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REPORT OF THE MARINE ENVIRONMENT PROTECTION COMMITTEE ON ITS FORTY-NINTH SESSION

Attached are annexes 13 to 25 to the report of the Marine Environment Protection Committee on its forty-ninth session (MEPC 49/22).

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ANNEX 13

RESOLUTION MEPC.107(49)

Adopted on 18 July 2003

REVISED GUIDELINES AND SPECIFICATIONS FOR POLLUTION PREVENTION EQUIPMENT FOR MACHINERY SPACE BILGES OF SHIPS

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

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

NOTING resolution MEPC.60(33) adopted on 30 October 1992 by which the Marine Environment Protection Committee adopted, at its thirty-third session, the revised Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships and invited Governments to adopt and apply them to the maximum possible extent which they found reasonable and practicable and to report to the Organization the results of such application,

NOTING FURTHER the provisions of regulation 16(5) of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 thereto (MARPOL 73/78), in which reference is made to the above-mentioned specifications,

RECOGNIZING the advancement of technology, as well as the amendments to Annex I of MARPOL 73/78 on its operational discharge requirements which were adopted by the Marine Environment Protection Committee in 1992 and which entered into force on 6 July 1993,

HAVING CONSIDERED, at its forty-ninth session, the Revised Guidelines and Specifications developed by the Sub-Committee on Ship Design and Equipment in the light of the requirements of Annex I of MARPOL 73/78,

1. ADOPTS the Revised Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships, the text of which is set out in the annex to this resolution, which supersedes the recommendations contained in resolution MEPC.60(33);

2. INVITES Governments to:

   (a) implement the Revised Guidelines and Specifications and apply them so that all equipment installed on board on or after 1 January 2005 meets these Revised Guidelines and Specifications in so far as is reasonable and practicable; and

   (b) provide the Organization with information on experiences gained from their application and, in particular, on successful testing of equipment against the Specifications;

3. REQUESTS the Secretariat, on the basis of information received, to maintain and update a list of approved equipment and to circulate it once a year to Governments; and

4. FURTHER INVITES Governments to issue an appropriate "Certificate of type approval" as referred to in paragraph 5.2.1 of the Specifications and to recognize such certificates issued under the authority of other Governments as having the same validity as certificates issued by them.

ANNEX

REVISED GUIDELINES AND SPECIFICATIONS FOR POLLUTION PREVENTION EQUIPMENT FOR MACHINERY SPACES OF SHIPS

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REVISED GUIDELINES AND SPECIFICATIONS FOR POLLUTION PREVENTION EQUIPMENT FOR MACHINERY SPACE BILGES OF SHIPS

1 INTRODUCTION

1.1 General

1.1.1 The specifications in respect of 15 ppm Bilge Separators are considered to be applicable for use in conjunction with oily bilge-water and ballast water from fuel oil tanks, as these are of a low or medium capacity, and are conditioned by the need to avoid discharging oil mixtures with an oil content more than 15 ppm of the mixture.

1.1.2 It is recognized that the development and testing of high capacity separating equipment designed for dealing with effluent from cargo tanks on tankers pose special problems and such equipment does not require to be tested under these specifications. Such development and tests should not be hindered and Administrations should be prepared to accept deviations from these specifications when they are considered necessary in this context.

1.1.3 It should be understood that a 15 ppm Bilge Separator must be capable of handling any oily mixtures from the machinery space bilges and be expected to be effective over the complete range of oils which might be carried on board ship, and deal satisfactorily with oil of very high relative density, or with a mixture presented to it as an emulsion. Cleansing agents, emulsifiers, solvents or surfactants used for cleaning purposes may cause the bilge water to emulsify. Proper measures should be taken to minimize the presence of these substances in the bilges of a ship. With the possibility of emulsified bilge water always present the 15 ppm Bilge Separator must be capable of separating the oil from the emulsion to produce an effluent with an oil content not exceeding 15 ppm.

1.1.4 Where a range of 15 ppm Bilge Separators of the same design, but of different capacities, requires certification in accordance with these specifications, the Administration may accept tests in two capacities within the range, in lieu of tests on every size, providing that the two tests actually performed are from the lowest quarter and highest quarter of the range.

Training

1.1.5 Ship staff training should include familiarization in the operation and maintenance of the equipment.

Maintenance

1.1.6 The routine maintenance of the 15 ppm Bilge Separator and the 15 ppm Bilge Alarm system should be clearly defined by the manufacturer in the associated Operating and Maintenance Manuals. All routine and repair maintenance to be recorded.

