



NEWBUILDINGS
SPECIAL EQUIPMENT AND SYSTEMS – ADDITIONAL CLASS

Ballast Water Management

JULY 2010

*This chapter has been amended since the main revision (July 2010), most recently in July 2011.
See “Changes” on page 3.*

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FOREWORD

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The Rules lay down technical and procedural requirements related to obtaining and retaining a Class Certificate. It is used as a contractual document and includes both requirements and acceptance criteria.

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CHANGES

General

The present edition of the rules includes amendments and additions approved by the Executive Committee as of June 2010 and supersedes the July 2005 edition of the same chapter.

The rule changes come into force as indicated below.

This chapter is valid until superseded by a revised chapter.

Amendments July 2011

- **Sec.1 Systems and Arrangements**

— In Table C1 references to documentation type “Z030 – System arrangement plan” and “Z020 – Local arrangement plan” have been amended to read “Z030 – Arrangement plan”.

Amendments January 2011

- **Sec.1 Systems and Arrangements**

— In sub-section A104, a reference to Pt.4 Ch.1 has been replaced with an explanation.

Main changes coming into force 1 July 2010

- **General**

— The structure of this chapter has been totally revised.

— Reference to the safety requirements in machinery system rules - design principles, Pt.4 Ch.1 has been included

— Reference to the performance and safety requirements in piping system rules – ship piping systems, Pt.4 Ch.6 Sec.4 has been included.

— Update of content of the treatment requirements for the voluntary **BWM-T** class notation to bring these in line with the convention/ IMO guidelines texts.

— The **BWM-TP** notation has been deleted.

Corrections and Clarifications

In addition to the above stated rule requirements, a number of corrections and clarifications have been made in the existing rule text.

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SECTION 1 GENERAL REQUIREMENTS

A. Classification

A 100 Application

101 The rules in this chapter state requirements for vessels complying with the International Convention for the Control and Management of Ship's Ballast Water and Sediments (hereafter called the Convention) as adopted by IMO 13 February 2004. The requirements shall be regarded as supplementary to those given for the assignment of main class.

102 Where "Guidelines" are referred to in this text, these are the Guidelines referred to in the Convention.

103 The Rules apply to vessels of any type whatsoever operating in the aquatic environment. For special ship types like unmanned barges, special considerations will have to be done and other requirements may be relevant.

104 The safety and environmental requirements of this chapter, identified by being printed in *bold italics* apply to ships not covered by the class notations **Reefer**, **RM** or **RM CONTAINER** or **Tanker for Liquefied Gas**.

A 200 Class notations

201 Vessels complying with the requirements in this chapter may be given one or combinations of the additional class notations:

BWM-E () Ballast water exchange, where the letter(s) in the bracket denote the method for exchange that has been applied, see 202.

BWM-EP () Ballast water enhanced exchange-performance, where the letter(s) in the bracket denote the method for exchange that has been applied, see 202 and Sec.3 E.

BWM-T Ballast water treatment

202 The class notations **BWM-E ()** and **BWM-EP ()** are applicable to vessels complying with the Convention by means of ballast water exchange. The exchange of the ballast water could take place either by the sequential method, flow through method or the dilution method. The applied method is indicated by the letters in the bracket:

d for dilution method

s for sequential method

f for flow-through method

203 The class notation **BWM-T** is applicable to vessels complying with the Convention by means of system(s) for treatment of ballast water complying with the Guidelines for Approval of Ballast Water Management Systems (G8).

A 300 Structure

The document consists of 4 sections:

Section 1: gives the general scope of the document, background information, definitions, references and procedural requirements

Section 2: gives general requirements applicable for vessels with a **BWM** notation with one of the qualifiers – **E**, **-EP** and **-T**

Section 3: gives specific requirements for vessels complying with the Convention by means of ballast water exchange

Section 4: gives specific requirements for vessels complying with the Convention by means of ballast water treatment equipment including the mandatory safety requirements.

B. References

B 100 References

101 International Convention for the Control and Management of Ship's Ballast Water and Sediments (hereafter called the Convention) as adopted by IMO 13 February 2004 and its Guidelines.

B 200 Terminology and Definitions

201 The following definitions apply:

Sequential method: a process by which a ballast tank or hold intended for the carriage of water ballast is first emptied of at least 95% or more of its volume and then refilled with replacement ballast water.

Flow through method: a process by which replacement ballast water is pumped into a ballast tank or hold intended for the carriage of water ballast allowing water to flow through overflow or other arrangements. At least three times the tank or hold volume shall be pumped through the tank or hold.

