

ANNEX 4
Resolution MEPC.20(22)
ADOPTION OF THE STANDARDS FOR PROCEDURES AND ARRANGEMENTS FOR
THE DISCHARGE OF NOXIOUS LIQUID SUBSTANCES
adopted on 5 December 1985

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THE DISCHARGE OF NOXIOUS LIQUID SUBSTANCES

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THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38 of the Convention on the International Maritime
Organization concerning the functions of the Committee,

NOTING resolution MEPC 16(22) by which it adopted amendments to the Annex
of the Protocol of 1978 relating to the International Convention for the
Prevention of Pollution from Ships, 1973 (the 1978 Protocol) which introduced,
inter alia, the concepts of efficient stripping of cargo tanks and mandatory
prewash of unloaded tanks for certain noxious liquid substances, under
Annex II of the International Convention for the Prevention of Pollution from
Ships, 1973, as modified by the 1978 Protocol (MARPOL 73/78)

NOTING ALSO that Regulations 5, 5A and 8 of Annex II of MARPOL 73/78, as
amended, call upon the Organization to develop standards for procedures and
arrangements for the discharge of noxious substances into the sea, for
procedures for assessing the residues in cargo tanks and associated pipings
and for procedures for the removal of cargo residues from tanks by prewashing
or ventilating such tanks, with a view to providing a uniform basis for the
guidance of Parties to the 1978 Protocol in approving such procedures and
arrangements,

NOTING FURTHER resolution A.544(13) by which the Assembly adopted the
Standards for Procedures and Arrangements called for by Annex II of
MARPOL 73/78 and requested the Committee to keep the Standards under review in
the light of the experience gained from trial application of them and other
developments,

HAVING CONSIDERED the revision of the Standards for Procedures and Arrangements called for by Annex II of MARPOL 73/78 to bring them in line with the above-mentioned amendments,

1. ADOPTS the Standards for Procedures and Arrangements for the Discharge of Noxious Liquid Substances (called for by Annex II of MARPOL 73/78), the text of which is given in the Annex to the present resolution to supersede the Standards annexed to resolution A.544(13);
2. REQUESTS the Secretary-General to transmit a copy of the present resolution, together with the text of the Standards, to all Members of the Organization and to all Parties to the 1978 Protocol which are not Members of the Organization.

ANNEX

STANDARDS FOR PROCEDURES AND ARRANGEMENTS FOR THE DISCHARGE OF NOXIOUS LIQUID SUBSTANCES (called for by Annex II of MARPOL 73/78, as amended)

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Preamble

- (1) Annex II of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78) and as further amended by the Organization (hereafter referred to as Annex II) inter alia provides for the control of operational discharges of noxious liquid substances carried in bulk by ships. Operational discharges in this context mean the discharges of noxious liquid substances or water contaminated by these substances which are the result of cargo tank and line washing, deballasting of unwashed cargo tanks or cargo pump room bilge slops.
- (2) Annex II prohibits the discharge into the sea of noxious liquid substances except when the discharge is made under specified conditions. These conditions vary according to the degree of hazard a noxious liquid substance poses to the marine environment. For this purpose the noxious liquid substances have been divided into four categories, A,B,C and D.
- (3) Regulation 5 of Annex II specifies the conditions under which discharge of residues of categories A,B,C and D substances may take place. These conditions, which are not reproduced in this document, include such parameters as: the maximum quantity which may be discharged into the sea, speed of ship, distance from nearest land, depth of water, maximum concentration of substance in ship's wake or dilution of substance prior to discharge.
- (4) For certain sea areas, referred to as "Special Areas", more stringent discharge criteria apply.
- (5) The standards for procedures and arrangements called for by Annex II (hereafter referred to as the Standards) have been developed in response to resolution 13 of the International Conference on Marine Pollution, 1973, and in compliance with regulations 5, 5A and 8 of Annex II. The Standards provide a uniform basis for the guidance of the Parties to MARPOL 73/78 in approving procedures and arrangements for the discharge of noxious liquid substances of a specific ship.

(6) The Standards will take effect on 6 April 1987, the date of implementation of Annex II, and apply to all ships which carry noxious liquid substances in bulk.

(7) The Annex II requirements are not restated in the Standards. To ensure compliance with Annex II, the requirements of Annex II and those contained in the Standards should be considered together.

(8) Annex II discharge requirements and certification requirements have been interpreted as requiring each ship to have a Procedures and Arrangements Manual approved by the Administration. The Manual should contain the information specified in the Standards and the requirements of Annex II. Compliance with the procedures and arrangements set out in a ship's Manual will ensure that the discharge requirements of Annex II are met.

(9) Regulation 5A of Annex II requires that the efficiency of the cargo pumping system of a tank certified fit to carry category B or C substances be tested in accordance with Standards developed by the Organization. The test procedure is set out in the Standards. The pump stripping efficiency determined by the test will be assumed to be the stripping efficiency achieved when unloading the tank in accordance with the specified procedures.

(10) The presence of a "sheen" resulting after discharges of some Category B, C and D substances should not be regarded as contrary to the principles of Annex II, provided that the discharges have been made in accordance with the Standards.

(11) Throughout the Standards the word "discharge" is used to refer to the discharge of residues or residue/water mixtures either into the sea or to reception facilities, whilst the word "unloading" is used to refer to the unloading of cargo to receivers, terminals or ports.

Chapter 1 - Introductory

1.1 Purpose

The purpose of the Standards is to provide a uniform international basis for approving procedures and arrangements by which ships carrying noxious liquid substances in bulk can satisfy the discharge provisions of Annex II. It is on the basis of these Standards that the Administration should approve the procedures and arrangements necessary for the issue of an "International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk" or a "Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk" or an "International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk" to each such ship. For that purpose the procedures and arrangements for each ship are to be laid out in an approved Procedures and Arrangements Manual (hereinafter called the "Manual") for use on board the ship. It is not intended that these Standards be used by the ship's crew.

1.2 Scope

1.2.1 These Standards apply to all ships which carry category A,B,C or D noxious liquid substances in bulk, including those provisionally assessed as such.

1.2.2 The Standards have been developed to ensure that the criteria for discharge of noxious liquid substances specified in regulations 5 and 8 will be met. For category A substances, the Standards identify a prewash procedure which may be used in lieu of measuring the concentration of the effluent from a tank from which tank washings containing a category A substance are discharged. For category B and C substances, the Standards identify procedures and arrangements which will ensure that the maximum quantity of residue that may be discharged per tank and the maximum permitted concentration of the substance in the ship's wake are not exceeded. For category B and C substances, the Standards identify procedures and arrangements for assessing compliance with regulation 5A. For category A,B,C and D substances, the Standards identify ventilation procedures which may be used to remove residues from cargo tanks. The prewash procedures contained in appendix B to the Standards also enable Administrations to approve the prewash procedure referred to in regulation 5A(6)(b)(i).

1.2.3 The Standards do not cover the means by which the Administration ensures compliance with a ship's approved procedures and arrangements, and neither do they cover details of any constructions or materials used.

1.2.4 Regulation 13 requires, inter alia, chemical tankers carrying category A, B or C noxious liquid substances to comply with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* (hereinafter referred to as the "IBC Code") or the "Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk"* (hereinafter referred to as "the BCH Code") as may be amended. All constructions, materials and equipment fitted as a requirement of Annex II and of the Standards shall therefore comply with the IBC or BCH Code for all substances of categories A, B or C the chemical tanker is certified fit to carry in accordance with its Certificate of Fitness under that Code.

1.3 Definitions

1.3.1 "New Ship" means a ship constructed on or after 1 July 1986.

1.3.2 "Existing Ship" means a ship that is not a new ship.

1.3.3 "Residue" means any noxious liquid substance which remains for disposal.

1.3.4 "Residue/water mixture" means residue to which water has been added for any purpose (e.g. tank cleaning, ballasting, bilge slops).

1.3.5 "Miscible" means soluble with water in all proportions at washwater temperatures.

1.3.6 "Associated piping" means the pipeline from the suction point in a cargo tank to the shore connection used for unloading the cargo and includes all ship's piping, pumps and filters which are in open connection with the cargo unloading line.

* The IBC and BCH Codes extended to cover marine pollution aspects were adopted by the Marine Environment Protection Committee (MEPC) of the Organization by resolution MEPC 19(22) and MEPC 20(22) respectively on 5 December 1985.

1.3.7 "Solidifying substance" means a noxious liquid substance which:

- .1 in the case of substances with melting points less than 15°C, is at a temperature, at the time of unloading, of less than 5°C above its melting point; or
- .2 in the case of substances with melting points equal to or greater than 15°C, is at a temperature, at the time of unloading, of less than 10°C above its melting point.

1.3.8 "Non-solidifying substance" means a noxious liquid substance which is not a solidifying substance.

1.3.9 "High viscosity substance" means:

- .1 in the case of category B substances and in the case of category C substances within Special Areas, a substance with a viscosity equal to or greater than 25 mPa.s at the unloading temperature; and
- .2 in the case of category C substances outside Special Areas, a substance with a viscosity equal to or greater than 60 mPa.s at the unloading temperature.

1.3.10 "Low viscosity substance" means a noxious liquid substance which is not a high viscosity substance.

1.3.11 "Regulation" means a regulation of Annex II to MARPOL 73/78.

1.4 Equivalents

The equivalent provisions in regulation 2(5) and (6) are also applicable to the Standards.

1.5 Certification

1.5.1 Before issuing the appropriate Certificate referred to in paragraph 1.1, the Administration should examine, and, if satisfied, approve:

- .1 the Manual for compliance with Annex II and the Standards;
- .2 the equipment and arrangements provided for compliance with the Standards.

1.5.2 Reference to the approved Manual should be made by the Administration in the appropriate Certificate issued to the ship.

1.6 Responsibilities of the master

The master must ensure that no discharges into the sea of cargo residues or residue/water mixtures containing category A, B, C or D substances shall take place, unless such discharges are made in full compliance with the operational procedures contained in the Manual and that the arrangements required by the Manual and needed for such discharges are used.

1.7 Safety considerations

1.7.1 The Standards are concerned with the marine environmental aspects of the cleaning of cargo tanks which have contained noxious liquid substances, and the discharge of residues and residue/water mixtures from these operations. Certain of these operations are potentially hazardous but no attempt is made in the Standards to lay down safety standards covering all aspects of these operations. For a description of potential hazards reference should be made to the IBC or BCH Codes and other documents as developed and published by the relevant associations or organizations, e.g. the Tanker Safety Guide (Chemicals) of the International Chamber of Shipping (ICS). Some potential safety hazards are mentioned below.

1.7.2 Compatibility

In mixing residue/water mixtures containing different substances, compatibility should be carefully considered.

1.7.3 Electrostatic hazards

The hazards associated with the generation of electrostatic charges during the cargo tank washing should be carefully considered.

1.7.4 Tank entry hazards

The safety of persons required to enter cargo tanks or slop tanks for any purpose should be carefully considered.

1.7.5 Reactivity hazards

The water washing of cargo tanks and slop tanks containing residues of certain substances may produce dangerous reactions and should be carefully considered.

