標題

MARPOL 条約附属書 VI(船舶からの大気汚染防止のための規則)の改正について(外国籍船舶用)

ClassNK
テクニカル
インフォメーション

No. TEC-0810
発行日 2010 年 4 月 20 日

各位

2008 年 10 月 10 日に開催された IMO 第 58 回海洋環境保護委員会(MEPC58)において MARPOL 条約附属書 VI の改正が採択され、2010 年 7 月 1 日に発効いたします。「第 13 規則 窒素酸化物(NOx)」及び「第 14 規則 硫黄酸化物(SOx)及び粒子状物質」関連の改正の概要については、すでに ClassNK テクニカル・インフォメーション No. TEC-0771 にてお知らせしておりますが、改正に関しての追加情報をお知らせ致します。

本改正により証書の書式が変更となり、新たに VOC Management Plan やオゾン層破壊物質記録簿等の搭載が義務付けられます。証書の書式変更や検査の時期、改正内容の具体的な取り扱いにつきましては、次のとおりです。

1. 新証書への切替について(国際大気汚染防止証書)
   MSC-MEPC.5/ Circular.6 に従って、2010 年 7 月 1 日以降最初の定期的検査又は臨時検査(MARPOL Annex VI)の際に新証書への切替を行う必要があります。

2. オゾン層破壊物質の放出規制について
   第 12 規則の改正により、オゾン層破壊物質が恒久的に封印されている設備(家庭用冷蔵庫等)については適用除外とすることが明記されました。
   また、2010 年 7 月 1 日以降、オゾン層破壊物質を含んでいる設備の一覧表を船内に保管又は掲示し、記録簿を備える必要があります。参考までに弊会作成一覧表のサンプルを添付いたしますので、ご活用下さい。(添付1.)
   記録簿には、物質の質量を記入し、かつ、次の事項をその都度遅滞なく記録する必要があります。
   a) オゾン層破壊物質を含む設備への全部又は一部の補充
   b) オゾン層破壊物質を含む設備の修理又は保守
   c) 以下の場合のオゾン層破壊物質の大気への排出
      c-1)故意の排出
      c-2)故意ではない排出
   d) オゾン層破壊物質の陸上の受入施設への排出
   e) オゾン層破壊物質の船舶への供給
   なお、記録簿は既存の航海日誌の一部または主官庁に承認された電磁的記録装置とすることができます。

(次頁に続く)

3. 原油タンカーに対する VOC Management Plan の承認及び船上検査について
原油を積載する油タンカー*においては、2010 年 7 月 1 日以降、主管庁に承認された"VOC Management Plan"を本船上に保管することが義務付けられています。
つきましては、対象となる船舶の VOC Management Plan を作成の上、添付 2.の「VOC Management Plan 承認申請フォーム」と共に、弊会船体部へご提出下さい。ご参考までに、VOC Management Plan のサンプルを添付いたしましたのでご活用ください(添付 3.)。
なお、承認された VOC Management Plan の船上保管に関する検査につきましては、2010 年 7 月 1 日以降最初の定期的検査時又は臨時検査時に実施致します。

(備考)
* IOPP Certificate の Form B の"Type of Ship"の欄中、"Crude oil tanker"又は"Crude oil/product carrier"にチェックされている油タンカー

4. 燃料油変更作業について
第 14 規則改正により、2010 年 7 月 1 日以降一般海域で通常使用する燃料油と放出規制海域で使用する低硫黄燃料油とを切り替えて使用する場合に燃料油変更作業手引書を船上に備えることが義務付けられます。
この手引書は、安全な燃料油変更作業に不可欠であるため、従来より実質的に船上に備えることが必要とされていたものです。なお、この燃料油変更作業手引書の承認は必要ありません。
また、燃料油変更のログブックへの記載については「燃料油変更作業が完了した時点」の日時、船舶の位置および各タンクの低硫黄燃料油の量を記載することとされておりましたが、第 14 規則改正により、「放出規制海域入域前に燃料油変更作業が完了した時点、および放出規制海域を出域後に燃料油変更作業を始めた時点」の日時、船舶の位置並びに各タンクの低硫黄燃料油の量の記載へと明確化されました。

（次頁に続く）

なお、本件に関してご不明な点は、以下の部署にお問い合わせください。

VOC Management Plan に関するお問い合わせ
財団法人 日本海事協会 （ClassNK）
本部 管理センター 船体部
住所: 東京都千代田区紀尾井町 4-7（郵便番号 102-8567）
Tel.: 03-5226-2017 / 2018
Fax: 03-5226-2019
E-mail: hld@classnk.or.jp

