid and securely cap the bottle containing the blank sample.
- Immediately label the blank sample with appropriate tag.

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- Samples shall be delivered to the appropriate laboratory for customer required analysis.
- The laboratory shall be informed in advance if analysis is required on wall wash samples.

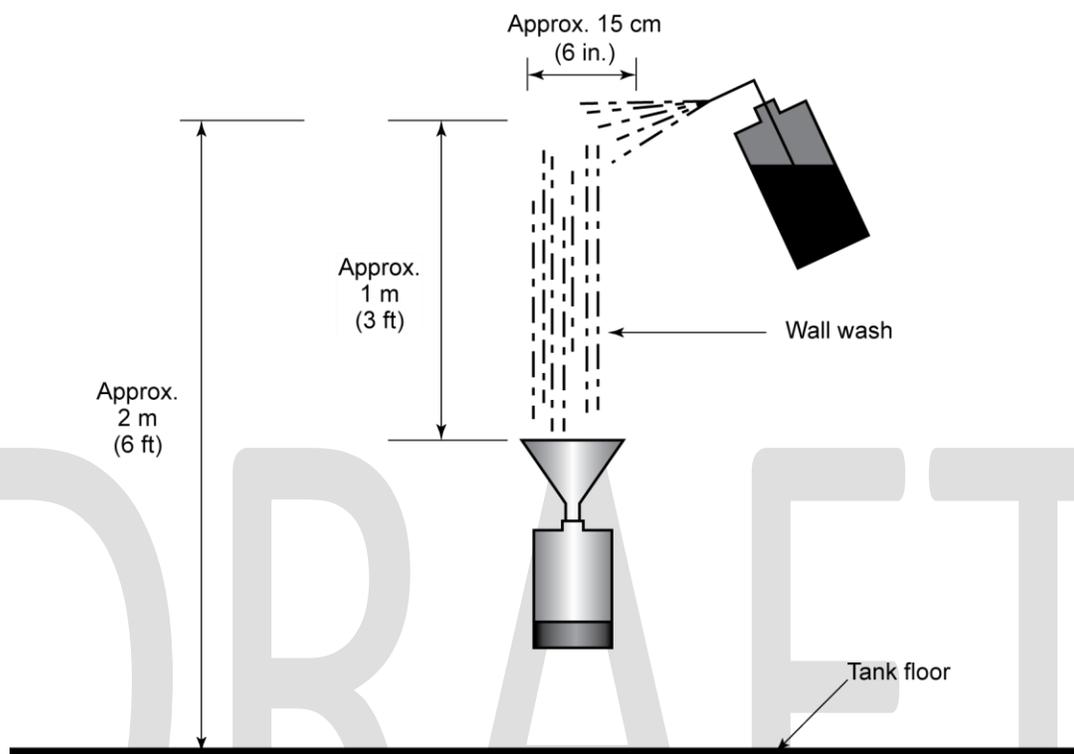


Figure A.1—Wall Wash Procedures

A.3 Blotter Wall Wash Method Procedure

A.3.1 General

Since filter papers are not consistent in chemical composition, the blotter wall wash procedure should be used only when it is not practical to use the funnel wall wash procedure.

A.3.2 Equipment

The following equipment is required prior to starting the blotter wall wash:

- use appropriate protective safety equipment prior to starting the wall wash procedure,
- intrinsically safe flashlight,
- HDPE squeeze bottle,
- clean wide mouth sample collection bottles with chemical-resistant caps,
- shoe covers,
- laboratory filter papers,

Caution—Since all filter papers in the same container may not be free of contaminants, or may not have the same level of contaminants, the result of laboratory tests of wall wash samples could be adversely affected by the filter papers.

- sufficient wall wash reagent,
- bucket and heaving line,

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- forceps or tweezers for handling filter papers.

A.3.3 Blotter Method Procedure

The following equipment is required prior to starting the blotter method.

- Wide mouth sample bottle and caps shall be clean and rinsed with reagent to prevent contamination of the sample.
- Hold a piece of laboratory filter paper with forceps or tweezers against the surface of the wall a few inches above the floor. Use the squeeze bottle to apply about 50 mL of reagent onto the test site, about 1 m (3 ft) above the floor, in a stream about 0.1 m (4 in.) wide. Allow the reagent to run down the wall and be absorbed by the filter paper being held near the floor.

Caution—Do not rub or wipe the filter paper on the tank wall.

- As the test papers are saturated, carefully fold and place them in the wide-mouth bottle.

Caution—Perspiration ~~will~~ contaminates the samples. Do not permit perspiration to drop into the sample bottle or onto the filter papers.

- For tank bottom washing, wash the tank bottom by placing a filter paper on a spot wetted with the reagent. Then lift the filter paper with forceps or tweezers carefully, fold it, and place into the wide-mouth bottle.

Caution—Do not take tank bottom samples where there has been foot traffic.