1.7.6 Ventilation hazards

The hazards associated with tank ventilation identified in the ICS Tanker Safety Guide (Chemicals) should be carefully considered.

1.7.7 Line clearing hazards

The hazards associated with line clearing identified in the ICS Tanker Safety Guide (Chemicals) should be carefully considered.

1.8 Cleaning agents or additives

1.8.1 When a cleaning agent (i.e. a solvent used instead of water or a solvent mixed with water) that is a harmful substance as defined by either Annex I or Annex II of MARPOL 73/78 is used to wash a tank having contained a noxious liquid substance, the discharge of this cleaning agent must be governed by the restrictions of Annex I or Annex II that would apply as if this cleaning agent had been carried as cargo.

1.8.2 When small amounts of cleaning additives (i.e. detergents) are added to water in order to facilitate tank washing, no restrictions additional to those applicable to the tank due to the previous cargo should apply.

Chapter 2 - Preparation of the Procedures and Arrangements Manual

2.1 Each ship which carries noxious liquid substances in bulk should be provided with a Manual as described in this chapter.

2.2 The main purpose of the Manual is to identify for the ship's officers the physical arrangements and all the operational procedures with respect to cargo handling, tank cleaning, slops handling, and cargo tank ballasting and deballasting which must be followed in order to comply with the requirements of Annex II.

2.3 The Manual should be based on the Standards. It should cover all noxious liquid substances which the ship is certified fit to carry.

2.4 The Manual should as a minimum contain the following information and operational instructions:

- .1 a description of the main features of Annex II, including discharge requirements;
- .2 a table of noxious liquid substances which the ship is certified fit to carry and which specifies information on these substances as detailed in appendix D;
- .3 a description of the tanks carrying noxious liquid substances; and a table identifying in which cargo tanks each noxious liquid substance may be carried;
- .4 a description of all arrangements and equipment including cargo heating and temperature control system, which are on board the ship and for which requirements are contained in chapters 3 or 8 including a list of all tanks that may be used as slop tanks, a description of the discharge arrangements, a schematic drawing of the cargo pumping and stripping systems showing the respective position of pumps and control equipment and identification of means for ensuring that the equipment is operating properly (check lists);

- .5 details of the procedures set out in the Standards as applied to the individual ship which should, where appropriate, include instructions such as:
 - .5.1 methods of stripping cargo tanks and under what restrictions, such as minimum list and trim, the stripping system should be operated;
 - .5.2 methods of draining cargo pumps, cargo lines and stripping lines;
 - .5.3 cargo tank prewash programmes;
 - .5.4 procedures for cargo tank ballasting and deballasting;
 - .5.5 procedures for discharge of residue/water mixtures; and
 - .5.6 procedures to be followed when a cargo tank cannot be unloaded in accordance with the required procedure;
- .6 for existing ships operating under the provisions of regulation 5A(2)(b) or 5A(4)(b) a residue table developed in accordance with appendix A, which indicate for each tank in which category B or C substances are to be carried, the quantities of residue which will remain in the tank and associated piping system after unloading and stripping;
- .7 a table which indicates the quantities measured as a result of carrying out the water test performed for assessing the "stripping quantity" referred to in paragraph 1.2.1 of appendix A; and
- .8 the responsibility of the Master in respect of operational procedures to be followed and the use of the arrangements. The Master must ensure that no residues or residue/water mixtures are discharged into the sea, unless the arrangements listed in the Manual and needed for the discharge are used.

2.5 In the case of a ship engaged in international voyages, the Manual should be produced in the standard format as outlined in the attached appendix D. If the language used is neither English nor French, the text should include a translation into one of these languages.

2.6 The Administration may approve a Manual containing only those parts applicable to the substances, the ship is certified fit to carry.

2.7 For a ship referred to in regulation 5A(6) or 5A(7), the format and the content of the Manual should be to the satisfaction of the Administration.

2.8 For a ship carrying only category D substances, the format and the content of the Manual should be to the satisfaction of the Administration.

Chapter 3 - Equipment and Constructional Standards for New Ships

3.1 General

3.1.1 This chapter contains the standards for the equipment and constructional features enabling a new ship to comply with the residue discharge requirements of Annex II.

3.1.2 The equipment requirements in this chapter should be read in conjunction with the operating requirements in chapters 4, 5, 6 and 7 in order to determine what equipment is needed on the ship.

3.2 Carriage requirements

A category B substance with a melting point equal to or greater than 15°C should not be carried in a cargo tank any boundary of which is formed by the ship's shell plating and should only be carried in a cargo tank fitted with a cargo heating system.

3.3 Cargo unloading system

3.3.1 The cargo unloading system for category B and C substances should be capable of unloading the cargo to the residue quantities not in excess of the quantities specified in regulations 5 and 5A. The performance test required by regulation 5A(5) should be carried out in accordance with appendix A.

3.4 Underwater discharge outlet location

The underwater discharge outlet (or outlets) should be located within the cargo area in the vicinity of the turn of the bilge and should be so arranged as to avoid the re-intake of residue/water mixtures by the ship's sea water intakes.

3.5 Underwater discharge outlet size

3.5.1 The underwater discharge outlet arrangement should be such that the residue/water mixture discharged into the sea in accordance with the Standards will not pass through the ship's boundary layer. To this end, when

the discharge is made normal to the ship's shell plating, the minimum diameter of the discharge outlet is governed by the following equation:

$$D = \frac{Q_D}{5L}$$

where D = minimum diameter of the discharge outlet, m

L = distance from the forward perpendicular to
the discharge outlet, m

Q_D = the maximum rate selected at which the ship may
discharge a residue/water mixture through the outlet, m³/h.

3.5.2 When the discharge is directed at an angle to the ship's shell plating, the above relationship should be modified by substituting for Q_D the component of Q_D , which is normal to the ship's shell plating.

3.6 Slop tanks

Although Annex II does not require the fitting of dedicated slop tanks, slop tanks may be needed for certain washing procedures. Cargo tanks may be used as slop tanks.

3.7 Ventilation equipment

If residues from cargo tanks are removed by means of ventilation, ventilation equipment meeting the requirements of appendix C should be provided.

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Chapter 4 - Operational Standards For New Ships Carrying Category A Substances

4.1 General

This chapter applies to any new ship certified fit to carry category A substances.

4.2 Prewash of category A substances from cargo tanks

4.2.1 Annex II requires that when a cargo tank that has contained a category A substance is washed, the resulting residue/water mixtures be discharged to a reception facility until the concentration of the substance in the effluent is at or below a specified value and until the tank is empty. Where it is found to be impracticable to measure the concentration of the substance in the effluent, a prewash procedure in accordance with appendix B should be applied in conformity with regulation 8(4) .

4.2.2 The residue/water mixture generated during the prewash should be discharged to a reception facility in accordance with regulation 8.

4.2.3 Any water subsequently introduced into the cargo tank may be discharged into the sea in accordance with the requirements of regulation 5(1) or regulation 5(7) in respect of the ship's position, speed and discharge outlet location.

4.3 Ventilation of category A substances from cargo tanks

4.3.1 Ventilation procedures may be applied only to those substances having a vapour pressure greater than 5×10^3 Pa at 20°C.

4.3.2 The ventilation procedures set out in appendix C should be followed when a tank is to be ventilated.

4.3.3 In ventilating a tank the associated piping of the tank should be cleared of liquid and the tank should be ventilated until no visible remains of liquid can be observed in the tank. When direct observation is impossible or impracticable, means for detection of liquid remains should be provided.

4.3.4 When the cargo tank has been ventilated dry in accordance with the Standards, any water subsequently introduced into the cargo tank for ballasting or for preparing the tank to receive the next cargo should be regarded as clean and should not be subject to the discharge requirements of Annex II.

Chapter 5 - Operational Standards for New Ships Carrying Category B Substances

5.1 General

5.1.1 This chapter applies to any new ship certified fit to carry category B substances.

5.1.2 If a cargo tank is to be washed or ballasted and some or all of the residue left in the tank is to be discharged into the sea, the requirements of sections 5.2 to 5.7 apply.

5.1.3 If the requirements of this chapter under which discharges into the sea of residues and residue/water mixtures containing category B substances are allowed cannot be met, no such discharges may be made.

5.2 Pumping and stripping

In unloading a cargo tank containing a category B substance, the tank and its associated piping should be emptied to the maximum extent practicable by maintaining a positive flow of cargo to the tank's suction point and using the stripping procedure set out in the Manual.

5.3 Tank washing and residue discharge procedures outside Special Areas

5.3.1 High viscosity or solidifying substances

- .1 A prewash procedure as specified in appendix B should be applied;
- .2 the residue/water mixture generated during the prewash should be discharged to a reception facility in accordance with regulation 8; and
- .3 any water subsequently introduced into the cargo tank may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 3.5 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(2) in respect of ship's position, speed, and discharge outlet location.

5.3.2 Low viscosity, non-solidifying substances

- .1 Any water introduced into the cargo tank may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 3.5 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(2) in respect of ship's position, speed and discharge outlet location.

5.4 Tank washing and residue discharge procedures within Special Areas

- 5.4.1 A prewash procedure as specified in appendix B should be applied.

5.4.2 The residue/water mixture generated during the prewash should be discharged to a reception facility in accordance with regulation 8.

5.4.3 Any water subsequently introduced into the cargo tank may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 3.5 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(8) in respect of ship's position, speed and discharge outlet location.

5.4.4 Notwithstanding the provisions of paragraphs 5.4.1 to 5.4.3, residues or residue/water mixtures containing only low viscosity, non-solidifying substances may be retained on board and discharged into the sea outside Special Areas in accordance with the provisions of paragraph 5.3.2 or 5.5.2.

5.5 Discharges from a slop tank

- 5.5.1 Residue/water mixtures in a slop tank should not be discharged into the sea within Special Areas.

5.5.2 Residue/water mixtures in a slop tank which contain only low viscosity, non-solidifying substances may be discharged into the sea outside Special Areas at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 3.5 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(2) in respect of ship's position, speed and discharge outlet location.

5.5.3 Residue/water mixtures in a slop tank which contain high viscosity or solidifying substances, retained on board in accordance with regulation 8, should be discharged to a reception facility.

5.6 Ventilation of category B substances from cargo tanks

When ventilation procedures are used to remove residue from cargo tanks, the requirements set out at section 4.3 apply.

5.7 Ballasting and deballasting

5.7.1 After unloading, and, if required, carrying out a prewash, a cargo tank may be ballasted. Procedures for the discharge of such ballast are set out in sections 5.3 and 5.4.

5.7.2 Ballast introduced into a cargo tank which has been washed to such an extent that the ballast contains less than 1 ppm of the substance previously carried, may be discharged into the sea without regard to the discharge rate, ship's speed and discharge outlet location, provided that the ship is not less than 12 miles from land and in water that is not less than 25 metres deep. It is assumed this degree of cleanliness has been achieved when a prewash as specified in appendix B has been carried out and the tank has been subsequently washed with a complete cycle of the cleaning machine.