Dilution method: a process by which replacement ballast water is filled through the top of the ballast tank or hold intended for the carriage of water ballast with simultaneous discharge from the bottom at the same flow rate and maintaining a constant level in the tank or hold. At least 3 times the tank or hold volume shall be pumped through the tank or hold.

Ballast Water: water with its suspended matter taken on board a ship to control trim, list, draught, stability or stresses of the vessel.

Administration: the government of the state under whose authority the ship is operating. With respect to a ship entitled to fly a flag of any state, the Administration is the government of that state.

Ballast Water Management System (BWMS): any system which processes ballast water such that it meets or exceeds the Ballast Water Performance Standard in Regulation D-2 in the Convention. The BWMS includes ballast water treatment equipment, all associated control equipment, monitoring equipment and sampling facilities.

Ballast Water Treatment Equipment: a mechanical, physical, chemical, or biological process, either singularly or in combination, that removes, renders harmless, or avoids the uptake or discharge of harmful aquatic organisms and pathogens within ballast water and sediments. Ballast water treatment equipment may operate at the uptake or discharge of ballast water, during the voyage, or at a combination of these events.

Control Equipment: installed equipment required to operate and control the ballast water treatment equipment.

Treatment Rated Capacity: the maximum continuous capacity expressed in cubic meters per hour for which the BWMS is type approved. It states the amount of ballast water that can be treated per unit time by the BWMS to meet the standard in regulation D-2 of the Convention.

Guidelines: the Guidelines referred to in the Convention.

C. Documentation

C 100 Documentation requirements

101 Documentation shall be submitted as required by Table C1.

Table C1 Documentation requirements				
<i>Object</i>	<i>Documentation type</i>	<i>Additional description</i>	<i>For approval (AP) or For information (FI)</i>	<i>Applicable only for the listed qualifiers</i>
Ballast water management	Z230 – Ballast water management plan		AP	-E, -EP & -T
Ballast tank sampling points	Z030 – Arrangement plan		AP	-E, -EP & -T
Tanks containing potentially hazardous liquid chemicals in the engine room	H050 – Structural drawing		AP	-T
	S010 – Piping diagram (PD)	Air pipes, sounding and drain systems from drip trays.	AP	-T
	Z030 – Arrangement plan	Drip trays.	AP	-T
	S010 – Piping diagram (PD)	Injection system of the liquid to the ballast system.	AP	-T
	S010 – Piping diagram (PD)	Filling arrangement.	AP	-T
	I200 – Control and monitoring system documentation	If the control and monitoring system is connected to the vessel's control and monitoring system.	AP	-T
	Z030 – Arrangement plan	Space where the tank is located	AP	-T
	Z110 – Data sheet	Liquid intended to be carried	FI	-T
	Z160 – Operation manual	Filling, emergency procedures etc.	FI	-T
Ballast overflow system	S010 – Piping diagram (PD)		AP	-EP
Auxiliary systems	S011 – System diagram	Handling of auxiliary systems for the treatment system like filling of chemicals, neutralization systems, etc.	AP	-T
Sensors and alarms for flammable and/or toxic gases leakage detection	Z030 – Arrangement plan	Position of the sensors and alarms for flammable and/or toxic gases leakage detection.	AP	-T
Leakage detection equipment for flammable and/or toxic gases generated during the treatment process	I070 – Instrument and equipment list		AP	-T
Compartment containing ballast water treatment system	Z030 – Arrangement plan	Accesses, emergency escapes and ventilation.	AP	-T
Documents	Z280 – Type approval certificate		FI	-T
	Z160 – Operation manual	Approved by the administration.	FI	-T

Table C1 Documentation requirements				
<i>Object</i>	<i>Documentation type</i>	<i>Additional description</i>	<i>For approval (AP) or For information (FI)</i>	<i>Applicable only for the listed qualifiers</i>
Treatment process	Z090 – Equipment list	Major and minor components of the BWMS including all design operating conditions and all operational performances of the BWMS. System description for automatic adjustment of treatment dosage (mechanical dosage or active substances) based on the water quality must be included as approved by the Administration.	FI	-T
Liquid chemicals	Z110 – Data sheet	Overview over liquid chemicals used during the treatment process.	FI	-T
Gases and residuals	Z110 – Data sheet	Overview over all treatment residuals and by-products, including gases generated.	FI	-T
Documents	Z130 – Report from test at manufacturer	Corrosion report. Only when specifically requested.	FI	-T
Function test	Z140 – Test procedure for quay and sea trial	Approved by the Administration in compliance with the G8 Guidelines Item 5.1.9.	FI	-T
Documents	Z240 – Calculation report	Scaling studies and related tests approved by the Administration if applicable for the model and type of the BWMS to be installed	FI	-T

102 For general requirements to documentation, see Pt.0 Ch.3 Sec.1.

103 For a full definition of the documentation types, see Pt.0 Ch.3 Sec.2.

104 Documentation to be kept and used onboard but not subject to approval:

— Ballast water record book.