- Samples shall be labeled immediately following collection.
- Include a sample of the reagent and filter paper used in the blotter wall wash procedure. This is the analytical “blank.” ~~In the event that~~ If the blotter [wall wash method](#) sample fails, this reagent and filter paper ~~will~~ shall be analyzed and the results of the “blank” ~~will~~ shall be subtracted from each tank’s blotter [wall wash method](#) sample’s results.

Prepare a blotter blank sample as follows.

NOTE The following steps should be performed after leaving the tank.

- Rinse a wide-mouth bottle with a small amount of the wash liquid.
- Take an unused filter paper from the box and place it into the rinsed wide-mouth bottle.
- Add wash liquid from the squeeze bottle. Rinse the plastic cap with wash liquid and securely cap the bottle containing the blank sample and filter paper.
- Immediately label the blank sample with appropriate tag.
- Samples shall be delivered to the appropriate testing site for customer-required analysis.

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Annex B (informative)

Inspection Checklists and Reports

Cleanliness Inspection Checklist				
Vessel Name (barge or ship)		Port / Location:		Tank Entry Inspection only
Cargo:	Tanks inspected:	Date:		Standpipe(s) extend to bottom? (Y / N)
Deck level inspection? (Y / N)	Tank Entry inspection? (Y / N)	Original or follow-up inspection?		Stand pipe(s) (preforated / unperforated)
<i>Tank Entry inspection requires all deck level inspection items</i>				
Verification Steps		Yes, No, N/A	Observed, Not Observed, N/A	Observations / Notes
		Vessel Rep.	Inspector	
Visual Inspection from Deck Level Items				
Cargo load and/or discharge lines blown / popped from manifold into tank				
Cargo stripping lines blown / popped into cargo tanks				
Cargo tank valves open and lines drained				
Cargo stripping valves open and lines drained				
Port & starboard cargo manifold valves open and pipeline visually inspected				
Port & starboard vapor return valves open and pipeline visually inspected				
Load, discharge, pump can suction, check valve bypass valves open (U.S. inland barges only); see Figure B.4				
Vapor return line low point drain liquid free				
No apparent odor of previous cargoes or cleaning material				
Stand pipe(s) (if equipped) and vapor control valve(s) viewable interior surface visibly free of any				
Tank Entry Inspection Items				
No apparent odor of previous cargoes or cleaning material at any point during the				
Free of any visible sources of contamination on internal surfaces including, but not limited to, sump,				
Free of any visible sources of contamination on internal components including, but not limited to,				
Tank coating visibly free of any apparent deterioration (i.e. not cracked, stained, blistered, peeling,				
Below deck cargo pipeline internally inspected, where accessible, and found visibly free of any				
Cargo pump can and filter screen inspected and found free of visible sources of contamination (inspection plate should be removed by vessel prior to inspection)				
Additional Comments:				
Print Name		Signature		Date
Inspector				
Vessel Rep.				
Notes:				
1) The above items are intended to reflect the condition of the cargo-handling system to the extent possible, at the time of inspection, and are not intended to indicate acceptance or rejection of the cargo-handling system.				
2) Potential sources of contamination are identified in Annex D.				
3) Presence of contamination or any items of concern uncovered during the inspection process should be immediately brought to the attention of the appropriate parties.				
4) If a WWT is required, it should not be performed until the above verification steps are found to be acceptable.				

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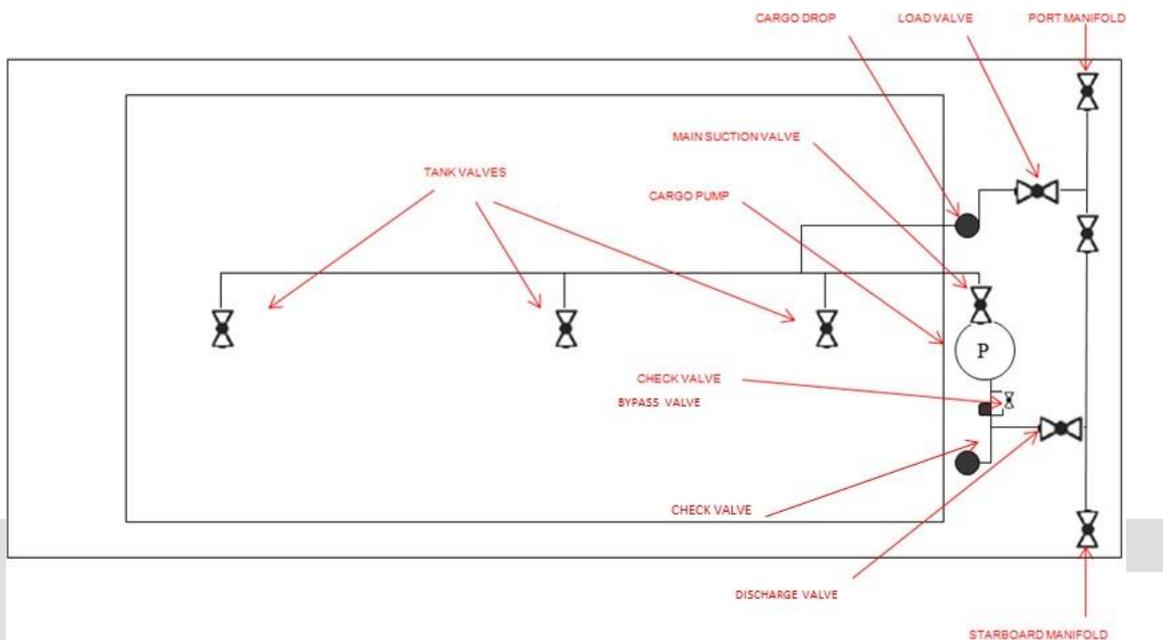