Chapter 6 - Operational Standards for New Ships Carrying Category C Substances

6.1 General

6.1.1 This chapter applies to any new ship certified fit to carry category C substances.

6.1.2 If a cargo tank is to be washed or ballasted and some or all of the residue left in the tank is to be discharged into the sea, the requirements of sections 6.2 to 6.7 apply.

6.1.3 If the requirements of this chapter under which discharges into the sea of residues and residue/water mixtures containing category C substances are allowed cannot be met, no such discharges may be made.

6.2 Pumping and stripping

In unloading a cargo tank containing a category C substance, the tank and its associated piping should be emptied to the maximum extent practicable by maintaining a positive flow of cargo to the tank's suction point and using the stripping procedure set out in the Manual.

6.3 Tank washing and residue discharge procedures outside Special Areas

6.3.1 High viscosity or solidifying substances

- .1 A prewash procedure as specified in appendix B should be applied;
- .2 the residue/water mixture generated during the prewash should be discharged to a reception facility in accordance with regulation 8; and
- .3 any water subsequently introduced into the cargo tank may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 3.5 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(3) in respect of ship's position, speed and discharge outlet location.

6.3.2 Low viscosity, non-solidifying substances

- .1 Any water introduced into the cargo tank may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 3.5 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(3) in respect of ship's position, speed and discharge outlet location.

6.4 Tank washing and residue discharge procedures within Special Areas

6.4.1 High viscosity* or solidifying substances

- .1 A prewash procedure as specified in appendix B should be applied;
- .2 the residue/water mixture generated during the prewash should be discharged to a reception facility in accordance with regulation 8;
- .3 any water subsequently introduced into the cargo tank may be discharged into the sea at a rate not exceeding the maximum rate for which underwater discharge outlet(s) referred to in section 3.5 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(9) in respect of ship's position, speed and discharge outlet location; and
- .4 notwithstanding the provisions of paragraphs 6.4.1.1 to 6.4.1.3, residue/water mixtures containing non-solidifying substances with a viscosity less than 60 mPa.s at the unloading temperature may be retained on board and discharged into the sea outside Special Areas in accordance with the provisions of paragraph 6.3.2.

* i.e. a substance with a viscosity equal to or greater than 25m unloading temperature. See definition of a high viscosity category substance discharged within Special Areas.

6.4.2 Low viscosity*, non-solidifying substances

- .1 Any water introduced into the cargo tank may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 3.5 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(9) in respect of ship's position, speed and discharge outlet location.

6.5 Discharges from a slop tank

6.5.1 Residue/water mixtures in a slop tank which contains only low viscosity**, non-solidifying substances may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 3.5 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulations 5(3) and 5(9) in respect of ship's position, speed and discharge outlet location.

6.5.2 Residue/water mixtures in a slop tank which contains high viscosity or solidifying substances, retained on board in accordance with regulation 8, should be discharged to a reception facility.

6.6 Ventilation of category C substances from cargo tanks

When ventilation procedures are used to remove residue from cargo tanks, the requirements set out at section 4.3 apply.

6.7 Ballasting and Deballasting

6.7.1 After unloading, and, if required, carrying out a prewash, a cargo tank may be ballasted. Procedures for the discharge of such ballast are set out in sections 6.3 and 6.4.

* i.e. a substance with a viscosity less than 25 mPa.s at the unloading temperature, within Special Areas.

** i.e. a substance with a viscosity less than 25 mPa.s at the unloading temperature if discharged within Special Areas, or a substance with a viscosity less than 60 mPa.s at the unloading temperature if discharged outside Special Areas.

6.7.2 Ballast introduced into a cargo tank which has been washed to such an extent that the ballast contains less than 1 ppm of the substance previously carried, may be discharged into the sea without regard to the discharge rate, ship's speed and discharge outlet location, provided that the ship is not less than 12 miles from land and in water that is not less than 25 metres deep. It is assumed this degree of cleanliness has been achieved when a prewash as specified in appendix B has been carried out and the tank has been subsequently washed with a complete cycle of the cleaning machine.

Chapter 7 - Operational Standards of New Ships Carrying Category D Substances

7.1 General

This chapter applies to any new ship certified fit to carry category D substances.

7.2 Discharge of category D residues

Although residue(s) of category D substances is(are) required to be discharged within and outside Special Areas in a diluted form in accordance with regulation 5(4), such residue(s) may also be discharged in accordance with the operational standards for low viscosity, non-solidifying category C substances as specified in Chapter 6.

7.3 Ventilation of category D substances from cargo tanks

When ventilation procedures are used to remove residue from cargo tanks the requirements set out in section 4.3 apply.

Chapter 8 - Equipment and Constructional Standards for Existing Ships

8.1 General

8.1.1 This chapter contains the standards for the equipment and constructional features enabling an existing ship to comply with the residue discharge requirements of Annex II.

8.1.2 The equipment requirements in this chapter should be read in conjunction with the operating requirements in chapters 9, 10, 11 and 12 in order to determine what equipment is needed on the ship.

8.2 Carriage requirements

A category B substance with a melting point equal to or greater than 15°C should not be carried in a cargo tank any boundary of which is formed by the ship's shell plating and should only be carried in a cargo tank fitted with a cargo heating system.

8.3 Cargo unloading system

The cargo unloading system for category B and C substances should be capable of unloading the cargo to the residue quantities not in excess of the quantities specified in regulations 5 and 5A. The performance test required by regulation 5A(5) should be carried out in accordance with appendix A.

8.4 Residue discharge system

8.4.1 When for the purpose of discharging residues into the sea, controlled pumping rates are needed to meet the requirements of chapter 10, one of the following systems should be used:

.1 a variable rate pumping system in which:

.1.1 the capacity is adjusted by varying the pump speed; or

.1.2 the capacity is adjusted through the use of a throttling arrangement fitted on the discharge piping;

.2 a fixed rate pumping system with a capacity not exceeding the permissible discharge rate as set out under sections 10.5 and 10.6.

8.4.2 If the pumping rates are controlled in accordance with 8.4.1.1, a flow rate indicating device should be provided.

8.5 Underwater discharge outlet location

8.5.1 The underwater discharge outlet (or outlets) should be located within the cargo area in the vicinity of the turn of the bilge and should be so arranged as to avoid the re-intake of residue/water mixtures by the ship's sea water intakes.

8.5.2 If dual outlets are provided to achieve a higher permissible discharge rate, these should be located on opposite sides of the ship.

8.6 Underwater discharge outlet size

8.6.1 The underwater discharge outlet arrangement should be such that the residue/water mixture discharged into the sea in accordance with the Standards will not pass through the ship's boundary layer. To this end, when the discharge is made normal to the ship's shell plating, the minimum diameter of the discharge outlet is governed by the following equation:

$$D = \frac{Q_D}{5L}$$

where D = minimum diameter of the discharge outlet, m

L = distance from the forward perpendicular to
the discharge outlet, m

Q_D = maximum rate selected at which the ship may discharge
a residue/water mixture through the outlet, m³/h

8.6.2 When the discharge is directed at an angle to the ship's shell plating, the above relationship should be modified by substituting for Q_D the component of Q_D , which is normal to the ship's shell plating.

8.7 Recording devices

8.7.1 When in accordance with chapter 10 it is necessary to record the discharge of residue/water mixtures, means should be provided for recording the start and stop time of the discharge with actual time (GMT or other standard time). The device should be in operation when there is a discharge into the sea which is to be recorded. The date should be recorded either manually or automatically. The record should be identifiable as to time and date and should be kept for at least three years.

8.7.2 When in accordance with chapter 10 it is necessary to record the rate at which residue/water mixtures are discharged, means should be provided for measuring such flow rates. The accuracy of the flow recording unit should be within 15% of the actual flow.

8.7.3 If the recording units described in paragraphs 8.7.1 or 8.7.2 become defective, a manual alternative method should be used. The Master should record such a defect in the Cargo Record Book. The defective unit should be made operable as soon as possible but at least within a period of 60 days.

8.8 Slop tanks

Although Annex II does not require the fitting of dedicated slop tanks, slop tanks may be needed for certain washing procedures. Cargo tanks may be used as slop tanks.

8.9 Ventilation equipment

If residues from cargo tanks are removed by means of ventilation, ventilation equipment meeting the requirements of appendix C should be provided.

Chapter 9 - Operational Standards for Existing Ships Carrying Category A Substances

9.1 General

This chapter applies to any existing ship certified fit to carry category A substances.

9.2 Prewash of a category A substance from a cargo tank

9.2.1 Annex II requires that when a tank that has contained a category A substance is washed, the resulting residue/water mixtures be discharged to a reception facility until the concentration of the substance in the effluent is reduced below a specified value and until the tank is empty. Where it is found to be impracticable to measure the concentration of the substance in the effluent, a prewash procedure in accordance with appendix B should be applied in conformity with regulation 8(4).

9.2.2 The residue/water mixture generated during the prewash should be discharged to a reception facility in accordance with regulation 8.

9.2.3 Any water subsequently introduced into the cargo tank may be discharged into the sea in accordance with the requirements of regulation 5(1) or regulation 5(7) in respect of the ship's position, speed and discharge outlet location.

9.3 Ventilation of category A substances from cargo tanks

9.3.1 Ventilation procedures may be applied only to those substances having a vapour pressure greater than 5×10^3 Pa at 20°C.

9.3.2 The ventilation procedures set out in appendix C should be followed when a tank is to be ventilated.

9.3.3 In ventilating a tank the associated piping of the tank should be cleared of liquid and the tank should be ventilated until no visible remains of liquid can be observed in the tank. When direct observation is impossible or impracticable, means for detection of liquid remains should be provided.

9.3.4 When the cargo tank has been ventilated dry in accordance with the Standards, any water subsequently introduced into the cargo tank for ballasting or for preparing the tank to receive the next cargo should be regarded as clean and should not be subject to the discharge requirements of Annex II.

Chapter 10 - Operational Standards for Existing Ships Carrying
Category B Substances

10.1 General

10.1.1 This chapter applies to any existing ship certified fit to carry category B substances.

10.1.2 When a cargo tank on an existing ship is fitted with a cargo unloading system capable of unloading the cargo to the residue quantities not in excess of the quantity specified in regulation 5A(2)(a) and if the tank is to be washed or ballasted and some or all of the residue left in the tank is to be discharged into the sea, the requirements of chapter 5 apply.

10.1.3 If a tank other than that referred to in paragraph 10.1.2 is to be washed or ballasted and some or all of the residue left in the tank is to be discharged into the sea, the requirements of sections 10.2 to 10.8 apply.

10.1.4 If the requirements of this chapter under which discharges into the sea of residues and residue/water mixtures containing category B substances are allowed cannot be met, no such discharges may be made.

10.2 Pumping and stripping

In unloading a cargo tank containing a category B substance, the tank and its associated piping should be emptied to the maximum extent practicable by maintaining a positive flow of cargo to the tank's suction point and using the stripping procedure set out in the Manual.

