



Office of
Deputy Commissioner
of Maritime Affairs

THE REPUBLIC OF LIBERIA
LIBERIA MARITIME AUTHORITY

Marine Notice

POL-010
Rev. 04/10

TO: ALL SHIPOWNERS, OPERATORS, MASTERS AND OFFICERS OF MERCHANT SHIPS, AND AUTHORIZED CLASSIFICATION SOCIETIES

SUBJECT: Requirements for Volatile Organic Compounds (VOC) Management Plans

Reference:

- a) **Maritime Regulation 2.37**
- b) **Regulation 15.6 Annex VI of MARPOL 73/78**
- c) **IMO Resolution MEPC.185 (59)**
- d) **IMO MEPC.1/Circ.680**
- e) **IMO MSC/Circ.585**

PURPOSE:

This Notice provides guidance to vessel owners, operators and managers in the development of Volatile Organic Compounds (VOC) Management Plans to meet the requirements of MARPOL revised Annex VI, regulation 15.6, requires that all tankers carrying crude oil have on board and implement a VOC Management Plan approved by the Administration. The purpose of the Plan is to ensure that VOC emissions from tanker operations to which revised Annex VI/15.6 applies are prevented or minimized as much as possible.

APPLICABILITY:

The requirement applies to all oil tankers of 400 GT and above carrying crude oil.

1.0 REQUIREMENTS

- 1.1 The requirement that oil tankers carrying crude oil have on board and implement a ship-specific VOC Management Plan approved by the Administration takes effect from July 1, 2010. The VOC Management Plan shall be prepared in accordance with MARPOL regulation 15.6 of revised Annex VI, taking into account guidelines contained in resolution **MEPC.185(59)**, Guidelines for the Development of a VOC Management Plan and **MEPC.1/Circ.680**, Technical Information on Systems and Operation to Assist Development of VOC Management Plans, references (c) and (d), respectively.
- 1.2 The VOC Management Plan must be reviewed and approved by the Administration. In keeping with current policy, Liberia has also authorized the classification society organizations it has recognized (RO) to review and approve VOC Management Plans on its behalf.
- 1.3 An approved VOC Management Plan is required prior to obtaining a MARPOL IAPP Certificate issued by a recognized organization on behalf of the Administration.

2.0 VOC MANAGEMENT PLAN PREPARATION, REVIEW AND APPROVAL

2.1 PREPARATION: The VOC Management Plan should be prepared taking into account the guidelines in, references (c) and (d).

2.2 The Administration has developed a model VOC Management Plan to assist ship-owners and operators in preparing their VOC Plan(s) and is available on request. The model Plan will simplify the preparation of a VOC Management Plan and may be structured as outlined below:

Cover Page

Particulars of the Vessel

Introduction

Index of Sections

- Section 1: Main features of Marpol 73/78, revised Annex VI, Regulation 15
- Section 2: Description of the Ship's equipment and arrangements
- Section 3: Procedures for minimizing VOC emissions during cargo loading
- Section 4: Procedures for minimizing VOC emissions during sea passage
- Section 5: Procedures for minimizing VOC emissions during discharge of cargoes
- Section 6: Person responsible for implementing the Plan
- Section 7: Monitoring and Control of VOC releases
- Section 8: Training Program
- Section 9: Information

- Section 9.1: Cargo tank information/plans
 - 1. General Arrangement drawing
 - 2. Tank Plan
 - 3. Schematic drawing(s) of the cargo tank venting system
 - 4. Schematic drawing of the inert gas system
 - 5. Schematic drawing of the vapor emission control systems (VECS), if applicable
 - 6. Schematic drawing(s) of Vapor Recovery System (VRS) or other VOC control systems, if applicable
 - 7. Details of pressure vacuum (P/V) relief devices including settings and Capacities

- Section 9.2 References
 - 1. SOLAS II-2, regulation 11.6 and 4
 - 2. Vapor Emission Control System (VECS) manual, if applicable
 - 3. Vapor Recovery System (VRS) manual, if applicable
 - 4. Other VOC control system manual, if applicable
 - 5. Inert Gas manual
 - 6. Crude Oil Washing (COW) manual
 - 7. Industry/Operators Best Practices during loading, sea passage and discharge of cargo.

2.3 Each plan shall as a minimum:

- be specific to the ship for which it is prepared;
- provide written procedures for minimizing VOC emissions during the loading and sea passage;
- give consideration to the additional VOC generated during Crude Oil Washing;
- identify a person responsible for implementing the Plan;
- If the ship is equipped with VOC reduction devices or equipment, the use of these devices or equipment should be incorporated into the procedures as appropriate;
- identify training, and
- be evaluated, reviewed and updated regularly.