オゾン層破壊物質の放出規制、燃料油変更作業に関するお問い合わせ
本部 管理センター 機関部
住所: 東京都千代田区紀尾井町 4-7（郵便番号 102-8567）
Tel.: 03-5226-2022 / 2023
Fax: 03-5226-2024
E-mail: mcd@classnk.or.jp

添付:
1. オゾン層破壊物質を含んでいる設備の一覧表（例）
2. VOC Management Plan 承認申請フォーム
3. VOC Management Plan のサンプル

添付 1

List of equipment containing Ozone Depleting Substances

Ship Name :

Kind	Refrigerant No.	Substance Name	Symbol	Mass(g)	Equipment Name	Quantity	Location	Date of confirmation	Signature
Halons								1 July 2010	Chief Engineer
CFCs									
HCFC	R-22	Chlorodifluoromethane	HCFC-22	22.3kg 7kg 7kg	Provison Ref. Machine Air Conditioner Spare bottle	1 1 1	Engine room Engine room Engine room		
HBFC									

添付 1

List of equipment containing Ozone Depleting Substances

Ship Name :

Kind	Refrigerant No.	Substance Name	Type	Mass(Kg)	Equipment Name	Quantity	Location	Date of confirmation	Signature

添付 2：VOC Management Plan 承認申請フォーム

TO: Nippon Kaiji Kyokai
Hull Department、Tanker Section
（FAX:+81 3 5226 2019　E-mail: hld@classnk.or.jp）

Application for Approval of VOC MANAGEMENT PLAN

We hereby request your Society to approve the VOC MANAGEMENT PLAN(s) under the Amendments to MARPOL Annex VI (RESOLUTION MEPC.176(58)).

Applicable Ships

	Name of Ship	Class Number	IMO Number	Flag State
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

To be continued* / See attached sheet*

Applicant

Name of Company:_____

Address : _____

Tel/Fax/E-mail :_____/_____/_____

Name and Signature : _____
( )

The relative fee will be paied by above */ following company*.

_____

* : Delete as appropriate

添付 3

BIBLIOGRAPHY

日付	改訂	内容
1 March, 2010	0	1. Prepared for our study

Approval Stamp of Administration:

Ship Name: "XXX"	IMO No.: 1234567
Owner: XXXXXXXX	Class No.: 999999
Port of resgistry: XXXXXX	Distinctive number or letters: XXXXXXXXXXXX

Approved by	
Approved by	
Checked by	
Drawn by	

VOC MANAGEMENT PLAN

Scale	Date	Class	DWG.No.	REV.	Project No.
NONE	DD/MM/YYYY		PAM-1	0	XXX

Record of Revision

Rev. No.	Date	Section	Revised provision	Sign

Introduction

Regulation 15 of Annex VI of MARPOL 73/78, as revised by IMO Resolution MEPC.176(58) (hereinafter referred to as "revised Annex VI") regulates the VOC emissions from a tanker in designated port(s) or terminal(s) of a Party regulation such emissions.
Regulation 15.6 requires that a tanker carrying crude oil shall have on board and implement a VOC Management Plan approved by the Administration.

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 MARPOL 73/78, and to clearly identify for the ship's officers all operational procedures for VOC emission control.

CONTENTS

7. Attached Drawings

Chapter 1 Objectives

1.1 The purpose of the VOC management plan is to ensure that the operation of a tanker, to which regulation 15 of MARPOL Annex VI applies, prevents or minimizes VOC emissions to the extent possible.

1.2 Emissions of VOCs can be prevented or minimized by:

1) optimizing operational procedures to minimize the release of VOC emissions; and/or

2) using devices, equipment, or design changes to prevent or minimize VOC emissions.

1.3 To comply with this plan, the loading and carriage of cargoes which generate VOC emissions should be evaluated and procedures written to ensure that the operations of a ship follow best management practices for preventing or minimizing VOC emissions to the extent possible. If devices, equipment, or design changes are implemented to prevent or minimize VOC emissions, they shall also be incorporated and described in the VOC management plan as appropriate.

1.4 While maintaining the safety of the ship, the VOC management plan should encourage and, as appropriate, set forth the following best management practices:

1) 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;

2) 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;

3) 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;

4) 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

5) 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 programme.

1.5 The VOC management plan also includes the following contents to ensure the management practice above para.1.4:

1) A person in charge of carrying out the plan (ref. Chapter 6)
   a) A person shall be designated in the VOC management plan to be responsible for implementing the plan and that person may assign appropriate personnel to carry out the relevant tasks;

2) Procedures for preventing or minimizing VOC emissions (ref. Chapter 4)
   a) Ship-specific procedures should be written or modified to address relevant VOC emissions, such as the following operations:
      1) Loading;
      2) Carriage of relevant cargo; and
      3) Crude oil washing;
   b) If the ship is equipped with VOC reduction devices or equipment, the use of these devices or equipment should be incorporated into the above procedures as appropriate.