1.1.7 Regulations referred to in these Guidelines and Specifications are those contained in Annex I of MARPOL 73/78.

1.2 Purpose

1.2.1 These Guidelines and Specifications contain requirements regarding the design, installation, performance and testing of pollution prevention equipment required by regulation 16.

1.2.2 The purpose of these Guidelines and Specifications is:

.1 to provide a uniform interpretation of the requirements of regulation 16;

.2 to assist Administrations in determining appropriate design, construction and operational parameters for pollution prevention equipment when such equipment is fitted in ships flying the flag of their State;

.3 to define test and performance requirements for pollution prevention equipment; and

.4 to provide guidance for installation requirements.

1.3 Applicability

1.3.1 These Guidelines and Specifications apply:

.1 to installations fitted to ships, the keel of which are laid or which are at a similar stage of construction on or after 1 January 2005; and

.2 to new installations fitted on or after 1 January 2005 to ships, the keel of which were laid or which were at a similar stage construction before 1 January 2005 in so far as is reasonable and practicable.

1.3.2 The Guidelines and Specifications adopted under resolutions A.393(X) and MEPC.60(33) are not applicable to ships to which these new Guidelines and Specifications apply.

1.3.3 Installations fitted to ships the keel of which were laid or which were at a similar stage of construction before 1 January 2005 should comply either:

.1 with the Recommendation on International Performance and Test Specifications for Oily-Water Separating Equipment and Oil Content Meters adopted under resolution A.393(X), for equipment installed on board on or after 14 November 1978, as applicable; or

.2 with the Guidelines and Specifications adopted under resolution MEPC.60(33), for pollution prevention equipment installed on board on or after 30 April 1994, as applicable; or

with the requirements contained in these Guidelines and Specifications.

1.4 Summary of requirements

1.4.1 The approval requirements for pollution prevention equipment specified in these Guidelines and Specifications are summarized below:

.1 the 15 ppm Bilge Separator should be tested for type approval in accordance with the procedures described in part 1 of the annex, subject to environmental tests specified in part 3 of the annex; and

.2 the oil content meter for the 15 ppm Bilge Separator effluent discharge, hereinafter referred to as the 15 ppm Bilge Alarm should be tested for type approval in accordance with part 2 of the annex, subject to the environmental tests specified in part 3 of the annex.

2 BACKGROUND

2.1 The requirements of Annex I of MARPOL 73/78 relating to pollution prevention equipment for ships are set out in regulation 16, which stipulates that ships of 400 gross tonnage and above should be installed with approved equipment.

2.2 Regulation 16(5) stipulates that the oil content of the effluent from 15 ppm Bilge Separators should not exceed 15 ppm. The 15 ppm Bilge Alarm shall activate to indicate when this level cannot be maintained, and initiate automatic stop of overboard discharge of oily mixtures where applicable.

3 DEFINITIONS

3.1 Pollution prevention equipment

For the purpose of these Guidelines and Specifications pollution prevention equipment installed in a ship in compliance with regulation 16 comprises:

.1 15 ppm Bilge Separator;

.2 15 ppm Bilge Alarm; and

.3 automatic stopping device

3.2 15 ppm Bilge Separator

"15 ppm Bilge Separator" may include any combinations of a separator, filter, coalescer or other means, and also a single unit designed to produce an effluent with oil content not exceeding 15 ppm.

3.3 15 ppm Bilge Alarm

The alarm arrangements specified in regulation 16(5) are referred to in these Guidelines and Specifications as a "15 ppm Bilge Alarm".

3.4 ppm

"ppm" means parts of oil per million parts of water by volume.

3.5 ppm display

"ppm display" is a numerical scale display of the 15 ppm Bilge Alarm.

3.6 Automatic Stopping Device

The automatic stopping device is a device used, where applicable, to automatically stop any discharge overboard of oily mixture when the oil content of the effluent exceeds 15 ppm. The automatic stopping device should consist of a valve arrangement installed in the effluent outlet line of the 15 ppm Bilge Separator which automatically diverts the effluent mixture from being discharged overboard back to the ship's bilges or bilge tank when the oil content of the effluent exceeds 15 ppm.

4 TECHNICAL SPECIFICATIONS

4.1 15 ppm Bilge Separator

4.1.1 The 15 ppm Bilge Separator should be strongly constructed and suitable for shipboard use, bearing in mind its intended location on the ship.

4.1.2 It should, if intended to be fitted in locations where flammable atmospheres may be present, comply with the relevant safety regulations for such spaces. Any electrical equipment which is part of the 15 ppm Bilge Separator should be based in a non-hazardous area, or should be certified by the Administration as safe for use in a hazardous area. Any moving parts which are fitted in hazardous areas should be arranged so as to avoid the formation of static electricity.