2.4 The Plan shall be available in a working language understood by the master and officers, if the working language is not English.

2.5 Each Plan must identify the ship to which it applies, using the ship's name, call sign, port of registry, IMO number and deadweight.

2.6 Best Management Practices: VOC Management Plan should encourage and set forth the following best management practices:

- The loading procedures should take into account potential gas releases due to low pressure and, where possible, the routing of oil from crude oil manifolds into the tanks should be done so as to avoid or minimize excessive throttling and high flow velocity in pipes;
- The ship should define a target operating pressure for the cargo tanks. This pressure should be as high as safely possible and the ship should aim to maintain tanks at this level during the loading and carriage of relevant cargo;
- When venting to reduce tank pressure is required, the decrease in the pressure in the tanks should be as small as possible to maintain the tank pressure as high as possible;
- The amount of inert gas added should be minimized. Increasing tank pressure by adding inert gas does not prevent VOC release but it may increase venting and therefore increased VOC emissions; and
- When crude oil washing is considered, its effect on VOC emissions should be taken into account. VOC emissions can be reduced by shortening the duration of the washing or by using a closed cycle crude oil washing program.

3.0 REVIEW AND APPROVAL

- 3.1 All VOC Management Plans are required to be approved by the Administration or an RO. The Plan that is submitted for approval by the Administration shall be in English. To facilitate the review and plan approval process, it is recommended to complete the checklist in Appendix I to this notice and used by the Administration for plan approval and attach it to the submitted plan. The checklist identifies the applicable sections of the VOC Management Plan, taking into account references (c) and (d) and the revised Annex VI/15.6.
- 3.2 The VOC management Plan should be sent to the Office of the Deputy Commissioner of Maritime Affairs, Republic of Liberia, Liberian International Ship & Corporate Registry, LLC, Attn: Marine Safety, 8619 Westwood Center Dr., Suite 300 Vienna, Virginia 22182, USA, Telephone: + 1 703 251 2469, Telefax: + 1 703 790 5655.

Questions regarding this instruction, MARPOL requirements, and fees for VOC Management Plan review and approval should be referred to E-mail: safety@liscr.com.

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APPENDIX I

Liberian International Ship and Corporate Registry

VOLATILE ORGANIC COMPOUND (VOC) MANAGEMENT PLAN REVIEW CHECKLIST

VESSEL NAME: _____ DATE: ____/____/____

REVIEWER: _____ COMPANY: _____

References: 1. Regulation 15, Annex VI (MARPOL 73/78)
2. Liberian Maritime Regulation 2.37

Guidelines: 1. IMO Resolution MEPC.185 (59)
2. IMO MEPC.1/Circ.680
3. IMO MSC/Circ.585
4. Marine Notice POL-010

SECTIONS	VESSEL PARTICULARS	Yes	No	Comments
<i>Cover Page, Ship Particulars, Approval Page, Revision Page, and Index Page</i>	<ul style="list-style-type: none">• VESSEL NAME?• IMO NUMBER?• FLAG OF REGISTRY?• PORT OF REGISTRY?• CALL SIGN?• DEADWEIGHT?			
	<ul style="list-style-type: none">• Approval Page?• Record of Revision Page?• Index of Sections (Table of Contents) Page?			
<i>Vessel Vapour Control Equipment Available</i>	Vessel Equipments Available: <ul style="list-style-type: none">• Vapour Emission Control (VEC) System?• Crude Oil Washing (COW) System?• Inert Gas (IG) System?• Pressure Vacuum (PV) Valve?• Pressure Vacuum (PV) Breaker?• Mast Riser?			

SECTION 1	INTRODUCTION	
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Introduction Statement?