Figure B.1 – Cleanliness Inspection Checklist ~~Figure B.1~~—A Diagram of a Typical Three-Tank U.S. Inland Barge

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Tank Inspection Report

Vessel: _____	Cargo: _____	Port: _____	Terminal: _____
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Tank Number	Tank Coating	Last Cargo	Second Last Cargo	Third Last Cargo	Date Inspected	Time Completed Inspected	Deck Level Inspection (YES/NO)	Tank Entry Inspection (YES/NO)	WWT Required (YES/NO)	WWT Method	WWT Reagent	WWT Pass/Fail	First Foot Taken (YES/NO)	Visual Cleanliness Accepted/Rejected	Reason for Rejection

Tank Number	Stated Method of Cleaning

Figure B.1 - Tank Inspection Report

Annex C (informative)

Sample Permit/Report

Table C.1—Confined Space Entry Permit (Sample Format; Other Formats Are Permitted)

1	Vessel	Space to be entered	Date/time
2	Previous contents	Purpose of entry	Permit expires
3	Oxygen content (%)	Oxygen meter: Mfrs. Serial No.	Date meter calibrated
4	Combustible gas (% LEL)	Gas meter: Mfrs. Serial No.	Date meter calibrated
5	Toxicity (ppm, toxin, exposure limit, reading)	Toxicity test method	Mfrs. Serial No.
6	Toxicity (ppm, toxin, exposure limit, reading)	Toxicity test method	Mfrs. Serial No.
7	Toxicity (ppm, toxin, exposure limit, reading)	Toxicity test method	Mfrs. Serial No.
8	Toxicity (ppm, toxin, exposure limit, reading)	Toxicity test method	Mfrs. Serial No.
9	Date and time of tests (line 3-8 above)	Remarks:	
10	Confined space preparation procedure (e.g. washing)		
11	Confined space isolation (e.g. blanks, lockout/tagout)		
12	Ventilation procedures used:		
13	Confined space ventilation commenced (date/time):		
	1. Shall be continuous when person is in compartment. 2. Shall be stopped for atmospheric testing.		
14	Illumination provided (Yes/No):		
15	Standby person at confined space entrance:		
	Name 1. Standby person equipped with (Circle if applicable) 2 SCBAs Communication equipt. Rescue equipt.		
16	Communication established between person entering confined space and (Name)		
17	THIS CONFINED SPACE HAS BEEN EVALUATED AND (IS) (IS NOT) SAFE FOR ENTRY		
18	Qualified Person (name and signature):	Master or Chief Officer (name and signature):	
19	MY SIGNATURE BELOW VERIFIES THAT I HAVE READ AND UNDERSTAND THE CONTENTS OF THIS PERMIT, THAT I HAVE HAD SUFFICIENT TRAINING IN CONFINED SPACE ENTRY, AND I AGREE TO WEAR ALL NECESSARY PROTECTIVE CLOTHING AND USE ALL NECESSARY PROTECTIVE EQUIPMENT.		
20	Print Name:	Signature:	
21	Print Name:	Signature:	
22	Print Name:	Signature:	

Annex D **(informative)**

Potential Sources of Contamination

Potential sources of contamination can include, but are not limited to, the following:

- contaminates in vessel lines and cargo-handling system,
- prior cargoes or prior cargo residues,
- cleaning material residues,
- pump suctions including deep well pump casings,
- vent and inert gas lines,
- residue on heating coils,
- unbroken blisters in coated tanks,
- flaking or broken blisters of the tank coating,
- discoloration of tank coating,
- sea water residues,
- condensation,
- water,
- odor,
- polymerized materials,
- rust,
- debris/particulate matter,
- additive residue.

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Annex E **(informative)**

Typical Wall Wash Analysis

The wall wash samples typically should be analyzed for the following if no other guidance is given:

- appearance visual;
- color (ASTM D1209);
- hydrocarbons (ASTM D1722);
- chloride (SMA 68-62).

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