4.1.3 The 15 ppm Bilge Separator should be so designed that it functions automatically. However, fail-safe arrangements to avoid any discharge in case of malfunction should be provided.

4.1.4 Changing the feed to the 15 ppm Bilge Separator from bilge water to oil, bilge water to emulsified bilge water, or from oil and/or water to air should not result in the discharge overboard of any mixture containing more than 15 ppm of oil.

4.1.5 The system should require the minimum of attention to bring it into operation. In the case of equipment used for engine room bilges, there should be no need for any adjustment to valves and other equipment to bring the system into operation. The equipment should be capable of operating for at least 24 hours of normal duty without attention.

4.1.6 All working parts of the 15 ppm Bilge Separator which are liable to wear or to damage should be easily accessible for maintenance.

4.2 15 ppm Bilge Alarm

4.2.1 These Specifications relate to 15 ppm Bilge Alarms.

4.2.2 The 15 ppm Bilge Alarm should resist corrosion in conditions of the marine environment.

4.2.3 The 15 ppm Bilge Alarm should, if intended to be fitted in locations where flammable atmosphere may be present, comply with the relevant safety regulations for such spaces. Any electrical equipment which is part of the 15 ppm Bilge Alarm should be placed in a

non-hazardous area, or should be certified by the Administration as safe for use in a hazardous atmosphere. Any moving parts which are fitted in hazardous areas should be arranged so as to avoid the formation of static electricity.

4.2.4 The 15 ppm Bilge Alarm should not contain or use any substance of a dangerous nature, unless adequate arrangements, acceptable to the Administration, are provided to eliminate any hazards introduced thereby.

4.2.5 A ppm display should be provided. The ppm display should not be affected by emulsions and/or the type of oil given that the test fluid detailed in paragraph 1.2.4 of part 1 of the annex is deemed to represent a mixture that may be expected in the machinery space bilges of a ship. It should not be necessary to calibrate the 15 ppm Bilge Alarm on board ship, but onboard testing according to the manufacturers instructions shall be permitted. The accuracy of the readings should at all times remain within the limit specified in paragraph 2.2.1 of part 2 of the annex.

4.2.6 The response time of the 15 ppm Bilge Alarm, that is, the time which elapses between an alteration in the sample being supplied to the 15 ppm Bilge Alarm and the ppm display showing the correct response, should not exceed 5 seconds.

4.2.7 The 15 ppm Bilge Alarm should be fitted with an electrical/electronic device which should be pre-set by the manufacturer to activate when the effluent exceeds 15 ppm. This should also operate automatically if at any time the 15 ppm Bilge Alarm should fail to function, require a warm-up period or otherwise be de-energized.

4.2.8 It is recommended that a simple means be provided aboard ship to check on instrument drift, repeatability of the instrument reading, and the ability to re-zero the instrument.

4.2.9 The 15 ppm Bilge Alarm should record date, time and alarm status, and operating status of the 15 ppm Bilge Separator. The recording device should also store data for at least eighteen months and should be able to display or print a protocol for official inspections as required. In the event the 15 ppm Bilge Alarm is replaced, means should be provided to ensure the data recorded remains available on board for 18 months.

4.2.10 To avoid wilful manipulation of 15 ppm Bilge Alarms, the following items should be included:

.1 every access of the 15 ppm Bilge Alarm beyond the essential requirements of paragraph 4.2.8 requires the breaking of a seal; and

.2 the 15 ppm Bilge Alarm should be so constructed that the alarm is always activated whenever clean water is used for cleaning or zeroing purposes.

4.2.11 The accuracy of the 15 ppm Bilge Alarms should be checked at IOPP Certificate renewal surveys according to the manufacturers instructions. Alternatively the unit may be replaced by a calibrated 15 ppm Bilge Alarm. The calibration certificate for the 15 ppm Bilge Alarm, certifying date of last calibration check, should be retained onboard for inspection purposes. The accuracy checks can only be done by the manufacturer or persons authorized by the manufacturer.

5 SPECIFICATION FOR TYPE APPROVAL TESTING OF POLLUTION PREVENTION EQUIPMENT

5.1 Testing requirements

The production model of pollution prevention equipment, for which the approval will apply, should be identical to the equipment, type-tested in accordance with the test and performance specifications contained in part 1 or 2 of the annex to these Guidelines and Specifications. The equipment should also be type-tested in accordance with the specifications for environmental testing contained in part 3 of the annex.