10.3 Tank washing and residue discharge procedures outside Special Areas

10.3.1 High viscosity or solidifying substances

- .1 A prewash procedure as specified in appendix B should be applied;
- .2 the residue/water mixture generated during the prewash should be discharged to a reception facility in accordance with regulation 8;
and

- .3 any water subsequently introduced into the cargo tank may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 8.6 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(2) in respect of ship's position, speed and discharge outlet location.

10.3.2 Low viscosity, non-solidifying substances

- .1 A prewash procedure as specified in appendix B should be applied;
- .2 the residue/water mixture generated during the prewash should be discharged to a reception facility in accordance with regulation 8 or transferred to a slop tank for subsequent discharge into the sea in accordance with section 10.5 or 10.6; and
- .3 any water subsequently introduced into the cargo tank may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 8.6 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(2) in respect of ship's position, speed and discharge outlet location.

10.4 Tank washing and residue discharge procedures within Special Areas

10.4.1 A prewash procedure as specified in appendix B should be applied.

10.4.2 The residue/water mixture generated during the prewash should be discharged to a reception facility in accordance with regulation 8.

10.4.3 Any water subsequently introduced into the tank may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 8.6 is(are) designed. The discharge must also be in accordance with the requirements of regulation 5(8) in respect of ship's position, speed and discharge outlet location.

10.4.4 Notwithstanding the provisions of paragraphs 10.4.1 to 10.4.3, residue or residue/water mixtures containing only low viscosity, non-solidifying substances may be retained on board and discharged into the sea outside Special Areas in accordance with sections 10.5 or 10.6.

10.5 Discharge into the sea of a miscible residue/water mixture from a slop tank

10.5.1 Prewash residue/water mixtures containing category B substances should not be discharged into the sea within Special Areas.

10.5.2 Before a miscible residue/water mixture is discharged into the sea outside Special Areas, the composite concentration, C_s , should be determined as follows:

$$C_s = n/V_r$$

where n = number of tanks containing category B residues which have been transferred to the slop tank. (For the sake of simplification, it is assumed that each tank contains 1 m^3 of residue.)

V_r = volume of residue/water mixtures in the slop tank prior to discharge (determined from ullage tables), m^3

10.5.3 The residue/water mixture may be discharged into the sea, provided that the rate does not exceed the maximum rate for which the underwater discharge outlet(s) referred to in section 8.6 is(are) designed or that defined by one of the equations below, whichever is smaller:

$$Q_D = \frac{KV^{1.4} L^{1.6}}{C_s} \quad \text{when a single outlet is used; or}$$

$$Q_D = \frac{1.5 KV^{1.4} L^{1.6}}{C_s} \quad \text{when dual outlets are used}$$

where Q_D = rate of discharge of residue/water mixture, m^3/h

V = ship's speed, knots

L = ship's length, m

$K = 4.3 \times 10^{-5}$

C_s = Composite concentration referred to in paragraph 10.5.2.

10.5.4 The discharge must also be in accordance with the other discharge requirements of regulation 5(2) in respect of ship's position, speed and discharge outlet location.

10.5.5 Residue/water mixtures discharged into the sea in accordance with this Section should be recorded using the device referred to in paragraph 8.7.1. If a variable capacity pump is used for the discharge, the flow rate should also be recorded using the device referred to in paragraph 8.7.2.

10.6 Discharge into the sea of an immiscible residue/water mixture from a slop tank

10.6.1 Prewash residue/water mixtures containing category B substances should not be discharged into the sea within Special Areas.

10.6.2 The residue/water mixture may be discharged into the sea outside Special Areas, provided that the rate does not exceed the maximum rate for which the underwater discharge outlet(s) referred to in section 8.6 is(are) designed or that defined by one of the equations below, whichever is smaller:

$$Q_D = KV^{1.4} L^{1.6} \quad \text{when a single outlet is used; or}$$

$$Q_D = 1.5 KV^{1.4} L^{1.6} \quad \text{when dual outlets are used.}$$

10.6.3 The discharge must also be in accordance with the other discharge requirements of regulation 5(2) in respect of ship's position, speed and discharge outlet location.

10.6.4 Residue/water mixtures discharged into the sea in accordance with this Section should be recorded using the device referred to in paragraph 8.7.1. If a variable capacity pump is used for the discharge the flow rate should also be recorded using the device referred to in paragraph 8.7.2.

10.7 Ventilation of category B substances from cargo tanks

When ventilation procedures are used to remove residue from cargo tanks, the requirements set out at section 9.3 apply.

10.8 Ballasting and deballasting

10.8.1 After unloading, and, if required, carrying out a prewash, a cargo tank may be ballasted. Procedures for the discharge of such ballast are set out in sections 10.3 to 10.6.

10.8.2 Ballast introduced into a cargo tank which has been washed to such an extent that the ballast contains less than 1 ppm of the substance previously carried, may be discharged into the sea without regard to the discharge rate, ship's speed and discharge outlet location, provided that the ship is not less than 12 miles from land and in water that is not less than 25 metres deep. It is assumed this degree of cleanliness has been achieved when a prewash as specified in appendix B has been carried out and the tank has been subsequently washed with a complete cycle of the cleaning machine.

Chapter 11 - Operational Standards for Existing Ships Carrying Category C Substances

11.1 General

11.1.1 This chapter applies to any existing ship certified fit to carry category C substances.

11.1.2 When a cargo tank on an existing ship is fitted with a cargo unloading system capable of unloading the cargo to the residue quantities not in excess of the quantity specified in regulation 5A(4)(a) and if the tank is to be washed or ballasted and some or all of the residue left in the tank is to be discharged into the sea, the requirements of chapter 6 apply. However, an existing ship may only discharge residue/water mixtures containing category C substances within Special Areas in accordance with paragraph 6.4.2.1 if the cargo unloading system meets the requirements as specified for new ships in Regulation 5A(3). If the cargo unloading system does not meet these requirements, discharge of residue/water mixtures within Special Areas should be carried out in accordance with section 11.4 or 11.5.

11.1.3 If a cargo tank other than that referred to in paragraph 11.1.2 is to be washed or ballasted and some or all of the residue left in the tank is to be discharged into the sea, the requirements of sections 11.2 to 11.7 apply.

11.1.4 If the requirements of this chapter under which discharges into the sea of residues and residue/water mixtures containing category C substances are allowed cannot be met, no such discharges may be made.

11.2 Pumping and stripping

11.2.1 In unloading a cargo tank containing a category C substance, the tank and its associated piping should be emptied to the maximum extent practicable by maintaining a positive flow of cargo to the tank's suction point and using the stripping procedure set out in the Manual.

11.3 Tank washing and residue discharge procedures outside Special Areas

11.3.1 High viscosity or solidifying substances

- .1 A prewash procedure as specified in appendix B should be applied;
- .2 the residue/water mixture generated during the prewash should be discharged to a reception facility in accordance with regulation 8; and
- .3 any water subsequently introduced into the tank may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 8.6 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(3) in respect of ship's position, speed and discharge outlet location.

11.3.2 Low viscosity, non-solidifying substances

- .1 any water introduced into the cargo tank may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 8.6 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(3) in respect of ship's position, speed and discharge outlet location.

11.4 Tank washing and residue discharge procedures within Special Areas

11.4.1 A prewash procedure as specified in appendix B should be applied.

11.4.2 The residue/water mixture generated during the prewash should be discharged to a reception facility in accordance with regulation 8.

11.4.3 Any water subsequently introduced into the cargo tank may be discharged into the sea at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 8.6 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(4) in respect of ship's position, speed and discharge outlet location.

11.4.4 Notwithstanding the provisions of paragraphs 11.4.1 to 11.4.3, residue/water mixtures containing only non-solidifying substances with a viscosity less than 60 mPa.s at the unloading temperature may be retained on board and discharged into the sea outside Special Areas in accordance with paragraph 11.5.2.

11.5 Discharges from a slop tank

11.5.1 Residue/water mixtures in a slop tank should not be discharged into the sea within Special Areas.

11.5.2 Residue/water mixtures in a slop tank which contain only low viscosity, non-solidifying substances may be discharged into the sea outside Special Areas at a rate not exceeding the maximum rate for which the underwater discharge outlet(s) referred to in section 8.6 is(are) designed. The discharge must also be in accordance with the other discharge requirements of regulation 5(3) in respect of the ship's position, speed and discharge outlet location.

11.5.3 Residue/water mixtures in a slop tank which contain high viscosity or solidifying substances, retained on board in accordance with regulation 8, should be discharged to a reception facility.

11.6 Ventilation of category C substances from cargo tanks

When ventilation procedures are used to remove residue from cargo tanks, the requirements set out at section 9.3 apply.

11.7 Ballasting and deballasting

11.7.1 After unloading, and, if required, carrying out a prewash, a cargo tank may be ballasted. Procedures for the discharge of such ballast are set out in sections 11.3 to 11.4.

11.7.2 Ballast introduced into a cargo tank which has been washed to such an extent that the ballast contains less than 1 ppm of the substance previously carried, may be discharged into the sea without regard to the discharge rate, ship's speed and discharge outlet location, provided that the ship is not less than 12 miles from land and in water that is not less than 25 metres deep. It is assumed this degree of cleanliness has been achieved when a prewash as specified in appendix B has been carried out and the tank has been subsequently washed with a complete cycle of the cleaning machine.

Chapter 12 - Operational Standards for Existing Ships Carrying Category D Substances

12.1 General

This chapter applies to any existing ship certified fit to carry category D substances.

12.2 Discharge of category D residues

Although residue(s) of category D substances is(are) required to be discharged within and outside Special Areas in a diluted form in accordance with regulation 5(4), such residue(s) may also be discharged in accordance with the operational standards for low viscosity, non-solidifying category C substances as specified in Chapter 11.

12.3 Ventilation of category D substances from cargo tanks

When ventilation procedures are used to remove residue from cargo tanks the requirements set out in section 9.3 apply.

APPENDIX A

ASSESSMENT OF RESIDUE QUANTITIES IN CARGO TANKS, PUMPS AND PIPING

1 INTRODUCTION

1.1 Purpose

1.1.1 The purpose of this appendix is:

- .1 to provide the procedure for testing the efficiency of cargo pumping systems; and
- .2 to provide the method for calculating the residue quantities on the cargo tank surfaces.

1.2 Background

1.2.1 The ability of the pumping system of a tank to comply with regulation 5A(1), (2), (3) or (4) is determined by performing a test in accordance with the procedure set out in section 3 of this appendix. The quantity measured is termed the "stripping quantity". The stripping quantity of each tank shall be recorded in the ship's Manual.

1.2.2 For tanks of existing ships not satisfying the appropriate pumping efficiency requirement of regulation 5A(2)(a) or (4)(a) it is necessary to calculate the quantity of residue remaining on tank surfaces. The method for calculating the clingage residue is given in section 4.

1.2.3 For tanks referred to in 1.2.2, it is necessary to calculate the total quantity of residue remaining in the cargo tanks and its associated piping. The total residue quantity is the sum of the water test result and the calculated clingage quantity.

1.2.4 After having determined the stripping quantity and calculated clingage quantity (when required) of one tank, the Administration may use the determined quantities for a similar tank, provided the Administration is satisfied that the pumping system in that tank is similar and operating properly.

