Manual of Petroleum Measurement Standards
Chapter 17.8

Guidelines for Pre-loading Inspection of Marine Vessel Cargo Tanks

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Introduction

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 Operations 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 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.
Guidelines for Pre-loading Inspection of Marine Vessel Cargo Tanks

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.

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 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 D329, 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/OCIMF, International Safety Guide for Oil Tankers and Terminals

3 Terms, Definitions, Acronyms, and Abbreviations

3.1 Terms and Abbreviations

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

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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 including but not limited to:

— tank’s ladders, walls roof, and floor;
— tank’s main hatch, sampling hatch and tank cleaning hatch, and associated gaskets;
— cargo pump and/or deep well pump casing;
— heating coils and fittings;
— external deck heat exchangers (including associated piping and drains);
— stripping system including piping inside the tank, external piping on deck and drains;
— cargo pipelines, valves, sample points, and manifolds;
— cargo hoses, spool pieces or connectors, jumpers;
— vapor control valves, lines, and manifolds;
— stand pipes, gauging pipes.

3.1.2 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.

3.1.3 gas-free
A tank, compartment or container is gas-free when sufficient fresh air has been introduced into it to lower the level of any flammable, toxic, or inert gas to that required for a specific purpose, e.g. hot work, entry, etc.

3.1.4 pop the lines
The process of repeatedly opening and closing a bleeder valve on an empty line under pressure until no liquid appears.

3.1.5 qualified person
A trained and experienced licensed officer 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;
3.1.6 **standby person**
A person who meets 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.

3.1.7 **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. Stand pipes may also be found on ships and barges.

3.1.8 **wall wash test**
The procedure for washing selected areas, such as the interior bulkheads, tank bottoms, and sumps of cargo tanks, with reagent and, subsequently, testing the wash liquid for the presence of material that might contaminate cargo to be loaded.

3.1.9 **wipe test**
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.

3.2 **Acronyms and Abbreviations**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>ACS</td>
<td>American Chemical Society</td>
</tr>
<tr>
<td>HDPE</td>
<td>high-density polyethylene</td>
</tr>
<tr>
<td>OBQ</td>
<td>on board quantity</td>
</tr>
<tr>
<td>SDS</td>
<td>Safety Data Sheet</td>
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</table>

4 **General Information**

The procedures in this guideline shall be performed only by properly trained, experienced personnel using appropriate equipment and methods. Documentation of the specifics of the inspection event shall be jointly made by the vessel representative and the inspection representative to ensure agreement with the recorded
condition of the cargo-handling system in accordance with the Cleanliness Inspection Checklist, Annex D. Annex D specifies the minimum requirements that shall be met.

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.

5 Safety and Health Consideration

5.1 General

Due consideration must 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 must be observed. The referenced ISGOTT, API, and or other applicable publications should be consulted for additional safety information.

Since toxic vapors or oxygen deficient/enriched atmospheres cannot be detected safely by smell, visual inspection, or judgment, appropriate precautions should be taken to ensure protection. When it is necessary, personnel should 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 should 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.

5.3 Special Safety Considerations—Entry into Confined Spaces

It is the responsibility of vessel personnel to identify confined spaces and to ensure 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. (See ISGOTT, Chapter 10.)

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.

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— 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 Cargo-handling System Inspection

6.1 Vessel Responsibilities

In all loading situations 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 cargo to be loaded.

— Know the safety requirements unique to the extent of the inspection being performed and make sure 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, access hatches, etc., where appropriate, to permit a detailed inspection of the interior of the cargo-handling system.

— Completion of Cleanliness Inspection Checklist (Annex B).

— Load cargo only into those tanks that have surfaces or coatings compatible with the intended cargo; when personnel tank entry is required ensure that tanks are safe for entry.

6.2 Key Meeting

(Refer to API MPMS Ch. 17.1 for Key Meeting Requirements.)
At a minimum, the following items shall be discussed at the pre-loading key meeting:

- tank number, capacity, and intended cargo volume of each cargo tank;
- identification of the prior three cargoes in each tank;
- identify the cargo to be loaded;
- review 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;
- identify type of tank surfaces or coatings;
- number and identity of personnel who will enter the tank;
- method used to clean the cargo tanks, lines, and pumps;
- lockout/tagout procedure for valves leading to tanks to be entered as applicable for energy isolation;
- sampling requirements, i.e. manifold, pumpstack, first-foot sampling, or wall wash testing;
- 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;
- 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 Deck Level Inspection Procedures

Vessel personnel should open the tank valve for each tank nominated to receive cargo. Request that the vessel’s personnel have the deck lines drained into one specified cargo tank per grade of cargo, if practical, or into slop tank(s). The vessel shall discontinue inerting the tank being inspected. Visually inspect the interior of the cargo tank for any on board quantity (OBQ) (liquid or non-liquid).