5.2 Approval and certification procedures

5.2.1 Pollution prevention equipment which in every respect fulfils the requirements of these Guidelines and Specifications may be approved by the Administration for fitting on board ships. The approval should take the form of a certificate of type approval specifying the main particulars of the apparatus and any limiting conditions on its usage necessary to ensure its proper performance. Such certificate should be issued in the format shown in part 5 of the annex. A copy of the certificate of type approval for pollution prevention should be carried on board ships fitted with such equipment at all times.

5.2.2 A certificate of type approval for a 15 ppm Bilge Alarm should be issued and retained on board.

5.2.3 Approved pollution prevention equipment may be accepted by other countries for use on their vessels on the basis of the first trials, or after new tests carried out under the supervision of their own representatives. Should equipment pass a test in one country but fail a test of a similar nature in another country, then the two countries concerned should consult one another with a view to reaching a mutually acceptable agreement.

6 INSTALLATION REQUIREMENTS

6.1 15 ppm Bilge Separator

6.1.1 For future inspection purposes on board ship, a sampling point should be provided in a vertical section of the water effluent piping as close as is practicable to the 15 ppm Bilge Separator outlet. Re-circulating facilities should be provided, after and adjacent to the overboard outlet of the stopping device to enable the 15 ppm Bilge Separator system, including the 15 ppm Bilge Alarm and the automatic stopping device, to be tested with the overboard discharge closed (see figure 1).

The re-circulating facility should be so configured as to prevent under all operating conditions any by-pass of the oily-water-separator.

6.1.2 The capacity of the supply pump should not exceed 110% of the rated capacity of the 15 ppm Bilge Separator with size of pump and motor to be stated on the Certificate of Type Approval.

6.1.3 The 15 ppm Bilge Separator should be fitted with a permanently attached plate giving any operational or installation limits considered necessary by the manufacturer or the Administration.

6.1.4 A vessel fitted with a 15 ppm Bilge Separator should, at all times, have on board a copy of the Operating and Maintenance manuals.

6.2 15 ppm Bilge Alarm

6.2.1 The layout of the installation should be arranged so that the overall response time (including the response time of the 15 ppm Bilge Alarm) between an effluent discharge from the 15 ppm Bilge Separator exceeding 15 ppm, and the operation of the Automatic Stopping Device preventing overboard discharge, should be as short as possible and in any case not more than 20 s.

6.2.2 The arrangement on board ship for the extraction of samples from the 15 ppm Bilge Separator discharge line to the 15 ppm Bilge Alarm should give a truly representative sample of the effluent with an adequate pressure and flow.

6.2.3 A vessel fitted with a 15 ppm Bilge Alarm should, at all times, have on board a copy of the Operating and Maintenance manuals.

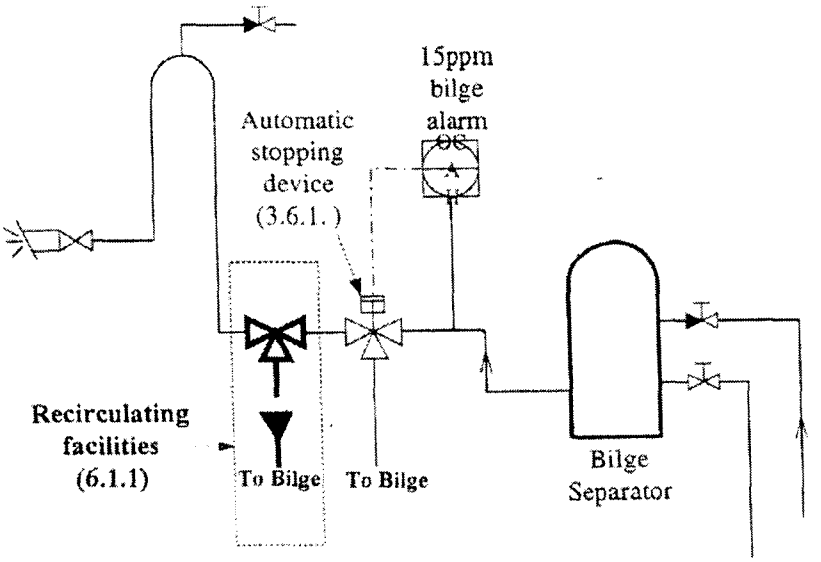

Figure 1

ANNEX

The annex provides detailed Test and Performance Specifications for pollution prevention equipment and contains:

Part 1 - Test and Performance Specifications for Type Approval of 15 ppm Bilge Separators;

Part 2 - Test and Performance Specifications for Type Approval of 15 ppm Bilge Alarms;

Part 3 - Specification for Environmental Testing for Type Approval of pollution prevention equipment;

Part 4 - Method for the Determination of Oil Content; and

Part 5 - Documentation of Approval.