SECTION 2 GENERAL REQUIREMENTS

A. Requirements Applicable to all Ships

A 100 Strength

101 All strength requirements applicable to the ship shall be met during the ballast water management operation. Special consideration shall be given to the following parameters, as relevant depending on the method:

- hull girder strength (bending, shear and torsion)
- sloshing in tanks
- bottom slamming
- over pressure in tanks.

A 200 Stability

201 All stability requirements applicable to the ship shall be met during the ballast water management operation.

202 Free surfaces of ballast tanks that may become slack during the ballast water management operation process shall be accounted for.

Guidance note:

It is recommended to account for the maximum free surface effect of a tank even when the tank is nearly empty or nearly full.

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A 300 Visibility, propeller immersion and forward draught

301 The visibility requirements as set forth by SOLAS Ch.V, Reg.22 shall in general be complied with during the ballast water management operation. The same applies for propeller immersion and minimum draught or trim limits.

Guidance note:

In case any of the above limits are exceeded, the guidelines included in IMO MSC/Circ. 1145 “Precautionary advice to masters when undertaking ballast water exchange operations” should be followed.

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A 400 Sampling

401 The ballast water system shall be provided with sampling facilities arranged according to the provisions of the Guidelines for ballast water sampling (G2 Guidelines) as amended.

A 500 Sediment management

501 Sediment management shall follow the recommendations given in the Guidelines to the Convention.

502 Detailed sediment management procedures shall be included in the Ballast Water Management Plan.

503 The recommendations given in Guidelines G12 “*Guidelines on Design and Construction to facilitate sediment control on ships*” shall be observed as far as practicable.

SECTION 3 BALLAST WATER EXCHANGE - CLASS NOTATION **BWM-E()** AND **BWM-EP ()**

A. Introduction

A 100 General

101 Ballast water exchange will be phased out as an acceptable method for complying with the Convention, depending on ballast water capacity and date of delivery of the vessel. Thereafter, ballast water treatment will be the only remaining option for complying with the Convention.

Guidance note:

The class notations **BWM-E ()** and **BWM-EP ()** will be withdrawn when the ballast water exchange has been phased out.

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B. Requirements

B 100 General requirements

101 The requirements given in this section shall be applied to vessels where ballast water exchange at sea is accepted as a process in lieu of treatment of ballast water.

102 Where the sequential method is adopted the sequences for both normal ballast and heavy ballast shall be included in the ballast water management plan, if applicable. The sequences shall be such that:

- i) Ballast water exchange can be performed at all filling levels of bunker tanks
- ii) In one sequence each tank shall be emptied and refilled only once

Guidance note:

For ships in operation the requirement in ii) may be especially considered.

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B 200 Valve arrangement

201 Every ballast tank and hold intended for the carriage of water ballast shall be provided with isolating valves for filling and/or emptying purposes.

202 To ensure that the movement of ballast water only takes place as required, the isolating valves for a ballast tank or hold intended for the carriage of water ballast shall be arranged so that they remain closed at all times except when ballasting, de-ballasting or ballast exchange operations are being carried out.

B 300 Sea chests and shipside openings intended for ballast water exchange

301 The relative positions of ballast water intake and discharge openings shall be such as to preclude as far as practicable the possibility of contamination of replacement ballast water by water which is being pumped out.

B 400 System arrangement

401 The design of ballast water systems shall allow for ballast water exchange operations with the minimum number of operational procedures.

402 The internal arrangements of ballast tanks as well as ballast water piping inlet and outlet arrangements shall allow for required ballast water exchange and the clearing of sediments.

B 500 Control features

501 *Remote control* - ballast pumps, and all valves to be operated during ballast water exchange shall be provided with a means of remote control from a central ballast control station.

Pump start/stop shall be included. Flow/speed control shall also be included, if part of the control system.

502 *Local control* - a means of local control shall be provided at each ballast pump operated during ballast water exchange.