2 DESIGN CRITERIA AND PERFORMANCE TEST

2.1 The cargo pumping systems should be designed to meet the required 0.1m^3 and 0.3m^3 or 0.3m^3 and 0.9m^3 respectively for category B or C substances as specified by regulation 5A to the satisfaction of the Administration.

2.2 In accordance with regulation 5A(5), the cargo pumping systems should be tested with water to prove their performance. Such water tests should, by measurement, show that the system meets the requirements of regulation 5A with the tolerance of 50 litres per tank.

3 WATER TEST PROCEDURE

3.1 Test Condition

3.1.1 The ship's trim and list should be such as to provide favourable drainage to the suction point. During the water test the ship's trim should not exceed 3° by the stern, and the ship's list should not exceed 1° .

3.1.2 The trim and list chosen for the water test should be the minimum favourable trim and list as given in the ship's Manual for the stripping of the cargo tanks.

3.1.3 During the water test means should be provided to maintain a back pressure of not less than 1 bar at the cargo tank's unloading manifold (see figures A-1 and A-2).

Figure A-1

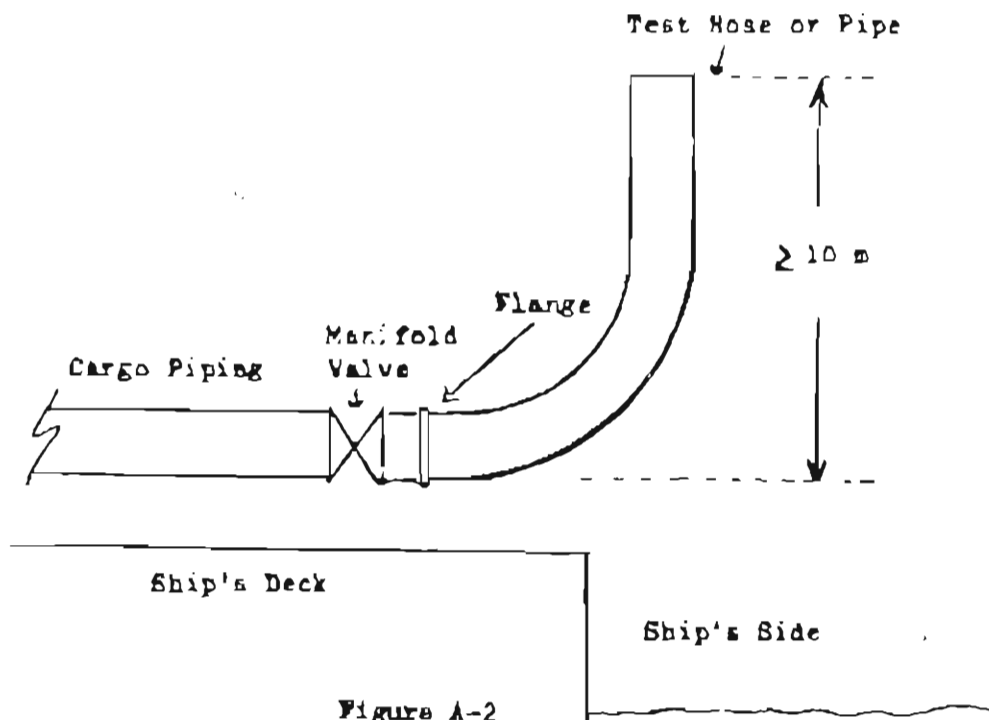
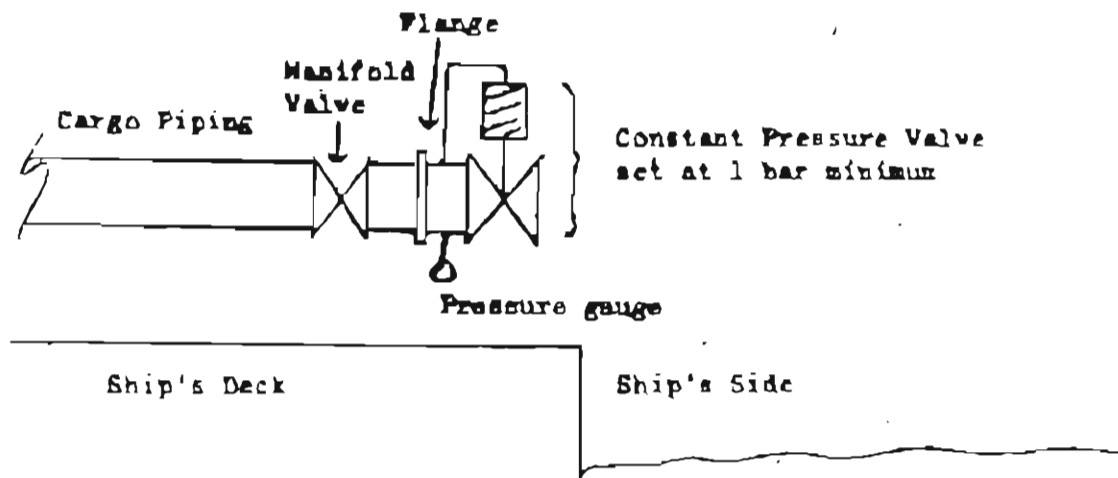


Figure A-2



The above figures illustrate test arrangements that would provide a backpressure of not less than 1 bar at the cargo tank's unloading manifold.

3.2 Test Procedure

3.2.1 Ensure that the cargo tank to be tested and its associated piping have been cleaned and that the cargo tank is safe for entry.

3.2.2 Fill the cargo tank with water to a depth necessary to carry out normal end of unloading procedures.

3.2.3 Pump and strip the cargo tank and its associated piping in accordance with the ship's approved Manual,

3.2.4 Collect water remaining in the cargo tank and its associated piping into a calibrated container for measurement. Water residues should be collected from the following points:

- .1 the cargo tank suction and its vicinity;
- .2 any entrapped areas on the cargo tank bottom;
- .3 the low point drain of the cargo pump; and
- .4 all low point drains of piping associated with the cargo tank up to the manifold valve.

3.2.5 The total water volumes collected above determines the stripping quantity for the cargo tank.

3.2.6 Where a group of tanks is served by a common pump or piping, the water test residues associated with the common system(s) may be apportioned equally among the tanks provided that the following operational restriction is included in the ship's approved Manual: "For sequential unloading of tanks in this group, the pump or piping is not to be washed until all tanks in the group have been unloaded".

4 CALCULATION OF CLINGAGE RESIDUES

4.1 Calculate the clingage residues using the following formula:

$$Q_{RES}(surf) = 1.1 \times 10^{-4} A_b + 1.5 \times 10^{-5} A_w + 4.5 \times 10^{-4} L^{1/2} A_b$$

4.3 Symbols and units used in residue equation

A_b = Area of tank bottom and horizontal components of tank structural members facing upwards (m^2)

A_d = Area underdecks and horizontal components of tank structural members facing downwards (m^2)

A_w = Surface area of tank walls and vertical components of tank structural members (m^2)

L = Length of tank (m)

$Q_{RES}(surf)$ = Amount of clingage residue on tank surfaces (m^3)

- NOTE: 1. For purposes of calculating A_b , A_d and A_w inclined (greater than 30° from the horizontal) and curved surfaces should be treated as vertical.
2. Methods of approximating A_b , A_d , and A_w are permissible. (A method presented in BCH 15/INF.5 by Japan is an example).

APPENDIX B

PREWASH PROCEDURES

In several sections of the Standards a prewash procedure is required in order to meet certain Annex II requirements. This appendix explains how these prewash procedures should be performed.

Prewash procedures for non-solidifying substances

1 Tanks should be washed by means of a rotary water jet, operated at sufficiently high water pressure. In the case of category A substances washing machines should be operated in such locations that all tank surfaces are washed. In the case of category B and C substances only one location need be used.

2 During washing the amount of water in the tank should be minimized by continuously pumping out slops and promoting flow to the suction point (positive list and trim). If this condition cannot be met the washing procedure should be repeated three times, with thorough stripping of the tank between washings.

3 Those substances which have a viscosity equal to or greater than 25 mPa.s at 20°C should be washed with hot water (temperature at least 60°C).

4 The number of cycles of the washing machine used should not be less than that specified in table B1. A washing machine cycle is defined as the period between two consecutive identical orientations of the washing machine (rotation through 360°).

5 After washing, the washing machine(s) should be kept operating long enough to flush the pipeline, pump and filter.

Prewash procedures for solidifying substances

- 1 Tanks should be washed as soon as possible after unloading. If possible tanks should be heated prior to washing.
- 2 Residues in hatches and manholes should preferably be removed prior to the prewash.
- 3 Tanks should be washed by means of a rotary water jet operated at sufficiently high water pressure and in locations to ensure that all tank surfaces are washed.
- 4 During washing the amount of water in the tank should be minimized by pumping out slops continuously and promoting flow to the suction point (positive list and trim). If this condition cannot be met, the washing procedure should be repeated 3 times with thorough stripping of the tank between washings.
- 5 Tanks should be washed with hot water (temperature at least 60°C).
- 6 The number of cycles of the washing machine used should not be less than that specified in table B1. A washing machine cycle is defined as the period between two consecutive identical orientations of the machine (rotation through 360°).
- 7 After washing, the washing machine(s) should be kept operating long enough to flush the pipeline, pump and filter.

TABLE 81 - Number of washing machine cycles
to be used in each location

Category of substance	Number of washing machine cycles	
	non-solidifying substances	solidifying substances
Category A (residual concentration 0.1% or 0.05%)	1	2
Category A (residual concentration 0.01% or 0.005%)	2	3
Category B	1/2	1
Category C	1/2	1

Note: For an explanation of "residual concentration" see regulation 5(1) and 5(7) of Annex II.

APPENDIX C

VENTILATION PROCEDURES

- 1 Cargo residues of substances with a vapour pressure greater than 5×10^3 Pa at 20°C may be removed from a cargo tank by ventilation.
- 2 Before residues of noxious liquid substances are ventilated from a tank the safety hazards relating to cargo flammability and toxicity should be considered. With regard to safety aspects, the operational requirements for openings in cargo tanks in the International Bulk Chemical Code, the Bulk Chemical Code, and the ventilation procedures in the ICS Tanker Safety Guide (Chemicals) should be consulted.
- 3 Port authorities may also have regulations on cargo tank ventilation.
- 4 The procedures for ventilation of cargo residues from a tank are as follows:
 - .1 the pipelines should be drained and further cleared of liquid by means of ventilation equipment;
 - .2 the list and trim should be adjusted to the minimum levels possible so that evaporation of residues in the tank is enhanced;
 - .3 ventilation equipment producing an airjet which can reach the tank bottom shall be used. Figure C-1 could be used to evaluate the adequacy of ventilation equipment used for ventilating a tank of a given depth;
 - .4 ventilation equipment should be placed in the tank opening closest to the tank sump or suction point;
 - .5 ventilation equipment should, when practicable, be positioned so that the airjet is directed at the tank sump or suction point and impingement of the airjet on tank structural members is to be avoided as much as possible; and
 - .6 ventilation shall continue until no visible remain of liquid can be observed in the tank. This shall be verified by a visual examination or an equivalent method.