PART 1 – TEST AND PERFORMANCE SPECIFICATIONS FOR TYPE APPROVAL OF 15 PPM BILGE SEPARATORS

1.1 General

1.1.1 These Test and Performance Specifications for Type Approval relate to 15 ppm Bilge Separators. In addition, the electrical and electronic systems of the 15 ppm Bilge Separator should be tested in accordance with the Specifications for Environmental Testing contained in part 3 of this annex.

1.1.2 The 15 ppm Bilge Separator being tested should comply with the relevant requirements of the technical specifications contained in section 4.1 of these Guidelines and Specifications.

1.2 Test Specifications

1.2.1 These Specifications relate to 15 ppm Bilge Separators. 15 ppm Bilge Separators should be capable of producing an effluent for discharge to the sea containing not more than 15 ppm of oil irrespective of the oil content of the feed supplied to it.

1.2.2 The influent, whether emulsified or non-emulsified, which the system has in practice to deal with, depends on:

.1 the position of the oil/water interface, with respect to the suction point, in the space being pumped;

.2 the type of pump used;

.3 the type and degree of closure of any control valve in the circuit; and

.4 the general size and configuration of the system.

Therefore the test rig must be so constructed as to include not only the 15 ppm Bilge Separator, but also the pumps, valves, pipes and fittings as shown in figure 2. It is to be so designed for testing 15 ppm Bilge Separators with and without an integral supply pump.

- For the testing of 15 ppm Bilge Separators having no integral pump, the centrifugal pump "A" (figure 2) is used to feed the 15 ppm Bilge Separator with valves 4 and 6 open, and valve 5 closed. The rate of flow from the centrifugal pump "A" is matched to the design throughput of the 15 ppm Bilge Separator by the adjustment of the centrifugal pump's discharge valve.

- Where the 15 ppm Bilge Separator is fitted with an integral pump, the centrifugal pump "A" is not required.

- A centrifugal pump "B" should be fitted to re-circulate the Test Fluid C in the tank to ensure that the Test Fluid C is maintained in a stable condition throughout the testing. Re-circulation is not required for Test Fluids A and B.

- To ensure a good mix of the Test Fluid and the water, a conditioning pipe as specified in paragraph 1.2.5 of part 1 of this annex shall be fitted immediately before the 15 ppm Bilge Separator.

- Other valves, flow meters and sample points should be fitted to the test rig as shown in figure 2.

- The pipe work should be designed for a maximum liquid velocity of 3 metres/second.

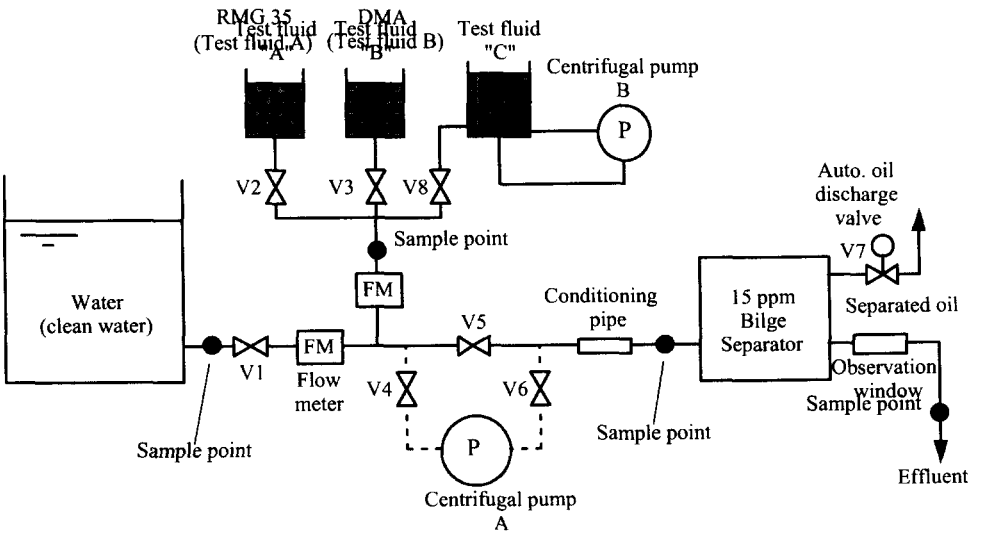

Figure 2 - Test rig

1.2.3 The tests should be carried out with a supply rate equal to the full throughput for which the 15 ppm Bilge Separator is designed.