NOTE 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.

After completing inspection of each tank, inspection personnel shall report results to the appropriate parties. The time of acceptance or rejection of the tank shall be recorded. (See Annex B.)

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If the tank 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 notify inspection personnel when the vessel is ready for re-inspection. All re-inspections shall be documented using a new Cleanliness Inspection Checklist.

If OBQ is found during the visual inspection, the quantity and nature of the OBQ should be agreed upon by the appropriate parties. 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 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 Ch. 17.4 for additional information.

8 Visual Tank Entry Inspection

8.1 General

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 cargo-handling system prior to loading. The method agreed by the parties should establish the requirements.

8.2 Tank Entry Precautions

Section 5.3 shall be followed before entering any vessel tank.

A standby person shall be stationed at the tank hatch at all times while personnel are in the tank.

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 pipelines leading to the tank should be verified, to the extent possible, to be empty and free of potential contaminants. (See Annex D.) An 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. Space shall be segregated by blinding or isolating all connecting pipelines and all valves on pipelines serving spaces shall be secured. The tank atmosphere should be tested and permitted for safe entry after any changes in valve settings. (See 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.

— All internal piping, pump cans, etc. shall be opened 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 the lines associated with the cargo-handling system are liquid free. This may not be allowed at all installations.

8.4 Wipe Testing

A wipe test may be performed on any tank surface.

8.5 Wall Wash Testing

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

8.6 Reporting Tank Entry Inspection Results

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

When cargo-handling system inspection procedures have been completed, inspection personnel shall prepare a written Cargo-handling System Inspection Report, including the Cleanliness Inspection Checklist(s). Vessel personnel shall jointly confirm inspection results as verification and agreement of completed work and condition of the cargo-handling system. The time of acceptance or rejection with reasons of the tank should be recorded. (See Annex B.)

8.7 Vessel Manifold Sample

If a manifold sample is required, the sample should be obtained at the vessel manifold prior to cargo entry into the vessel’s lines unless not permitted by local regulations. This is the custody transfer sample between the shore and vessel.

8.8 Vessel Line Sample

If a vessel line sample is required prior to cargo entering any tank, the sample should be obtained at the point nearest the cargo line drop into the tank.

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 the lines associated with the cargo-handling system are liquid free. This may not be allowed at all installations.

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8.7 Vessel Manifold Sample

If a manifold sample is required, the sample should be obtained at the vessel manifold prior to cargo entry into the vessel’s lines unless not permitted by local regulations. This is the custody transfer sample between the shore and vessel.

8.8 Vessel Line Sample

If a vessel line sample is required prior to cargo entering any tank, the sample should be obtained at the point nearest the cargo line drop into the tank.

3 Access to internal sections of pipe surfaces, deep-well pumps, etc. is sometimes limited, and approval of tanks may be conditional on the analysis results of first-foot samples. The Cleanliness Inspection Checklist shall indicate any non-accessible areas.

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8.9 First-foot Sample

If a first-foot sample is required, it should be taken when approximately 0.3 m (1 ft) of cargo has been loaded into the tank. A sample is then drawn from the tank. The sample should be examined or tested to determine conformity with cargo specifications. If the sample indicates potential contamination, no additional cargo shall be loaded into the tank until the problem is resolved. (Reference ISGOTT 20.5.2 and 20.5.3.)

Caution—Special attention is required while taking samples. Care must 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 been stopped. (Reference ISGOTT, Fifth Edition, Section 11.7).
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 all reagents 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 number of wash area.

<table>
<thead>
<tr>
<th>Tank Capacity</th>
<th>Minimum No. Areas to Wash</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;500 M³ (3000 bbl)</td>
<td>5</td>
</tr>
<tr>
<td>500–1000 M³ (3000 bbl to 6300 bbl)</td>
<td>7</td>
</tr>
<tr>
<td>&gt;1000 M³ (&gt;6300 bbl)</td>
<td>9</td>
</tr>
</tbody>
</table>

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,
— 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. (See 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. (See Figure A.1)

NOTE Special care must 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 “non-typical” areas, such as discolored patches, lining breaks, and exposed metal. If the “non-typical” 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.” In the event that the wall wash sample fails, this reagent will be analyzed and the results of the “blank” will be subtracted from each tank’s wall wash sample’s results.