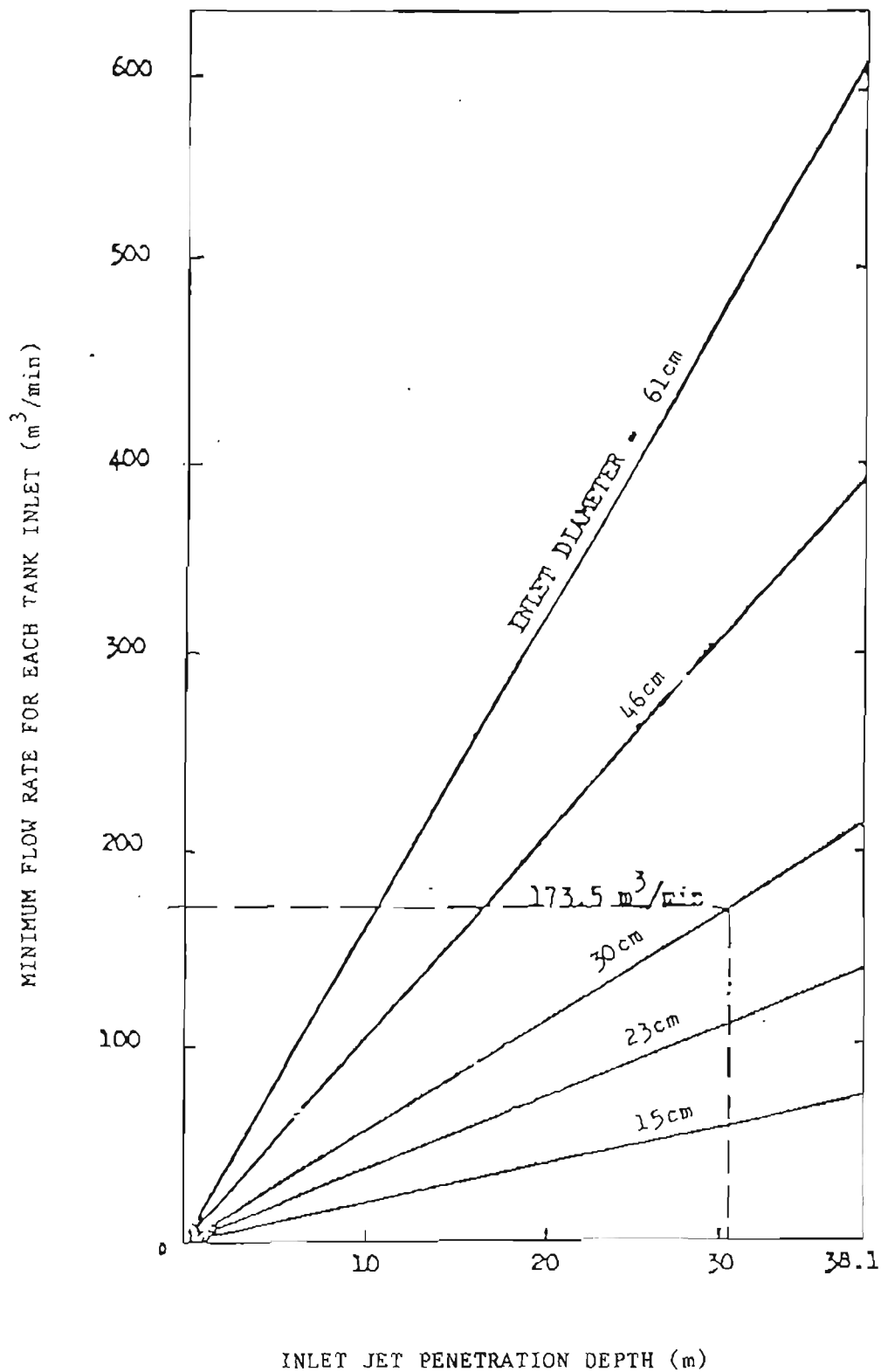


FIGURE C-1. MINIMUM FLOW RATE AS A FUNCTION OF JET PENETRATION DEPTH. JET PENETRATION DEPTH SHOULD BE COMPARED AGAINST TANK HEIGHT.

APPENDIX D

STANDARD FORMAT FOR THE PROCEDURES AND ARRANGEMENTS MANUAL

Note 1. The standard format consists of a standardized text of an introduction, of an index and of the leading paragraphs to each section. This standardized text should be reproduced in the Manual provided for each ship followed by the information necessary to complete each section as applicable to the particular ship. The necessary information is indicated within with left hand marking. When a section is not applicable NA should be entered. It is recognized that the content of the Manual will vary depending on the design of the ship, the trade and the types of cargoes intended to be carried.

Note 2. If the Administration requires or accepts information and operational instructions in addition to those outlined in this Standard Format, they should be included in part 2 of the Manual. If no such additional information or operating instructions are required or accepted by the Administration, the Manual will consist of one part only.

STANDARD FORMAT

MARPOL 73/78 ANNEX II PROCEDURES AND ARRANGEMENTS MANUAL

Name of Ship

Distinctive Numbers or Letters

Port of Registry

Approval stamp of Administration:

INTRODUCTION

1. The International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, (hereinafter referred to as MARPOL 73/78) was established in order to prevent the pollution of the marine environment by discharges into the sea from ships of harmful substances or effluents containing such substances. In order to achieve its aim, MARPOL 73/78 contains five Annexes in which detailed regulations are given with respect to the handling on board ships and the discharge into the sea of five main groups of harmful substances, i.e. Annex I (mineral oils), Annex II (liquid noxious substances carried in bulk), Annex III (harmful substances carried in packaged forms), Annex IV (sewage) Annex V (garbage).
2. Regulation 5 of Annex II prohibits the discharge into the sea of noxious liquid substances of Categories A, B, C and D or of ballast water, tank washings or other residues or mixtures containing such substances, except in compliance with specified conditions including procedures and arrangements based upon standards developed by the International Maritime Organization (IMO) to ensure that the criteria specified for each Category will be met.
3. The Standards for Procedures and Arrangements called for by Annex II of MARPOL 73/78 (as referred to above) require that each ship which is certified for the carriage of noxious liquid substances in bulk shall be provided with a Procedures and Arrangements Manual, hereinafter referred to as the Manual.
4. This Manual has been written in accordance with chapter 2 of the Standards and is concerned with the marine environmental aspects of the cleaning of cargo tanks and the discharge of residues and mixtures from these operations. The Manual is not a safety guide and reference should be made to other publications specifically to evaluate safety hazards.
5. The purpose of [Part 1 of]* the Manual, is to identify the arrangements and equipment required to enable compliance with Annex II and to identify for the ship's officers all operational procedures with respect to cargo handling, tank cleaning, slops handling, residue discharging, ballasting and deballasting, which must be followed in order to comply with the requirements of Annex II. [Part 2 of the Manual contains additional information and operational instructions required or accepted by the Administration].*

6. In addition, this Manual, together with the ship's Cargo Record Book and [International Certificate for the Carriage of Noxious Liquid Substances in Bulk/Certificate of Fitness issued under the International Bulk Chemical Code/Certificate of Fitness issued under the Bulk Chemical Code,]** will be used by Administrations for control purposes in order to ensure full compliance with the requirements of Annex II by this ship.

7. The master shall ensure that no discharges into the sea of cargo residues or residue/water mixtures containing Category A, B, C or D substances shall take place, unless such discharges are made in full compliance with the operational procedures contained in this Manual and that the equipment required by this Manual and needed for such discharge is used.

8. This Manual has been approved by the Administration and no alteration or revision shall be made to any part of it without the prior approval of the Administration.

Footnote:

* The parts in [] marked thus * to be included only if a Part 2 is incorporated in the Manual.

** Include only the Certificate issued to the particular ship.

INDEX OF SECTIONS

[Part 1]

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1. Main features of MARPOL 73/78, Annex II.
2. Description of the ship's equipment and arrangements.
3. Cargo unloading procedures and tank stripping.
4. Procedures relating to the cleaning of cargo tanks, the residue discharge, ballasting and deballasting.

Table 1 - List of noxious liquid substances allowed to be carried.

Table 2 - Cargo tank information.

Addendum A: Flow diagrams.

Addendum B: Prewash programmes.

Addendum C: Ventilation procedures.

[Addendum D: Determination of permitted residue discharge rates for Category B substances (if necessary).

[Part 2

[Additional information and operational instructions required or accepted by the Administration (if necessary).

SECTION 1 - Main features of MARPOL 73/78, Annex II

1.1 The requirements of Annex II apply to all ships carrying noxious liquid substances in bulk. Substances posing a threat of harm to the marine environment are divided into four categories, A, B, C and D, and listed as such in Appendix II to Annex II. Category A substances are those posing the greatest threat to the marine environment, whilst Category D substances are those posing the smallest threat.

1.2 Annex II prohibits the discharge into the sea of any effluent containing substances falling under these categories, except when the discharge is made under conditions which are specified in detail for each category. These conditions include, where applicable, such parameters as:

- the maximum quantity of substances per tank which may be discharged into the sea;
- the speed of the ship during the discharge;
- the minimum distance from the nearest land during discharge;
- the minimum depth of water at sea during discharge;
- the maximum concentration of substances in the ship's wake or the dilution of substances prior to discharge; and
- the need to effect the discharge below the waterline.

1.3 For certain sea areas identified as "special areas" more stringent discharge criteria are given. Under Annex II the special areas are the Baltic Sea Area* and the Black Sea Area**.

1.4 Annex II requires that every ship is provided with pumping and piping arrangements to ensure that each tank designated for the carriage of Category B and C substances does not retain after unloading a quantity of residue in excess of the quantity given in the Annex. For each tank intended for the carriage of such substances an assessment of the residue quantity has to be made. Only when the residue quantity as assessed is less than the quantity prescribed by the Annex may a tank be approved for the carriage of a Category B or a Category C substance.

1.5 In addition to the conditions referred to above, an important requirement contained in Annex II is that the discharge operations of certain cargo residues and certain tank cleaning and ventilation operations may only be carried out in accordance with approved procedures and arrangements based upon standards developed by the International Maritime Organization (IMO).

1.6 To enable this requirement to be complied with, this Manual contains in Section 2 all particulars of the ship's equipment and arrangements, in Section 3 operational procedures for cargo unloading and tank stripping and in Section 4 procedures for discharge of cargo residues, tank washing, slops collection, ballasting and deballasting as may be applicable to the substances the ship is certified to carry.

1.7 By following the procedures as set out in this Manual, it will be ensured that the ship complies with all relevant requirements of Annex II to MARPOL 73/78.

Note: MARPOL 73/78, Annex II defines these areas as follows:

- * The Baltic Sea area means the Baltic Sea proper with the Gulf of Bothnia, the Gulf of Finland and the entrance to the Baltic Sea bounded by the parallel of the Skaw in the Skagerrak at 57° 44.8'N.
- ** The Black Sea area means the Black Sea proper with the boundary between the Mediterranean and the Black Sea constituted by the parallel 41° N.