1.2.4 Tests should be performed using three grades of test fluids

.1 **Test Fluid "A"** which is a marine residual fuel oil in accordance with ISO 8217, type RMG 35 (density at 15°C not less than 980 kg/m^3)

.2 **Test Fluid "B"** which is a marine distillate fuel oil in accordance with ISO 8217, type DMA (density at 15°C not less than 830 kg/m^3).

.3 **Test Fluid "C"** which is a mixture of an oil-in-fresh water emulsion, in the ratio whereby 1 kg of the mixture consists of

- 947.8 g of fresh water;
- 25.0 g of Test Fluid "A"
- 25.0 g of Test Fluid "B";
- 0.5 g surfactant (sodium salt of dodecylbenzene sulfonic acid) in the dry form;
- 1.7 g "iron oxides" (The term "iron oxide" is used to describe black ferrosoferric oxide (Fe_3O_4) with a particle size distribution of which 90% is less than 10 microns, the remainder having a maximum particle size of 100 microns);

Note: Procedure for preparing Test Fluid C: (see example calculation)[1]

- Preparation

  (1) measure out 1.2 times the quantity of surfactant required for the "Test with Test Fluid C" as described in 1.2.11; and

  (2) mix it with fresh water and stir well in a small container (e.g., a beaker or bucket) to make a mixture ("Mixture D") until the surfactant has been thoroughly dissolved.

- To make Test Fluid C in the test fluid tank (figure 3),

  (3) Fill test fluid tank with fresh water with a quantity 1.2 times the volume of the total quantity of water in the test fluid "C" needed for the test described in 1.2.11.

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[1] Calculation of ingredients of Test Fluid" C" (Example: 2m^3/h Bilge Separator).
Operating period for the Test with Test Fluid "C" as per 1.2.11: 2.5 hours plus conditioning time (say 0.5hour) = 3 hours
Net volume needed for the Test: Volume of test water: 2m^{3}x 3 hours = 6m^3
Volume Test Fluid "C": 6% of test water = 0.06 x 6m^3 = 0.36m^3
Actual Volume to be prepared:
Volume of Test Fluid "C" to be prepared: 1.2 times of the net volume of Test Fluid "C" = 1.2 x 0.36 = 0.432m^3
Volume of fresh water in Test Fluid "C": (947.8g/1000g) of Test Fluid "C" =0.9478 x 0.432 = 0.4094m^3
Weight of Test Fluid "A": (25g/1000g) of Test Fluid "C" =25/1000 x 0.432 x 1000 = 10.8kg
Weight of Test Fluid "B": (25g/1000g) of Test Fluid "C" = 25/1000 x 0.432 x 1000 = 10.8kg
Weight of surfactant: (0.5g/1000g) of Test Fluid "C" = 0.5/1000 x 0.432 x 1000 = 0.216kg
Weight of iron oxide: (1.7g/1000g) of Test Fluid "C")=1.7/1000 x 0.432 x 1000 x 0.734kg

(4) Operate centrifugal pump B running at a speed of not less than 3,000 rpm (nominal) with a flow rate at which the volume of the test fluid has been changed out at least once per minute.

(5) Add "Mixture D" first, followed by oil and suspended solids (iron oxides) respectively, both 1.2 times of the required amounts, to the fresh water in the tank,

(6) To establish a stable emulsion keep running the centrifugal pump B for one hour and confirm no oil floats on the surface of the test fluid.

(7) After the one hour stated in paragraph (6) above keep running the centrifugal pump B at reduced speed to approximately 10% of original flow rate, until the end of the test.