3) Training (ref. Chapter 5)
   a) The plan should describe the training programmes to facilitate best management practices for the ship to prevent or minimize VOC emissions.

Chapter 2 General Information

2.1 Particulars of Registration and Principal Dimensions

The vessel is the tanker carrying crude oils and her principal dimensions are as the Table2.1 indicates. Refer to 7.1 "GENERAL ARRANGEMENT" for the tank arrangement.

Table 2.1 Particulars of Registration and Principal Dimensions

Ship's Name	
IMO Number	
Flag/Port of Registry	
Call Sign	
Year of Build	
Gross Tonnage	GT
Length (O.A.)	m
Length (B.P.)	m
Breadth moulded	m
Depth moulded	m
Draft (summer ext.)	m
Deadweight	DWT
Speed at loaded draft	knots
Notation	NS*(TOB)(ESP)
Class	ClassNK

Chapter 3 Cargo Tanks and Equipments

3.1 Cargo Tanks

This vessel has XX cargo tanks and are located in front of Pump Room.
The specification of cargo tanks is shown in Table 3.1.
The setting pressures of each pressure/vacuum valve are defined so as not to be more than the allowable cargo tank ullage pressure as the Table 3.1, i.e. these setting pressures are defined considering to some safety factors, so that the tank structural failure due to over /under pressure does not occur.

Table 3.1 List of Cargo Tanks and Setting Pressure of Cargo Tank Venting System

Tank No.	Capacity (m^3)	Allowable Ullage Pressure (MPa)	Setting Pressure of PV Valve* (MPa)		Setting Pressure of PV Breaker* (MPa)		Setting Pressure of Pressure Alarm (MPa)	
			Pressure Side (min.)	Vacuum Side (max.)	Pressure Side (min.)	Vacuum Side (max.)	High Pressure (MPa)	Low Pressure (MPa)
(Total)								

*) Names of Pressure / Vacuum relief systems and their setting pressures are to be shown in

applicable boxes.

3.2 Cargo Tank Venting System

(The section needs to be modified by each vessel's specification)

(Example for Very Large Crude Oil Carrier which installs Inert Gas System required by International Convention)

1) The vessel is provided with the inert gas supply main and this is also used for the control of cargo vapour release. (Ref. Chapter 4) This line is fitted with branch piping leading to each cargo tank. Branch piping for inert gas is fitted with either stop valves or equivalent means of control for isolating each tank. The stop valves are provided with locking arrangement, which is under the control of a responsible vessel's officer.
   In addition, the vessel has the independent vent post with the high velocity relief/vacuum valve for each cargo tank. This system also enables thermal breathing from cargo tanks when the isolation valve is closed.
   A liquid-filled P/V breaker is typically connected to the cargo tank venting/inert gas main. The P/V breaker has a capacity to accommodate the gas flow from cargo tanks during loading (125% of the loading rate and discharge rate).
   The cargo tank venting/inert gas main is typically used during loading and discharging operations. During loading the mast riser valve is open (unless vapour emission control is performed) and VOC is expelled to air. During discharge the same valve is closed and inert gas used to replace the tank atmosphere.
   The detail of the venting system can be found in "7.3 Diagram of Cargo Oil Tank Vent Line [dwg. No.xxxxxxx]."

(Example for Crude Oil Tanker not to be required to install Inert Gas System by International Convention)

1) The vessel is provided with the common cargo tank venting system and this is used for the control of cargo vapour release. (Ref. Chapter 4)
   This common vent line connects to the mast riser. The mast riser has a minimum height of 6 metres with an flame arrestor at its outlet. An isolation valve is provided between the cargo tank venting and the mast riser. These designs also have a small capacity pressure/vacuum valve fitted in a bypass across the isolation valve and this system enables thermal breathing from cargo tanks when the isolation valve is closed.
   The detail of the venting system can be found in "7.3 Diagram of Cargo Oil Tank Vent Line [dwg. No.xxxxxxx]."

(Example for Crude Oil Tanker provided with Vapour Emission Control System)

2) In addition, the vessel is provided with "Vapour Emission Control.
   The purpose of the system is to return the vapour containing VOC to shore terminal not to relief the vapour to atmosphere in ports/terminals.
   To comply with the VECS requirement of USCG CFR, the vessel is provided with Vapour Return Line and its Manifold, pressure sensors and their alarms, high level alarms and tank overfill alarms, etc. The detail of VECS system and this operation can be found in "Vapour Emission Control System Operation Manual [dwg. No.xxxxxxx]." This manual also shows the maximum allowable loading rate with max. vapour densities.