503 *Secondary means of control* - a manually operated independent means of control of all valves required

for ballast water exchange shall also be provided for operation in the event of main control system failure.

504 The central ballast control station shall include the following:

- valve position indicating system
- tank level indicating system
- tank level alarm (not applicable for tanks using flow through)
- draught indicating system
- means of communication between the central ballast control station and those spaces containing the means of local control for the ballast pumps and the manually operated independent means of control for the valves.

Guidance note:

Wireless communication such as UHF portable handset is acceptable.

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C. Requirements applicable to ships using flow-through method, class notation **BWM-E (f)**

C 100 Piping and systems

101 The capability of the ballast water system to provide ballast water exchange by the flow-through method without the risk of the tank being subject to a pressure greater than that for which it has been designed shall be demonstrated by water flow calculations or by testing on board. See Pt.4 Ch.6 Sec.4 K201.

102 The flow-through method with water flowing over the deck is not permitted for ships with class notations referred to in Pt.5 Ch.1 Sec.3 to Sec.6 and Ch.1 Sec.5.

Guidance note:

The use of collecting pipes, internal overflow pipes or interconnecting pipe/trunk arrangements between tanks may be used to avoid water flowing over the deck.

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D. Requirements applicable to ships using dilution method, class notation **BWM-E (d)**

D 100 Piping and systems

101 Level monitoring system shall be provided where maintaining a constant level in a tank is essential to the safety of the ship during ballast water exchange.

E. Additional requirements for Class Notation **BWM-EP ()**

E 100 General

101 On ships classed for navigation in ice according to Pt.5 Ch.1 Sec.3 and Sec.6, ship side ballast discharge valves placed above the assigned lightest load line shall be arranged with adequate heating arrangements

102 For class notation **BWM-EP (s)** for sequential method, the capacity of each ballast pump is, in general, to be capable of providing ballast water exchange of the largest dedicated ballast water tank or group of tanks that are undergoing simultaneous exchange (whichever is the greater volume), as per the approved BWM plan, within three hours.

Guidance note:

In special cases with large ballast water tanks/spaces the duration may be considered from case to case taking into account the duration of the ballast water exchange process, provided the whole ballast water exchange process is shorter than 24 hours.

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Cargo holds used for the carriage of water ballast will require an extended period of time and is normally to be completed within twenty four hours by one pump.

103 The flow-through method with water flowing over the deck is not permitted for ships with class notation **BWM-EP (f)**.

Guidance note:

The use of collecting pipes, internal overflow pipes or interconnecting pipe/trunk arrangements between tanks may

be used to avoid water flowing over the deck.

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104 For class notation **BWM-EP (d)** for dilution method, arrangements shall be made to automatically maintaining the ballast water level in the tanks at a constant level. These arrangements shall include the provision of a manual emergency stop for any operating ballast pump, in case of valve malfunction or incorrect control actions.

SECTION 4 TREATMENT SYSTEMS - CLASS NOTATION BWM-T

A. Introduction

A 100 General

101 The Ballast Water Management System shall comply with the performance standard as set forth by Regulation D-2 of the Convention.

102 The treatment system installed onboard shall be approved in accordance with Guidelines for Approval of Ballast Water Management Systems (G8 Guidelines).

103 The requirements in C500 are applicable to liquid chemicals storage tanks stowed in the engine room.

B. Pumping and Piping System for ballast

B 100 Ballast treatment capacities

101 Except as permitted in 105, the treatment system's capacity shall at least meet the design pump capacity of one ballast pump.

102 For pumping systems using centrifugal ballast pumps without the possibility of flow control, the initial flow rate through the ballast pump may exceed the design flow rate. The treatment system must still be able to treat the ballast water according to the type approval given until the flow settles to the maximum continuous flow rate.

Guidance note:

The following measures are acceptable to be in compliance with 102:

- Automatic flow control valves where the maximum allowable flow rate is the Treatment Rated Capacity (TRC).
- Confirmation from the Manufacturer and the Administration that the treatment system has proven its ability to treat water at a flow rate higher than the TRC for a certain period of time. In such a case, a warning shall be given and logged in the system. The warning shall turn into an alarm if the high flow rate above the TRC continues for a longer period of time. 10 minutes is considered as a maximum acceptable period of time.

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103 In cases where the treatment system's capacity is designed for one ballast pump, the Ballast Water Management Plan shall include specific instructions stating that using more than one ballast pump is not allowed.