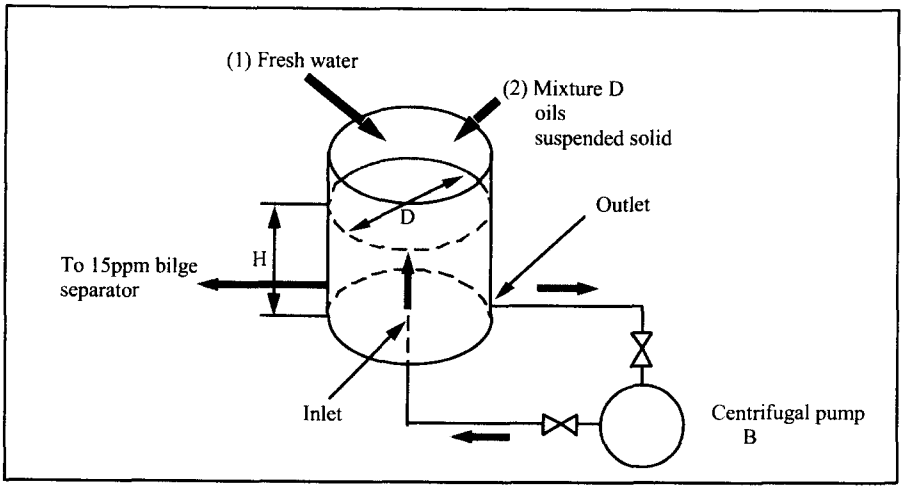

Figure 3 - Tank of Test Fluid "C"

Note:

(1) The tank should be of a cylindrical shape. The level of the water should be:

$$2D \geqq H \geqq 0.5D, \text{ when preparing Test Fluid "C".}$$

(2) Outlet going to centrifugal pump B should be placed at as low a position to the tank as possible.

(3) Inlet to the tank should be fitted at the center of tank bottom so that the mixture flows upward to obtain uniform and stable emulsion.

If the 15 ppm Bilge Separator is fitted with heating facilities to allow the separated oil retained in it to be discharged when the automatic discharge valve is activated, the Certificate of Type Approval should be endorsed under the heading "Limiting Conditions Imposed" with the following statement:

"The 15 ppm separator is fitted with heating facility."

1.2.5 If the 15 ppm Bilge Separator includes an integrated feed pump, this 15 ppm Bilge Separator should be tested with that pump supplying the required quantity of Test Fluid and water to the 15 ppm Bilge Separator at its rated capacity.

If the 15 ppm Bilge Separator is to be fed by the ship's bilge pumps, then the unit will be tested by supplying the required quantity of Test Fluid and water mixture to the inlet of a centrifugal pump operating at not less that 1,000 rpm (see dotted line in figure 2). This pump should have a delivery capacity of not less than 1.1 times the rated capacity of the 15 ppm Bilge Separator at the delivery pressure required for the test. The variation in Test Fluid/water ratio will be obtained by adjusting valves on the Test Fluid and water suction pipes adjacent to the pump suction, and the flow rate of Test Fluid and water or the Test Fluid content of the supply to the 15 ppm Bilge Separator should be monitored. If a centrifugal pump is used, the excess pump capacity should be controlled by a throttle valve on the discharge side of the pump.

In all cases, to ensure uniform conditions, the piping arrangements immediately prior to the 15 ppm Bilge Separator should be such that the influent to the 15 ppm Bilge Separator should have a Reynolds Number of not less than 10,000 as calculated in fresh water, a liquid velocity of not less than 1 metre per second and the length of the supply pipe from the point of Test Fluid injection to the 15 ppm Bilge Separator should have a length not less than 20 times its diameter. A mixture inlet sampling point and a thermometer pocket should be provided near the 15 ppm Bilge Separator inlet and an outlet sampling point and observation window should be provided on the discharge pipe.

1.2.6 In order to approach isokinetic sampling – i.e. the sample enters the sampling pipe at stream velocity – the sampling arrangement should be as shown in figure 4 and, if a cock is fitted, free flow should be effected for at least one minute before any sample is taken. The sampling points should be in pipes running vertically.

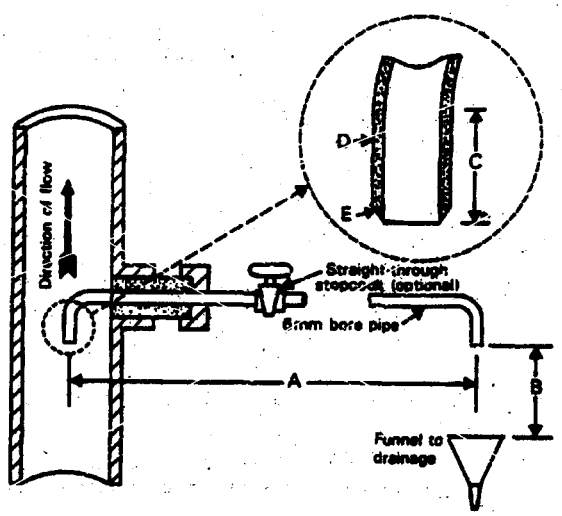

Figure 4 – Diagram of sampling arrangements

A Distance A, not greater than 400 mm
B Distance B, sufficient to insert sampling bottle
C Dimension C, straight length should not be less than 60 mm
D Dimension D, pipe thickness should not be greater than 2mm
E Detail E, chisel-edged chamfer (30°)

1.2.7 In the case of the 15 ppm Bilge Separator depending essentially on gravity, the feed to the system of the test water and Test Fluid mixture should be maintained at a temperature not greater than 40°C, and heating and cooling coils should be provided where necessary. The water shall have a density of not more than 1,015 at 20°C. In other forms of separation where the dependence of separation efficiency on temperature is not established, tests should be carried out over a range of influent temperatures representing the normal shipboard operating range of 10°C to 40°C or should be taken at a temperature in this range where the separation efficiency is known to be worst.