- Regulation 15 of Annex VI of MARPOL 73/78, as revised by IMO Resolution MEPC.176 (58) (hereinafter referred to as “revised Annex VI”) regulate the VOC emissions from a tanker in designated port(s) or terminal(s) of a Party regulating such emissions. Regulation 15.6 requires that a tanker carrying crude oil shall have on board and implement a VOC Management Plan (VOC Plan) approved by the Administration in accordance with IMO Resolution MEPC.185 (59). The VOC Plan shall be specific to each ship.
- The aim of the VOC Management Plan is to identify the arrangements and equipment required to enable compliance with Regulation 15.6 of the revised Annex VI of MARPOL73/78, and to clearly identify for the ship’s officers all operational procedures for VOC emission control.
- The VOC Management Plan is ship specific and provides written procedures for minimizing VOC emissions during conditions of loading of cargo, sea passage, and discharge of cargo.
- The VOC Management Plan has been written pursuant to the requirements in the revised Annex VI Regulation 15.6, and it has been developed in accordance with the IMO Resolution MEPC 185(59) “Guidelines for the Development of a VOC Management Plan”, having taken into account the provisions of MEPC.1 Circ.680 “Technical Information on Systems and Operations to assist Development of VOC Management Plans”.
- The VOC Management Plan describes the specific arrangement, operations and conditions onboard a crude oil tanker with respect to the emission and ability to control VOC emissions. This VOC Management Plan is not a safety guide, and reference shall be made to other publications to evaluate safety hazards.
- Any design modifications made to minimize VOC emissions, strength and stability need to be considered and comprehensive calculations have to be made.
- The VOC Management Plan has been approved by the Liberian Maritime Administration, and no alteration or revision shall be made to any part of it without the prior approval of the Administration.

SECTION 2	VOC MANAGEMENT PLAN – MAIN FEATURES OF REGULATION 15 ANNEX VI OF MARPOL73/78				
<p>MARPOL 73/78 Regulation 15 Annex VI?</p> <ul style="list-style-type: none"> • The Purpose of the VOC Management Plan is to ensure that the operation of a tanker, to which regulation 15.6 of the revised Annex VI applies, prevents or minimizes VOC emissions to the extent possible. • The requirements of Regulations 15.1 to 15.5 are applicable only to tankers operating in designated ports or terminals as specified by a Party to the Annex. • For the designated port or terminal, a VEC System is going to be required in accordance with IMO MSC/Circ. 585. • A tanker calling at a designated port or terminal regulating VOC shall be provided with a Vapour Emission Collection System approved by the Administration taking into account the safety standards laid out in IMO MSC/Circ.585, and shall use this system during the loading of relevant cargoes. A designated port or terminal which has installed VECS in accordance with regulation 15 may accept tankers which are not fitted with vapour collection systems for a period of 3 years after the effective date of the VOC control going to be applied (MARPOL Reg. VI/15.5). • Regulation 15.6 refers to mandatory VOC Management Plan which a tanker vessel carrying crude oil shall implement and have onboard. Ship specific VOC Management Plan shall provide written procedures for minimizing VOC emissions during the loading, sea passage, and discharge of cargo. • The emission of VOC can be prevented or minimized by: Optimizing operational procedures to minimize the release of VOC emissions; and / or using devices, equipment, or design changes to prevent or minimize VOC emissions. 					
SECTION 3	VESSEL VOC MANAGEMENT EQUIPMENT AND ARRANGEMENTS	Yes	No	Comments	
3.1 Introduction Page	1.1 Introductory statement that provides an outline and describes the particulars of ship' equipment and arrangements necessary to enable implementation of operational procedures for preventing or minimizing VOC emissions? 1.2 Arrangement of the ship & description of its cargo tanks with line or schematic drawings and heating arrangements, if provided.				

3.2 Description of Cargo Tanks and Lines, Pressure/Vacuum equipments, and Relief devices	1. Description of cargo tank venting arrangements? <ul style="list-style-type: none"> • Cargo tank venting and inert gas main pipeline? • Isolation valves and blanking arrangements? • Locking arrangements to prevent inadvertent closing/opening of tanks? • Connections between cargo tank venting/inert gas main to the mast riser, • The mast riser • Isolation valve between the cargo tank venting/inert gas main and the mast riser, and/or a pressure-vacuum valve fitted in a bypass across the isolation valve? • Liquid filled Pressure-Vacuum Breaker? • Pressure-vacuum relief device for thermal breathing in the event the cargo tank is isolated from the common cargo tank venting/inert gas main? • By pass lines/valves in vent pipes? 			
	2. Description of pressure control and over/under pressure alarms? <ul style="list-style-type: none"> • Vessel's Mast Riser? • Pressure/Vacuum (P/V) Breaker and Safety Mechanisms? • Individual tank Pressure/Vacuum (P/V) primary valves? • Over/Under pressure alarms and sensors? • Individual tank Pressure/Vacuum (P/V) secondary valves? 			
	3. Settings for Pressure/Vacuum (P/V) relief devices? <ul style="list-style-type: none"> • Settings for the Pressure/Vacuum (P/V) valves and P/V Breaker? • Settings for Pressure/Vacuum alarms per tank? 			
SECTION 4	OPERATIONAL PROCEDURES FOR MINIMIZING VOC EMISSIONS – LOADING OF CARGO	Yes	No	Comments
4.1 Introduction Page	1. Introductory statement that provides an outline and describes the cargo loading procedures, including best practices, methods and systems for the control of VOC emissions during cargo loading operations?			