104 When treatment systems are duplicated to meet a specific ballast pumping capacity, the division of the flow between the different treatment units must be done in such a way that the flow rate of ballast water through each unit is within the treatment system's range given in the Type Approval Certificate.

105 Alternative means of ballast water treatment where water is circulated in the ship for treatment are in principle acceptable. The treatment system's capacity is then allowed to be lower than the maximum capacity of one ballast pump, but shall meet the maximum pump capacity of the circulation pump.

106 For systems employing the method described in 105, detailed instructions shall be included in the Ballast Water Management Plan on the operation of the system.

107 Systems employing the method described in 105 will be considered on a case by case basis. Among others, requirements for the control of valves, treatment sequence, stability and strength of the ship will be considered.

B 200 Ballast piping system

201 The requirements in B200 do not apply to ballast water operations to which the Convention does not apply.

202 Any bypass of the treatment system shall activate an alarm, and the bypass event shall be recorded by the control equipment of the treatment system.

203 Gravity flow is only allowed when discharging treated ballast water whereby the treatment system needs only to be functional during the uptake of ballast water.

204 In case of any failure compromising the proper operation of the treatment system, audible and visual alarm signals shall be given in all stations from which ballast water operations are controlled.

205 The requirement in 202 does not apply for internal transfer of ballast water within the ship (e.g. anti-

heeling operations). However, the recording in 202 shall identify such internal transfer operations.

206 All pumps connected to tanks or compartments designed for carriage of ballast water must be arranged for pumping the water to the treatment system.

207 Means to discharge remaining untreated ballast water in the pipeline between the sea chest and the treatment system must be provided. Detailed instructions on how this discharge is done shall be included in the Ballast Water Management Plan.

208 Ships with treatment systems where compliance with the D-2 standard of the Convention requires treatment during ballasting and de-ballasting, must be provided with means to efficiently drain the ballast tanks such that remaining untreated water in the ballast tanks cannot be a contamination source.

B 300 Instrumentation and Automation

301 For instrumentation and automation, including computer based control and monitoring, the requirements in this chapter are additional to those given in Pt.4 Ch.9.

302 The electric and electronic sections of the treatment system shall comply with the environmental tests required by the G8 Guidelines and DNV Rules Pt.4 Ch.9.

303 Arrangements of electrical installations in hazardous areas shall comply with Pt.4 Ch.8 Sec.11 based on area classification as specified in C306.

B 400 Systems with combined ballast and cargo piping, pumping and tanks

401 The requirements in 204 apply to combined cargo and ballast systems (e.g. offshore supply vessels)

402 Provisions to thoroughly clean the tanks from cargo and flushing the common pipelines before ballasting/de-ballasting shall be included in the Ballast Water Management plan.

C. Ballast Water Treatment Systems

C 100 General

101 All parts of the treatment system shall be easily accessible for inspection and overhauling. Sufficient space for cleaning and replacing components of the treatment system shall be available.

102 The requirements in C300 and C403 are applicable to treatment systems using gases and/or liquid chemicals representing flammable, explosive or significant toxic hazards.

Guidance note:

The IBC Code and published data shall be used to determine the toxicity of gases and chemicals.

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103 Installation testing and verification of the BWMS shall be carried out in accordance with the G8 Guidelines Item 8 "Installation Survey and Commissioning Procedures".

C 200 Location of ballast water treatment systems

201 Treatment systems for ballast water from ballast tanks adjacent to cargo tanks containing liquid oil or chemicals with flash point not exceeding 60°C shall be located within a separate compartment complying with the requirements of 301.

202 Treatment systems for ballast water from ballast tanks not adjacent to cargo tanks containing liquid oil or chemicals with flash point not exceeding 60°C can be placed in the engine room if complying with 302 and 406.

C 300 Arrangement of compartments for ballast water treatment systems

301 Except as permitted in 302 and 406, the complete treatment system shall be located within a separate compartment surrounded by steel decks and bulkheads and fitted with self-closing doors opening outwards and with a sill height of at least 300 mm.

Decks and bulkheads shall be without openings and pipe and cable penetrations etc. shall be sufficiently tight to prevent leaked gas and liquid from entering other rooms and spaces. Special glands of approved type need not be used.

The treatment system compartment is subject to approval with regard to its location and arrangement within the ship and with regard to accesses and emergency escapes.

Except for small treatment system compartments, at least two access doors shall be provided.

302 For treatment systems where separate components are used for storage or generation of gases and liquid

chemicals, the requirements for separate compartment in 301 are only applicable for the separate components.