— Prepare a wall wash blank sample as follows.

  NOTE  The following steps may 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.

— Samples shall be delivered to the appropriate laboratory for customer required analysis.

— The laboratory must be informed in advance if analysis is required on wall wash samples.
A.3 Blotter Wall Wash 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,
— 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 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.

NOTE Forceps or tweezers shall be used to handle filter papers.

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

Caution—Perspiration will contaminate 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 the blotter wall wash sample fails, this reagent and filter paper will be analyzed and the results of the "blank" will be subtracted from each tank’s blotter wall wash sample’s results.

Prepare a blotter blank sample as follows.

NOTE The following steps may 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.
Annex B
(normative)

Cleanliness Inspection Checklist
## Cleanliness Inspection Checklist

<table>
<thead>
<tr>
<th>Vessel Name (barge or ship)</th>
<th>Cleaning facility name (if any)</th>
<th>Tanks inspected:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior cargoes:</td>
<td>Stand pipe(s)</td>
<td>(pretedrated / unpretedrated / None)</td>
</tr>
<tr>
<td>Cleaning orders per inspector paperwork.</td>
<td>Cleaning orders per facility paperwork.</td>
<td>-</td>
</tr>
<tr>
<td>Cleaning orders match?</td>
<td>Original or follow up inspection?</td>
<td>Wall wash test (WWT) required?</td>
</tr>
<tr>
<td>Deck level inspection?</td>
<td>Tank Entry inspection?</td>
<td>WWT method?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tank Entry Inspection requires</th>
<th>deck level inspection items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verification Description</td>
<td>(Acceptable, (Unacceptable, N/A)</td>
</tr>
<tr>
<td>Vessel Rep.</td>
<td>Inspector</td>
</tr>
</tbody>
</table>

| Verification Description | (Acceptable, (Unacceptable, N/A) | Comments |
| Vessel Rep. | Inspector | (required if unacceptable) |

### Cleanliness Inspection Items

- Any prior cargo residue on roof, under heating coils, etc.
- Walls, bulkheads and roof free of any sources of contamination
- Cargo pump can inspection plate removed to facilitate inspection
- Cargo pump can filter screen inspected and clean
- Cargo pump can / well clean, dry & odor free
- Cargo pump can filter screen inspected and clean
- Any source of contamination observed in tanks
- Stand pipe(s) (if equipped) above / below deck and vapor control valve(s) clean and free of any source of contamination
- Any prior cargo residue on roof, under heating coils, etc.
- Walls, bulkheads and roof free of any sources of contamination
- Cargo tank valves open for tank inspection
- Cargo stripping valve open for tank inspection
- Port & starboard CARGO header valves open and pipeline visually inspected
- Port & starboard VAPOR header valves open and pipeline visually inspected
- Vapor line low point drain liquid free
- No prior cargo residue observed or any other sources of contamination
- Ladders free of any sources of contamination
- Cargo load and discharge lines blown / popped into tank
- Cargo stripping lines blown / popped into cargo tanks
- Cargo tank valves open for tank inspection
- Below deck cargo pipeline inspection flanges removed to facilitate inspection
- Below deck cargo pipeline clean, dry & odor free
- Cargo pump can inspection plate removed to facilitate inspection
- Cargo tank clean and dry (including sump)
- Vapor line low point drain liquid free
- No prior cargo residue observed or any other sources of contamination
- Ladders free of any sources of contamination
- Any prior cargo residue on roof, under heating coils, etc.
- Walls, bulkheads and roof free of any sources of contamination
- Cargo tank valves open for tank inspection
- Cargo stripping valve open for tank inspection
- Port & starboard CARGO header valves open and pipeline visually inspected
- Port & starboard VAPOR header valves open and pipeline visually inspected
- Vapor line low point drain liquid free
- No prior cargo residue observed or any other sources of contamination
- Ladders free of any sources of contamination
- Cargo load and discharge lines blown / popped into tank
- Cargo stripping lines blown / popped into cargo tanks
- Cargo tank valves open for tank inspection
- Below deck cargo pipeline inspection flanges removed to facilitate inspection
- Below deck cargo pipeline clean, dry & odor free
- Cargo pump can inspection plate removed to facilitate inspection
- Cargo tank clean and dry (including sump)
- Vapor line low point drain liquid free
- No prior cargo residue observed or any other sources of contamination
- Ladders free of any sources of contamination
- Cargo load and discharge lines blown / popped into tank
- Cargo stripping lines blown / popped into cargo tanks
- Cargo tank valves open for tank inspection
- Below deck cargo pipeline inspection flanges removed to facilitate inspection
- Below deck cargo pipeline clean, dry & odor free
- Cargo pump can inspection plate removed to facilitate inspection
- Cargo tank clean and dry (including sump)
- Vapor line low point drain liquid free
- No prior cargo residue observed or any other sources of contamination
- Ladders free of any sources of contamination
- Cargo load and discharge lines blown / popped into tank
- Cargo stripping lines blown / popped into cargo tanks
- Cargo tank valves open for tank inspection
- Below deck cargo pipeline inspection flanges removed to facilitate inspection
- Below deck cargo pipeline clean, dry & odor free
- Cargo pump can inspection plate removed to facilitate inspection
- Cargo tank clean and dry (including sump)
- Vapor line low point drain liquid free
- No prior cargo residue observed or any other sources of contamination
- Ladders free of any sources of contamination
- Cargo load and discharge lines blown / popped into tank
- Cargo stripping lines blown / popped into cargo tanks
- Cargo tank valves open for tank inspection
- Below deck cargo pipeline inspection flanges removed to facilitate inspection
- Below deck cargo pipeline clean, dry & odor free
- Cargo pump can inspection plate removed to facilitate inspection
- Cargo tank clean and dry (including sump)
- Vapor line low point drain liquid free
- No prior cargo residue observed or any other sources of contamination
- Ladders free of any sources of contamination