<i>4.2 Description of procedures for minimizing VOC emissions during loading of cargo</i>	<p>1. Best practices and design to include?</p> <ul style="list-style-type: none"> • Manual pressure relief procedures? • Pressure-Vacuum (P/V) valve condition and maintenance? • Condition of cargo tank openings and gaskets? • Inert Gas topping up procedures? • Partially filled tanks? • Loading sequence and rate? • Use of vapour return manifold and pipelines when shore facilities are available? 			
	<p>2. A description of the system, method of operation and equipment parameters applied to control VOC emissions during cargo loading, should be given in this section of the Plan.</p> <ul style="list-style-type: none"> • Vapour Emission Control Systems (maximum allowable loading rates and corresponding maximum vapour/air densities and vapour growth rates should be specified)? • Vapour Pressure Release Control Valve (VOCON valve)? • Cargo Pipeline Partial Pressure control system (KVOC)? • Increased pressure relief settings (Applicable also for sea passage)? • Vapour recovery systems <ul style="list-style-type: none"> 1. Vapour Recovery Systems - Condensation Systems ? 2. Vapour Recovery Systems – Absorption Systems? 3. Vapour Recovery Systems - Absorption Carbon Vacuum? 			
	<p>3. Loading procedure should take into account potential gas releases due to low pressure and, where possible, the routing of oil from crude oil manifolds into the tanks should be done so as to avoid or minimize excessive throttling and high flow velocity in pipes?</p>			
	<p>4. Vessel should define a target operating pressure for the cargo tanks. This pressure should be as high as safely possible and the ship should aim to maintain tanks at this level during the loading and carriage of relevant cargo?</p>			

SECTION 5	OPERATIONAL PROCEDURES FOR MINIMIZING VOC EMISSIONS – SEA PASSAGE	Yes	No	Comments
5.1 Introduction Page	1. Introductory statement that provides an outline and describes the best practices, methods and systems for the control of VOC emissions during sea passage?			
5.2 Description of procedures for minimizing VOC emissions during sea passage	1. Best practices and design to include? <ul style="list-style-type: none"> • Manual pressure relief procedures? • Pressure-Vacuum (P/V) valve condition and maintenance? • Condition of cargo tank openings and gaskets? • Inert Gas topping up procedures? • Partially filled tanks? • Loading sequence and rate? • COW procedures (closed cycle)? 			
	2. A description of the system, method of operation and equipment parameters applied to control VOC emissions during sea passage, should be given in this section of the Plan? <ul style="list-style-type: none"> • VOCON procedure - Shipboard Procedure for the Control of Atmospheric Pollution by Volatile Organic Compounds and Reducing Loss of Cargo (Is the pressure drop during release of gas from the cargo tank vapour system monitored and recorded)? • Recovery of excess VOC and tank absorption (Venturi system)? • Increased pressure relief settings? (If applicable, provide the value of the new settings of the P/V valves and P/V Breaker) • Vapour recovery systems? • The VOC recovery plant efficiency as well as any operational limitations related to applicability for different cargo handling modes, maximum allowable loading rates or crude vapour pressures, are to be specified in the VOC management plan? <ol style="list-style-type: none"> 1. Vapour Recovery Systems - Condensation Systems 2. Vapour Recovery Systems – Absorption Systems 3. Vapour Recovery Systems - Absorption Carbon Vacuum? 			
	3. Vessel should define a target operating pressure for the cargo tanks. This pressure should be as high as safely possible and the ship should aim to maintain tanks at this level during the loading and carriage of relevant cargo?			
	4. Cargo temperature - A description of cargo heating requirements to maintain the vapour/liquid equilibrium should be included?			