303 The ventilation system for the treatment room shall be separated from other ventilation systems, shall be of the exhaust type and to give minimum 30 air changes per hour. If the gases stored, generated or evaporated from liquid state are heavier than air the ventilation exhaust shall be from the bottom of the treatment room.

304 All ventilation outlets from the treatment room shall be at safe locations with regard to:

- the hazards of possibly leaked gases in the ventilation air
- intake of ventilation air into other ventilation systems on the ship
- recycling between the ventilation outlets and intakes for the treatment room.

305 The ventilation shall be arranged such that a single failure cannot cause a complete ventilation failure for the treatment room.

306 Thin-plate ventilation ducts for other spaces shall not be lead through the treatment room.

307 The ventilation system for compartments generating or storing liquid chemicals and/or gases that represent explosion hazards shall follow the requirements of DNV Rules Pt.5 Ch.4 Sec.10 B300 for ventilation of hazardous spaces.

308 When containing liquid chemicals or gases with flash point not exceeding 60°C, or acids where the IBC Code requires compliance with Chapter 15.11.5; the treatment compartment shall be considered as a hazardous area zone 1 as defined in IEC Standard 60092-502.

C 400 Handling and storage of gases and chemicals used to treat ballast water

401 The provisions of BWB.2/Circ.20 “Guidance to ensure safe handling and storage of chemicals and preparations used to treat ballast water and the development of safety procedures for risks to the ship and crew resulting from the treatment process” shall be observed.

402 The requirements for handling of liquid chemicals given in the IBC Code and gases given in the IGC Code, if applicable, shall be used as guidelines.

403 Suitable gas masks and hermetically sealed filters shall be available in a glass door case located immediately outside each entrance to the space where the treatment system is located.

Additionally at least two sets of suitable protective clothing including also gloves and boots shall be available onboard and located in the vicinity of the space for the treatment system.

In case substantial amount of liquid chemicals or gas is stored or generated, then the two sets of protective clothing shall be gas tight suits with permanently attached boots and gloves and suitable for use in combination with the air breathing apparatuses.

404 Storage spaces dedicated for single components generating small amounts of flammable liquid chemicals or explosive gases shall be regarded as hazardous area zone 1 and shall be gas tight when installed in a gas safe area.

405 Safety, spillage and fire fighting measures will be considered on a case by case basis depending on the products used.

406 Treatment equipment, or components generating or storing liquid chemicals or gases may be located outside a dedicated treatment room if the following is met:

- The equipment or components are installed within normally manned spaces such as the engine room.
- The piping shall not be located within the crew accommodation spaces, the navigating bridge or such that all accesses to the main engine room will be blocked in case of pipe rupture.
- Gas masks as referred to in 403 are additionally required to be located outside all normal accesses to such spaces.
- The manufacturer can demonstrate that the amount of liquid chemicals or gases generated are far below the normally recognized thresholds for toxic, flammable, explosion or suffocating hazards.
- For single components installed in dedicated storage spaces in the engine room, safety measures, alarms, sensors and ventilation requirements must be approved on a case by case basis.
- Material of piping and joining details accepted for the liquid chemicals or gases used must be in compliance with DNV Rules Pt.4 Ch.6 or in accordance with a recognized standard acceptable to the Society when not available in DNV Rules.

C 500 Liquid chemicals storage tanks stowed in the engine room

501 Liquid products with flash point not exceeding 60°C are not allowed to be stowed in the engine room or any other gas safe area.

502 The tank must be located in a well ventilated space in the engine room.

503 Access for inspection and filling of the tank must be easy and acceptable to the Society.

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- 504** The construction of the tanks must be approved by the Society.
- 505** The material of the tank must be suitable to the liquid chemicals intended to be used.
- 506** Air pipes serving the tank must be led to open deck.
- 507** The tank must be equipped with a high level alarm in compliance with Pt.5 Ch.4 Sec.13 B202; however the device can be combined with a gauging device.
- 508** Drip trays must be arranged below the tank, tank connections, flanges and pumps serving the tank. An efficient drain system from the drip tray must be arranged.
- 509** A manual describing filling procedures, alarms, emergency procedures etc. including an MSDS sheet of the liquid stored shall be available onboard.
- 510** Signs on the tank stating the content of the tank and simple and essential safety measures shall be available.
- 511** At least two sets of suitable protective clothing must be available in a locker well marked close to the location of the tank. This equipment need not be in addition to the equipment required in 403.