3.3 Inert Gas System

(The section needs to be modified/deleted by each vessel's specification)

The vessel is provided with the inert gas system and the inert gas supply main is also used as cargo vent common line. The system is capable of delivering inert gas to the cargo tanks at a rate of at least 125% of the maximum rate of discharge capacity of the vessel expressed as a volume.

The purpose of inert gas system is inerting in the cargo tanks and relevant pipe lines during loading/unloading/voyage to change from explosive atmosphere to non-explosive atmosphere. However, adding inert gas into cargo tanks, it is possible to relief the mixture of inert gas and VOC to atmosphere acting pressure/relief valve and/or PV Breaker.

The detail of inert gas system can be found in "7.4 Diagram of Inert Gas Line [dwg. No.xxxxxxx]," as attached, and "Inert Gas System Manual [dwg. No.xxxxxxx]."

3.4 Crude Oil Washing System

(The section needs to be modified/deleted by each vessel's specification)

The vessel is provided with the fixed type of crude oil washing system. The purpose of the system is to wash in the cargo tanks by crude oil using not only cleaning effect of physical spray impact but also crude oil chemical characteristics to dissolve the sludge such as waxes or asphalt in crude oil. However, cargo vapour generates as a result of the Crude Oil Washing of the cargo tanks.

The detail of crude oil washing system can be found in "7.5 Diagram of Tank Cleaning System [dwg. No.xxxxxxx]," as attached, and "Crude Oil Washing System Manual [dwg. No.xxxxxxx]."

Chapter 4 Methods for the control Volatile Organic Compound (VOC) Emissions

* The following sample is prepared for typical Crude Oil Tanker not having VOCON valve, KVOC etc. So, if the vessel has these equipments, they shall also be incorporated and described in VOC Management as appropriate.

4.1 General Characters of VOC

VOCs are a pollutant to the air and act as a precursor to the formation of Tropospheric Ozone - commonly termed Smog.
There are four criteria that impact on the extent and rate of evolution of gaseous VOC from crude oils and its subsequent release to atmosphere. These are:

1) the volatility or vapour pressure of the crude oil;
2) the temperature of the liquid and gas phases of the crude oil tank;
3) the pressure setting or control of the vapour phase within the cargo tank; and
4) the size or volume of the vapour phase within the cargo tank

4.2 Loading Control Procedures

1) Before loading, where inert gas is added for inerting in cargo tanks, the amount of inert gas added should be minimized to prevent the release of mixture gas of VOC and inert gas. The detail of the Inert gas system can be found in "Inert Gas System Manual [dwg. No.xxxxxxx]."

2) Cargo vapour (VOC) evolves during cargo loading. The quantity of this vapour depends on the loading capacity, and the vapour is emitted to atmosphere through common vent line/inert gas main and the mast riser to protect cargo tanks and their relevant pipe lines. To prevent over pressure in the cargo tanks system, the isolation valve with the mast riser is to be opened during cargo loading unless special regulations are required by Port Authorities.

3) Where VECS is available, evolved vapour from cargo oil is to be return to shore terminal using this system and reduce the vapour release to atmosphere as far as possible. The detail of VECS Operation can be found in "Vapour Emission Control System Operation Manual [dwg. No.xxxxxxx]."

4.3 Voyage Control Procedures

1) During voyage, cargo vapours may be evolved by thermal breathing in cargo tanks.

2) The setting pressure of the pressure relief system should be as high as safely possible to reduce the cargo vapour release to atmosphere (see Table 3.1), but when cargo tank pressure exceeds the setting pressure, the cargo vapour (mixture of air, inert gas and VOC) is released to atmosphere through high velocity valves

for each cargo tank vent.

3) Where the vapour release is remarkable, method of cooling for cargo tanks, such as sprinkling of water on deck, should be carried out appropriately.

4) (The section needs to be modified/deleted by each vessel's specification)
The vessel has cargo heating system. The cooler the cargo temperature the lower will be the Saturated Vapour Pressure of the crude oil but care should be taken not to allow cooling of waxy cargoes too much. The vessel's requirement of cargo heating is as follows;
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX.

4.4 Unloading Control Procedures

1) Before unloading, where inert gas is added for inerting in cargo tanks, the amount of inert gas added should be minimized to prevent the release of mixture gas of VOC and inert gas. The detail of the Inert gas system can be found in "Inert Gas System Manual [dwg. No.xxxxxxx]."