SECTION 6	OPERATIONAL PROCEDURES FOR MINIMIZING VOC EMISSIONS – DISCHARGING OF CARGO AND BALLASTING	Yes	No	Comments
<i>6.1 Introduction Page</i>	1. Introductory statement that provides an outline and describes the cargo discharging procedures, including best practices, method and systems for the control of VOC emissions when discharging cargo or ballasting?			
<i>6.2 Description of procedures for minimizing VOC emissions when discharging cargo or ballasting</i>	1. Best practices and design to include (whichever applicable)? <ul style="list-style-type: none"> • Manual pressure relief procedures? • Pressure-Vacuum (P/V) valve condition and maintenance? • Condition of cargo tank openings and gaskets? • Inert Gas procedures? • Partially filled tanks? • Discharging sequence and rate? • Use of vapour return manifold and pipelines when shore facilities are available? 			
	2. Description of the system and procedures for minimizing VOC emissions during discharge of cargo tanks. It is important that pressure monitoring is exercised in order to avoid excessive supply of inert gas to cargo tanks. 3. When crude oil washing is considered, its effect on VOC emissions should be taken into account. VOC emissions can be reduced by shortening the duration of the washing or by using a closed cycle crude oil washing program?			
SECTION 7	DESIGNATED PERSON – RESPONSIBLE FOR PLAN IMPLEMENTATION	Yes	No	Comments
<i>7.1 Identification of Designated Responsible Person</i>	1. A person shall be designated to assume overall charge of the VOC management onboard the ship?			
	2. The designated person qualification requirement? <ul style="list-style-type: none"> • At least one year’s experience on crude oil tankers where his duties have included all cargo handling operations relevant to VOC management. In the absence of experience with VOC management, he or she shall have completed a training program in VOC management in as specified in this manual? 			

7.2 Designated Person Qualification?	<ul style="list-style-type: none"> • Have participated at least twice in cargo loading operations, Crude Oil Washing Operations and transit where VOC management procedures have been applied, one of which shall be on the particular ship or a similar ship in all relevant aspects, for which he or she is to undertake the responsibility of VOC management? • Be fully knowledgeable of the contents of the manual? 			
SECTION 8	MONITORING AND CONTROL OF VOC RELEASES	Yes	No	Comments
8.1 Monitoring and Recordkeeping of VOC releases	<ul style="list-style-type: none"> • Record keeping is necessary in order to document compliance with the requirements of the management plan and, potentially, the extent of release of gases from the crude oil cargo tanks/ • The form of record keeping is dependent upon the specific form of method used to minimize the emission of VOC from the crude oil cargo. It will also be dependent upon the operation being performed by the ship necessitating the release of VOC, namely during loading, the carriage or as a result of a COW operation? • Record keeping procedure could be as follows: <ul style="list-style-type: none"> - A record of the time and pressure within the tank gas/vapour system before the release takes place? - A record of the time and pressure within the gas/vapour system after the release has been completed? 			
SECTION 9	TRAINING PROGRAM	Yes	No	Comments
9.1 Description of Training Program	<p>The VOC Management Plan should contain description of training program that include training requirements for all persons involved and responsible for the VOC management onboard the ship. The VOC management training program should cover and not be limited to the following:</p> <ul style="list-style-type: none"> • An introduction to the purpose of VOC emission control? <ul style="list-style-type: none"> - Volatile organic compounds (VOCs) pollution and toxicity, - Regulation 15 of Annex VI to MARPOL 73/78 • An introduction to the principles of VOC emission control? <ul style="list-style-type: none"> - VOC generation systems in crude oil - Crude oil tanker pressure control/release systems • General VOC emission control options? <ul style="list-style-type: none"> - Methods and system for the control of VOC emissions • Ship specific VOC emission control options? 			