SECTION 2 - Description of the ship's equipment and arrangements

2.1 This section contains all particulars of the ship's equipment and arrangements necessary to enable the crew to follow the operational procedures set out in sections 3 and 4.

2.2 General Arrangement of ship and description of cargo tanks

This section should contain a brief description of the cargo area of the ship with the main features of the cargo tanks and their positions.

Line or schematic drawings showing the general arrangement of the ship and indicating the position and numbering of the cargo tanks and heating arrangements should be included. Identification of the cargo tanks certified fit to carry noxious liquid substances should be made in conjunction with Table 1 of this Manual.

2.3 Description of cargo pumping and piping arrangements and stripping system

This section should contain a description of the cargo pumping and piping arrangements and of the stripping system.

Line or schematic drawings should be provided showing the following and be supported by textual explanation where necessary:

- cargo piping arrangements with diameters;
- cargo pumping arrangements with pump capacities;
- piping arrangements of stripping system with diameters;
- pumping arrangements of stripping system with pump capacities;
- location of suction points of cargo lines and stripping lines inside every cargo tank;
- if a suction well is fitted, the location and cubic capacity thereof;
- line draining and stripping or blowing arrangements; and
- quantity and pressure of nitrogen or air required for line blowing if applicable.

2.4 Description of ballast tanks and ballast pumping and piping arrangements

This section should contain a description of the ballast tanks and ballast pumping and piping arrangements.

Line or schematic drawings and tables should be provided showing the following:

- a general arrangement showing the segregated ballast tanks and cargo tanks to be used as ballast tanks together with their capacities (cubic metres);
- ballast piping arrangement;
- pumping capacity for those cargo tanks which may also be used as ballast tanks; and
- any interconnection between the ballast piping arrangements and the underwater outlet system.

2.5 Description of dedicated slop tanks with associated pumping and piping arrangements

This section should contain a description of the dedicated slop tanks with the associated pumping and piping arrangements.

Line or schematic drawings should be provided showing the following:

- which dedicated slop tanks are provided together with the capacities of such tanks;
- pumping and piping arrangements of dedicated slop tanks with piping diameters and their connection with the underwater discharge outlet.

2.6 Description of underwater discharge outlet for effluents containing noxious liquid substances

This section should contain information on position and maximum flow capacity of the underwater discharge outlet (or outlets) and the connections to this outlet from the cargo tanks and slop tanks.

Line or schematic drawings should be provided showing the following:

- location and number of underwater discharge outlets;
- connections to underwater discharge outlet;
- location of all seawater intakes in relation to underwater discharge outlets.

2.7 Description of flow rate indicating and recording devices

This section, which applies only to ships operating under Regulation SA(2)(b), should contain a description of the means of measuring the flow rate, and if required also the means of recording of the flow rate and time, and the methods of operation.

A line or schematic drawing showing the position and connections of these devices should be provided.

2.8 Description of cargo tank ventilation system

This section should contain a description of the cargo tank ventilation system.

Line or schematic drawings and tables should be provided showing the following and supported by textual explanation if necessary:

- the noxious liquid substances the ship is certified fit to carry having a vapour pressure over 5×10^3 Pa at 20° suitable for cleaning by ventilation to be listed in table 1;
- ventilation piping and fans;
- position of the ventilation openings;
- the minimum flow rate of the ventilation system to adequately ventilate the bottom and all parts of the cargo tank;
- the location of structures inside the tank affecting ventilation;
- the method of ventilating the cargo pipeline system, pumps, filters, etc; and
- means for ensuring that the tank is dry.

2.9 Description of tank washing arrangements and washwater heating system

This section should contain a description of the cargo tank washing arrangements, washwater heating system and all necessary tank washing equipment.

Line or schematic drawings and tables or charts showing the following:

- arrangements of piping dedicated for tank washing with pipeline diameters;
- type of tank washing machines with capacities and pressure rating;
- maximum number of tank washing machines which can operate simultaneously;
- position of deck openings for cargo tank washing;
- the number of washing machines and their location required for ensuring complete coverage of the cargo tank walls;
- maximum capacity of washwater which can be heated to 60°C by the installed heating equipment; and
- maximum number of tank washing machines which can be operated simultaneously at 60°C.

SECTION 3 - Cargo unloading procedures and tank stripping

3.1 This Section contains operational procedures in respect of cargo unloading and tank stripping which must be followed in order to ensure compliance with the requirements of Annex II.

3.2 Cargo unloading

This Section should contain procedures to be followed including the pump and cargo unloading and suction line to be used for each tank. Alternative methods may be given.

The method of operation of the pump or pumps and the sequence of operation of all valves should be given.

The basic requirement is to unload the cargo to the maximum practicable extent.

3.3 Cargo tank stripping

This section should contain procedures to be followed during the stripping of each cargo tank.

The procedures should include the following:

- operation of stripping system;
- list and trim requirements;
- line draining and stripping or blowing arrangements if applicable.

3.4 Cargo temperature

This section should contain information on the heating requirements of cargoes which have been identified as being required to be at a certain minimum temperature during unloading.

Information should be given on control of the heating system and the method of temperature measurement.

3.5 Procedures to be followed when a cargo tank cannot be unloaded in accordance with the required procedures

This section should contain information on the procedures to be followed in the event that the requirements contained in Sections 3.3 and/or 3.4 cannot be met due to circumstances such as the following:

- failure of cargo tank stripping system; and
- failure of cargo tank heating system.

3.6 Cargo Record Book

The cargo record book should be completed in the appropriate places on completion of cargo unloading.

SECTION 4 - Procedures relating to the cleaning of cargo tanks, the discharge of residues, ballasting and deballasting

4.1 This section contains operational procedures in respect of tank cleaning, ballast and slops handling which must be followed in order to ensure compliance with the requirements of Annex II.

4.2 The following paragraphs outline the sequence of actions to be taken and contain the information essential to ensure that noxious liquid substances are discharged without posing a threat of harm to the marine environment.

4.3 Establish if the last cargo in the tank is included in the ship's approved list of noxious liquid substances, see table 1. If not included, no special tank cleaning, residue discharge, ballasting and deballasting procedures apply under the provisions of Annex II.

4.4 If the last cargo in the tank is included in the above mentioned list, the information necessary to establish the procedures for discharging the residue of that cargo, cleaning, ballasting and deballasting the tank, should take into account the following:

4.4.1 Category of substance

Obtain the category of the substance from table 1.

4.4.2 Stripping efficiency of tank pumping system

The contents of this section will depend on the design of the ship and whether it is a new ship or existing ship. (See flow diagrams - pumping/stripping requirements.)

4.4.3 Vessel within or outside Special Area

This section should contain instructions on whether the tank washings can be discharged into the sea within a Special Area (as defined in section 1.3) or outside a Special Area. The different requirements should be made clear and will depend on the design and trade of the ship.

4.4.4 Solidifying or high viscosity substance

The properties of the substance should be obtained from the shipping document.

4.4.5 Miscibility in water

This property of the substance should be obtained from table 1.

[Note: This section should be completed only for existing ships and only for Category B substances.

4.4.6 Compatibility with slops containing other substances

[This section should contain instructions on the permissible and non-permissible mixing of cargo slops. Reference should be made to compatibility guides.

4.4.7 Discharge to reception facility

[This section should identify those substances the residues of which are required to be prewashed and discharged to a reception facility.

4.4.8 Discharging into the sea

[This section should contain information on the factors to be considered in order to identify whether the residue/water mixtures are permitted to be discharged into the sea.

4.4.9 Use of cleaning agents or additives

[This section should contain information on disposal of cleaning agents (e.g. bulk solvent used for tank cleaning) and information on the use of additives to tank washing water (e.g. detergents).

4.4.10 Use of ventilation procedures for tank cleaning

[This section should make reference to table 1 to ascertain the suitability of the use of ventilation procedures.

4.5 Having assessed the above information, the correct operational procedures to be followed should be identified using the instructions and flow diagrams in this Section. Appropriate entries should be made in the cargo record book indicating the procedure adopted.

This section should contain procedures, which will depend on the age of the ship and pumping efficiency, based on the Standards. Examples of flow diagrams referred to in this section are given at addendum A and incorporate comprehensive requirements applicable to both new and existing ships. The Manual for a particular ship should only contain those requirements specifically applicable to that ship. The Manual should contain the following information and procedures:

Table 1: List of noxious liquid substances allowed to be carried.

Table 2: Cargo tank information.

Addendum A: Flow diagrams.

Addendum B: Prewash programmes.

Addendum C: Ventilation procedure.

Addendum D: Determination of permitted residue discharge rates for Category B Substances as required.

Outlines of the above tables and addenda follow.

Table 1: List of noxious liquid substances allowed to be carried

Substance	Category	Tanks (tank groups)* fit for carriage	Melting point °C	Viscosity at 20°C mPa.s			Suitable for ventilation Yes/No	Miscible in water Yes/No
				<25	25-60	≥60		