### Notes:

1. In some situations, a cleaning facility employee/ship crewman will be able to verify Tank Entry Verification Descriptions but the inspector will not (i.e. deck level inspections). In these situations, the facility employee/ship crewman should document verification of Tank Entry Verification Descriptions to the extent possible. Both parties should use N/A for Verification Descriptions that are not possible to verify and document reason in the Comments.
2. Potential sources of contamination are identified in Annex D. Presence of contamination should result in an unacceptable condition.
3. Customer shall be immediately notified if a vessel inspection is rejected for any reason.
4. If a WWT is performed, the RESULTS OF THE WWT (i.e. pass / reject) SUPERSEDES the acceptability of this field inspection and the vessel tanks must be re-cleaned if not acceptable.
5. If a WWT is performed, the results of the WWT (i.e. pass / reject) SUPERSEDES the acceptability of this field inspection and the vessel tanks must be re-cleaned if not acceptable.

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### Annex C
(normative)

### Sample Permit/Report

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

<table>
<thead>
<tr>
<th></th>
<th>Vessel</th>
<th>Space to be entered</th>
<th>Date/time</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Previous contents</td>
<td>Purpose of entry</td>
<td>Permit expires</td>
</tr>
<tr>
<td>3</td>
<td>Oxygen content (%)</td>
<td>Oxygen Meter: Mfrs. Serial No.</td>
<td>Date meter calibrated</td>
</tr>
<tr>
<td>4</td>
<td>Combustible gas (% LEL)</td>
<td>Gas Meter: Mfrs. Serial No.</td>
<td>Date meter calibrated</td>
</tr>
<tr>
<td>5</td>
<td>Toxicity (ppm, toxin, exposure limit, reading)</td>
<td>Toxicity test method</td>
<td>Mfrs. Serial No.</td>
</tr>
<tr>
<td>6</td>
<td>Toxicity (ppm, toxin, exposure limit, reading)</td>
<td>Toxicity test method</td>
<td>Mfrs. Serial No.</td>
</tr>
<tr>
<td>7</td>
<td>Toxicity (ppm, toxin, exposure limit, reading)</td>
<td>Toxicity test method</td>
<td>Mfrs. Serial No.</td>
</tr>
<tr>
<td>8</td>
<td>Toxicity (ppm, toxin, exposure limit, reading)</td>
<td>Toxicity test method</td>
<td>Mfrs. Serial No.</td>
</tr>
<tr>
<td>9</td>
<td>Date &amp; time of tests (lines 3-8 above)</td>
<td>Remarks:</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Confined space preparation procedure (e.g. washing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Confined space isolation (e.g. blanks, lockout/tagout)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Ventilation procedures used:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Confined space ventilation commenced (date/time):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Illumination provided (Yes/No):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Standby person at confined space entrance:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Communication established between person entering confined space and (Name)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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This confined space has been evaluated and *(is) (is not)* safe for entry.

<table>
<thead>
<tr>
<th>Table C.1—Confined Space Entry Permit (Sample Format; Other Formats Are Permitted) (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
</tr>
<tr>
<td>19</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>21</td>
</tr>
<tr>
<td>22</td>
</tr>
</tbody>
</table>
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,
— 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.
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.