	<ul style="list-style-type: none"> - Ship specific methods and system for the control of VOC emissions • Monitoring and recording of VOC release? <ul style="list-style-type: none"> - Methods for monitoring and recording of VOC emissions • Hazards and Safety related to VOC emission control? <ul style="list-style-type: none"> - The hull and its pressure limitations - Personnel safety hazards related to exposure to crude oil vapour. 			
SECTION 10	VESSEL SPECIFIC INFORMATION	Yes	No	Comments
<i>10.1 Vessel Plans and Drawings</i>	<p>The following Plans/Drawings must be included in the VOC Management Manual?</p> <ul style="list-style-type: none"> • General Arrangement drawing? • Cargo and Ballast Tank plan? • Schematic drawing(s) of the Cargo tank venting system? • Schematic drawing of the inert gas system? • Schematic drawing of the vapour emission control systems (if applicable)? • Schematic drawing(s) Vapour Recovery System or other VOC control systems (if applicable)? • Technical specifications and details of pressure vacuum relief devices, including settings and capacities? 			
SECTION 11	REFERENCES	Yes	No	Comments
<i>11.1 List of References used for the development of VOC Management Plan</i>	<p>The following list of reference documents must be included in the VOC Management Manual?</p> <ul style="list-style-type: none"> • SOLAS II-2 Regulation 11.6? • Vapour Emission Control System Manual (If applicable)? • Vapour Recovery System Manual (If applicable)? • Other VOC Control System Manual (If applicable)? • IGS Inert Gas System Operations Manual? • Crude Oil Washing System (COW) Operations Manual? • Industry Best Practices during loading, sea passage, and discharge of cargo? 			
	<p>SOLAS II-2, Regulation 11.6</p> <p>6 Protection of cargo tank structure against pressure or vacuum in tankers</p> <p>6.1 General</p> <p>The venting arrangement shall be so designed and operated as to ensure that neither pressure nor vacuum in cargo tanks shall exceed design parameters and be such as to provide for:</p> <p>1. The flow of the small volumes of vapour, air, or inert gas mixtures caused by thermal variations in a cargo tank in all cases through pressure/vacuum valves; and</p>			

<p>11.2 Extract reference from SOLAS II-2, Regulation 11.6</p>	<p>2. The passage of large volumes of vapour, air or inert gas mixtures during cargo loading and ballasting, or during discharging.</p> <p>6.2 Openings for small flow by thermal variations Openings for pressure release in 6.1.1 shall:</p> <ol style="list-style-type: none"> 1. have a great height as is practicable above the cargo tank deck to obtain maximum dispersal of flammable vapours, but in no case less than 2 m above the cargo tank deck; and 2. be arranged at the furthest distance practicable, but no less than 5 m, from the nearest air intakes and openings to enclosed spaces containing a source of ignition and from deck machinery and equipment which may constitute an ignition hazard. Anchor windlass and chain locker openings constitute an ignition hazard. <p>6.3 Safety measure in cargo tanks</p> <p><i>6.3.1 Preventive measures against liquid rising in the venting system</i> Provisions shall be made to guard against liquid rising in the venting system to a height which would exceed the design head of cargo tanks. This shall be accomplished by high-level alarms or overflow control systems or other equivalent means, together with independent gauging devices and cargo tank filling procedures. For the purpose of this regulation, spill valves are not considered equivalent to an overflow system.</p> <p><i>6.3.2 Secondary means for pressure/vacuum relief</i> A secondary means of allowing full flow relief of vapour, air or inert gas mixtures shall be provided to prevent over-pressure or under-pressure in the event of failure of the arrangements in paragraph 6.1.2. Alternatively, pressure sensors may be fitted in each tank protected by the arrangement required in paragraph 6.1.2, with a monitoring system in the ship's cargo control room or the position from which cargo operations are normally carried out. Such monitoring equipment shall also provide an alarm facility which is activated by detection of over-pressure or under-pressure conditions within a tank.</p> <p><i>6.3.3 Bypasses in vent mains</i> Pressure/vacuum valves required by paragraph 6.1 may be provided with a bypass arrangement when they are located in a vent main or masthead riser. Where such an arrangement is provided there shall be suitable indicators to show whether the</p>			
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	<p>bypass is open or closed.</p> <p><i>6.3.4 Pressure/vacuum-breaking devices</i> One or more pressure/vacuum- breaking devices shall be provided to prevent the cargo tanks from being subject to:</p> <ol style="list-style-type: none"> 1. a positive pressure, in excess of the test pressure of the cargo tank, if the cargo were to be loaded at the maximum rated capacity and all other outlets are left shut; and 2. a negative pressure in excess of 700 mm water gauge if the cargo was to be discharged at the maximum rated capacity of the cargo pumps and the inert gas blowers were to fail. <p>Such devices shall be installed on the inert gas main unless they are installed in the venting system required by SOLAS II-2 regulation 4.5.3.1 or on individual cargo tanks. The location and design of the devices shall be in accordance with regulation 4.5.3 and paragraph 6.</p> <p>6.4 Size of vents outlets Vent outlets for cargo loading, discharging and ballasting required by paragraph 6.1.2 shall be designed on the basis of the maximum designed loading rate multiplied by a factor of at least 1.25 to take account of gas evolution, in order to prevent the pressure in any cargo tank from exceeding the design pressure. The master shall be provided with information regarding the maximum permissible loading rate for each cargo tank and, in the case of combined venting systems, for each group of cargo tanks.</p>			
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