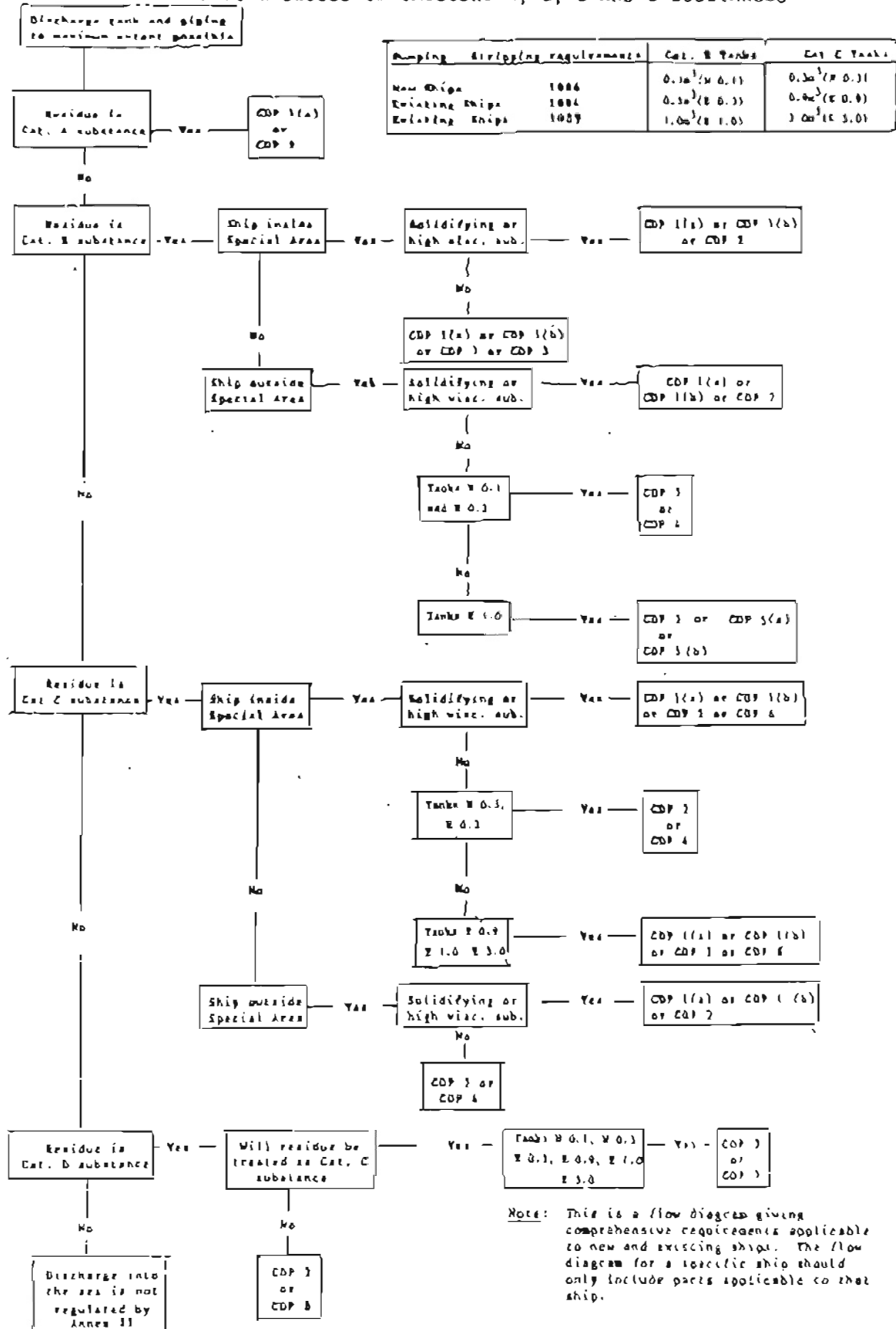
Note: Information need only be inserted in the fourth and fifth columns, relating to melting point and viscosity, for those substances which have a melting point greater than 0°C or a viscosity greater than 25 mPa.s at 20°C. When more than one commercial grade is shipped and the viscosities or the melting points of those commercial grades differ, enter and note that other commercial grades may have lower viscosities or melting points or give the values for each commercial grade which will be shipped.

* Tank numbers (tank groups) should be identical to those in the ship's Certificate of Fitness.

ADDENDUM A

FLOW DIAGRAMS

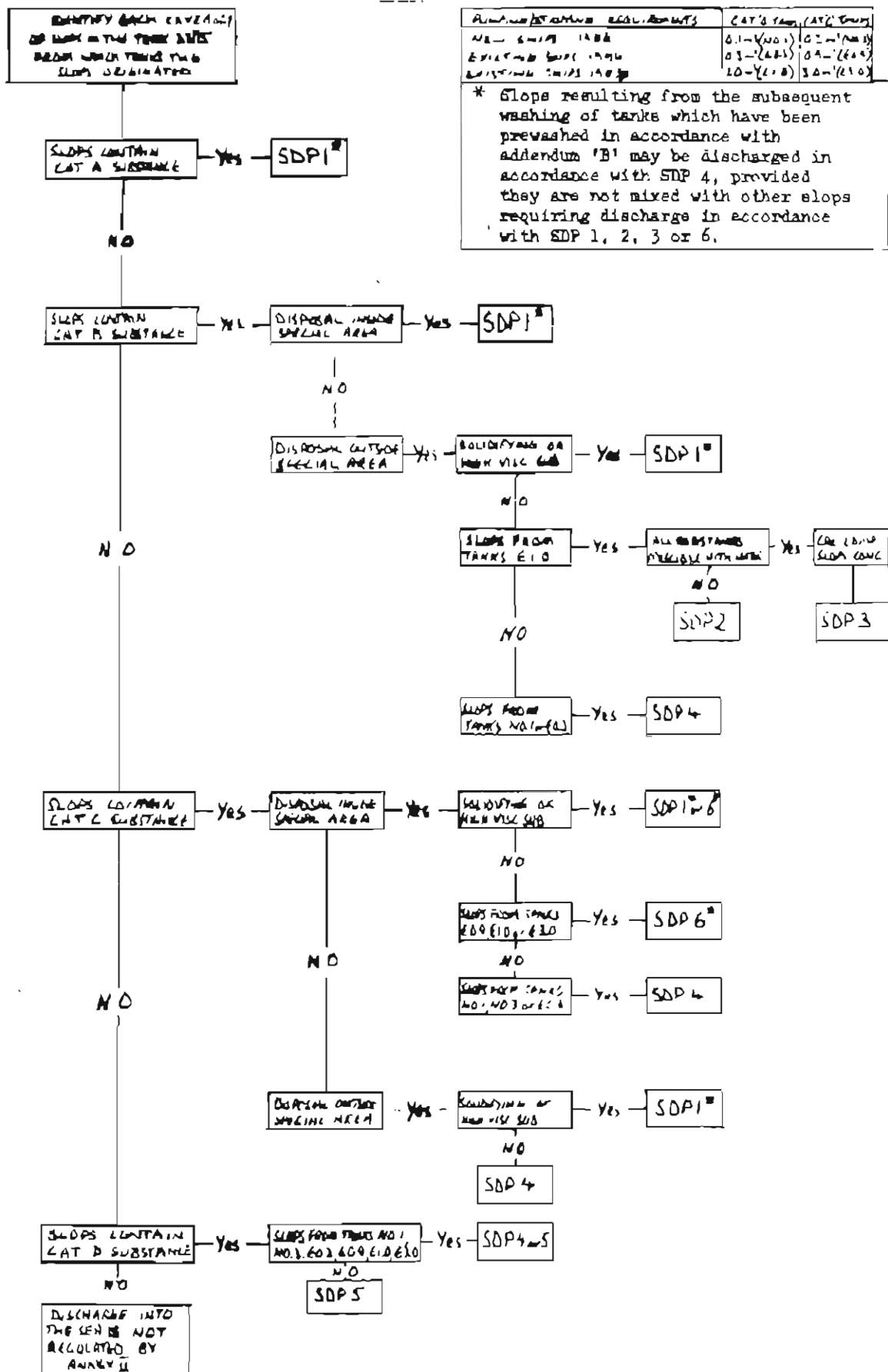
CLEANING OF CARGO TANKS AND DISPOSAL OF TANK WASHINGS/BALLAST CONTAINING RESIDUES OF CATEGORY A, B, C AND D SUBSTANCES



CLEANING AND DISPOSAL PROCEDURES (CDP)	SEQUENCE OF PROCEDURES									
	1(a)	1(b)	2	3	4	5(a)	5(b)	6	7	8
Apply prewash in accordance with appendix B and discharge residue to reception facility	X	X								
Apply prewash in accordance with Appendix B and transfer residues to slop tank for discharge to sea in accordance with chapter 10, section 10.5 or 10.6						X	X			
Apply subsequent wash of minimum one cycle		X					X			
Apply ventilation procedures in accordance with appendix C			X							
Residue may be retained on board and discharged outside special area				X						
Residues of substances with viscosities <60 mPa.s at the unloading temperature may be retained on board and discharged outside special area. Alternatively, tanks may be prewashed and slops discharged ashore								X		
Dilute residue in cargo tanks with water to obtain residue concentration in mixture of 10% or less										X
Ballast tank or, wash tank to commercial requirements	X			X	X	X		X	X	
Conditions for discharge of ballast/ residue/water mixtures other than prewash:										
> 12 miles from land	X	X		X	X	X	X	X	X	X
> 7 knots ship's speed	X	X		X	X	X	X	X	X	X
> 25 metres water depth	X	X		X	X	X	X	X		
Using underwater discharge	X	X		X	X	X	X	X	X	
Ballast added to tank		X					X			
Condition for discharge of ballasts:										
> 12 miles from land		X					X			
> 25 metres water depth		X					X			
Alternatively, residue/water mixtures may be discharged ashore (N.B. optional not MARPOL requirement)	X	X		X	X	X	X	X	X	X
Any water subsequently introduced into the tank may be discharged into the sea without restrictions	X	X	X	X	X	X	X	X	X	X

Note: Start at the top of the column under the CDP number specified and complete each procedure in sequence where marked X.

DISPOSAL OF PREWASH OR TANK WASHINGS CONTAINING
CATEGORY A, B, C or D SUBSTANCES FROM DEDICATED
SLOP TANKS OR CARGO TANKS CONTAINING TANK WASHING OR SLOPS



"Note: This is a flow diagram giving comprehensive requirements applicable to new and existing ships. The flow diagram for a specific ship should only include parts applicable to that ship."

SLOPS DISPOSAL PROCEDURES (SDP)	SEQUENCE OF PROCEDURES					
	1	2	3	4	5	6
Slops must be discharged ashore	X					
Establish discharge rate of miscible residue/water mixture in accordance with appendix D		X	X			
Divide obtained discharge rate of pure produce by composite slops concentration			X			
The figure obtained shows the rate at which discharge is permitted		X	X			
Residues of substances with viscosities < 60 mPa.s at the unloading temperature may be retained on board and discharged outside special area. Alternatively, tanks may be prewashed and slops discharged ashore						X
Dilute slops with water to obtain a solution of 10% or less - no restriction on discharge rate					X	
Discharge rate is maximum permitted by underwater discharge outlet				X		X
Additional discharge conditions						
- ship's speed at least 7 knots		X	X	X	X	X
- outside 12 miles from nearest land		X	X	X	X	X
- depth of water at least 25M		X	X	X		X
- using underwater discharge		X	X	X		X

Note: Start at the top of the column under the CDP number specified and complete each procedure in sequence where marked X.

ADDENDUM B

PREWASH PROCEDURES

This addendum to the Manual should contain prewash procedures based on appendix B of the Standards. These procedures should contain specific requirements for the use of the tank washing arrangements and equipment provided on the particular ship and include the following:

- washing machine positions to be used
- slops pumping out procedure
- requirements for hot washing
- number of cycles of washing machine (or time)
- minimum operating pressures

ADDENDUM C

VENTILATION PROCEDURES

This addendum to the Manual should contain ventilation procedures based on appendix C of the Standards. The procedures should contain specific requirements for the use of the cargo tank ventilation system, or equipment, fitted on the particular ship and should include the following:

- ventilation positions to be used
- minimum flow or speed of fans
- procedures for ventilating cargo pipeline, pumps, filters, etc.
- procedures for ensuring that tanks are dry on completion.

ADDENDUM D

DETERMINATION OF PERMITTED RESIDUE DISCHARGE RATES FOR CATEGORY B SUBSTANCES

This addendum to the Manual, which is required only by ships operating under regulation 5A(2)(b), should contain a method for the ship's crew to determine the permitted discharge rates for category B substances. The method should be based on sections 10.5 and 10.6 of the Standards.

ANNEX 4
Resolution MEPC.20(22)
ADOPTION OF THE STANDARDS FOR PROCEDURES AND ARRANGEMENTS FOR
THE DISCHARGE OF NOXIOUS LIQUID SUBSTANCES
adopted on 5 December 1985