2) Where VECS is available, evolved vapour from cargo oil is to be return to shore terminal using this system and reduce the release to atmosphere as far as possible. The detail of VECS Operation can be found in "Vapour Emission Control System Operation Manual [dwg. No.xxxxxxx]."

4.5 Crude Oil Washing Control Procedures (The section needs to be modified/deleted by each vessel's specification)

1) Crude oil washing operation can be found in "Crude Oil Washing System Manual [dwg. No.xxxxxxx]."

2) When crude oil washing is carried out, 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 programme.

4.6 Emergency Control Procedures

1) Control procedure for hull structural health
The setting pressure of the pressure relief system is as high as safely possible to reduce the cargo vapour release to atmosphere. A secondary means of allowing full flow relief of vapour , air or inert gas mixtures are provided onboard to prevent over pressure or under pressure in the event of failure of the pressure relief system. Where pressure sensors are fitted alternatively, the crews are to be pay attention to this monitoring system with the alarm and take appropriate actions to prevent tank over/under pressure.

4.7 Record Keeping

1) 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.

2) The appropriate record keeping is as follows:
   - The target or minimum pressure within the tank gas/vapour system for the specific voyage
   - 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

3) The foregoing data and information may be compiled by the ship's management company or operators in order to assess or quantify the extent or degree of VOC release.

Chapter 5 Training Programme

5.1 Training Programme

A training programme is to be developed for the persons intended to assume overall charge of the VOC management on board each ship. The programme is to include the following:

1) An introduction to the purpose of VOC emission control:
   a) Volatile organic compounds (VOCs) may be toxic, and when they evaporate into the air they can react with Nitrogen Oxides (NOx) in sunlight and split apart oxygen molecules in air and thereby form ground-level ozone, commonly referred to as smog. The layer of brown haze it produces is not just an eyesore, but also is a source of serious illnesses. Ozone is extremely irritating to the airways and the lungs, causing serious damage to the delicate cells lining the airways. It contributes to decreased lung function, increased respiratory symptoms and illnesses.
   b) “Regulation 15 of MARPOL Annex VI

2) An introduction to the principles of VOC emission control:
   a) VOC generation systems in crude oil (ref. Chapter 4)
   b) Crude oil tanker pressure control/release systems (ref. Chapter 3)

3) General VOC emission control options:
   a) Methods and systems for the control of VOC emissions (ref. Chapter 3)

4) Ship specific VOC emission control options:
   a) Ship specific methods and systems for the control of VOC emissions (if any)

5) Monitoring and recording of VOC release:
   a) Methods for monitoring and recording of VOC emissions (ref. Chapter 4)

6) Hazards and Safety related to VOC emission control:
   a) The hull and its pressure limitations (ref. Chapter 3)
   b) Personnel safety hazards related to exposure to crude oil vapour.

Chapter 6 Designated Person

6.1 Qualification of Designated Person

A person should be designated to assume overall charge of the VOC management on board the ship.
The designated person should preferably have:

1) At least one year's experience on crude oil tankers where his or her duties have included all cargo handling operations relevant to VOC management. In the absence of experience with VOC management, he or she should have completed a training programme in VOC management as specified in the VOC management plan;
2) participated at least twice in cargo loading operations, Crude Oil Washing Operations and transit where VOC management procedures have been applied, one of which should 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; and
3) full knowledge of the contents of the VOC management plan.

6.2 Designated Person of the Vessel

The designated person of the vessel is as the following;

・The designated person・・・ First Officer

The designated person should notify personnel engaged in cargo handling of crude oil of matters stipulated in this plan as well as train them and may assign appropriate personnel to carry out the relevant tasks.

Chapter 7 Attached drawings (e.g.)

This Management Plan includes the following drawings.

7.1 General Arrangement [dwg. No.xxxxxxx]
7.2 Cargo and Ballast Tank Plan [dwg. No.xxxxxxx]
7.3 Diagram of Cargo Oil Line [dwg. No.xxxxxxx]
7.4 Diagram of Cargo Oil Tank Vent Line [dwg. No.xxxxxxx]
7.5 Diagram of Inert Gas Line [dwg. No.xxxxxxx]
7.6 Diagram of Tank Cleaning System [dwg. No.xxxxxxx]
7.7 Pressure/Vacuum Relief Valve [dwg. No.xxxxxxx]

Chapter 8 Reference Drawings (e.g)

The reference drawings/manuals onboard are as the following;

- Vapour Emission Control System Operation Manual [dwg. No.xxxxxxx]
- Inert Gas System Manual [dwg. No.xxxxxxx]
- Crude Oil Washing System Manual [dwg. No.xxxxxxx]