1.2.8 In those cases where, for the 15 ppm Bilge Separator, it is necessary to heat water up to a given temperature and to supply heat to maintain that temperature, the tests should be carried out at the given temperature.

1.2.9 The tests with Test Fluid "A" should be carried out as follows:

.1 To ensure that the 15 ppm Bilge Separator commences the test with the oil section full of Test Fluid and with the supply line impregnated with Test Fluid, the 15 ppm Bilge Separator should, after filling with water (density at 20°C not more than 1,015) and while in the operating condition, be fed with pure Test Fluid for not less than 5 min.

.2 The 15 ppm Bilge Separator should be fed with a mixture composed of between 5,000 and 10,000ppm of Test Fluid in water until steady conditions have been established. Steady conditions are assumed to be the conditions established after pumping through the 15 ppm Bilge Separator a quantity of Test Fluid/water mixture not less than twice the volume of the 15 ppm Bilge Separator. The test should then proceed for 30 min. Samples should be taken at the effluent outlet at 10 min and 20 min from the start of this period. At the end of this test, an air cock should be opened on the suction side of the pump and, if necessary, the oil and water valves should be slowly closed together, and a sample taken at the effluent discharge as the flow ceases (this point can be checked from the observation window).

.3 A test identical to that described in 1.2.9.2, including the opening of the air cock, should be carried out with a mixture composed of approximately 25%* Test Fluid and 75%* water.

.4 The 15 ppm Bilge Separator should be fed with 100%* of Test Fluid for at least 5 min during which time the observation window should be checked for any oil discharge. Sufficient Test Fluid should be fed into the 15 ppm Bilge Separator to operate the automatic oil discharge valve. After the operation of the oil discharge valve, the test should be continued for 5 min using a 100%* Test Fluid supply in order to check the sufficiency of the oil discharge system.

.5 The 15 ppm Bilge Separator should be fed with water (density at 20°C not more than 1,015) for 15 min. Samples of the separated water effluent are taken at the beginning of the test and after the first 10 min.

.6 A test lasting a minimum of 2 h should be carried out to check that the 15 ppm Bilge Separator will operate continuously and automatically. This trial should use a cycle varying progressively from water to oily mixture with approximately 25%*

* Percentage of volume.

Test Fluid content and back to water every 15 minutes, and should test adequately any automatic device which is fitted. The whole test sequence should be performed as a continuous programme. At the end of the test, while the 15 ppm Bilge Separator is being fed with 25%* Test Fluid, a water effluent sample should be taken for analysis.

1.2.10 The tests with Test Fluid "B" should be carried out as follows:

.1 The 15 ppm Bilge Separator should be fed with a mixture composed of between 5,000 and 10,000ppm of Test Fluid in water until steady conditions have been established. Steady conditions are assumed to be the conditions established after pumping through the 15 ppm Bilge Separator a quantity of Test Fluid/water mixture not less than twice the volume of the 15 ppm Bilge Separator. The test should then proceed for 30 min. Samples should be taken at the effluent outlet at 10 min and 20 min from the start of this period. At the end of this test, an air cock should be opened on the suction side of the pump and, if necessary, the oil and water valves should be slowly closed together, and a sample taken at the effluent discharge as the flow ceases (this point can be checked from the observation window).

.2 A test identical to that described in 1.2.10.1, including the opening of the air cock, should be carried out with a mixture composed of approximately 25%* Test Fluid and 75%* water.

1.2.11 The tests with Test Fluid "C" should be carried out as follows:

.1 The 15 ppm Bilge Separator should be fed with a mixture composed of 6% Test Fluid "C" and 94% water to have emulsified oil content of 3,000 ppm in the test water until steady conditions have been established. Steady conditions are assumed to be the conditions established after pumping through the 15 ppm Bilge Separator a quantity of Test Fluid "C"/water mixture not less than twice the volume of the 15 ppm Bilge Separator.

.2 The test should then proceed for 2.5 h. Samples should be taken at the effluent outlet at 50 minutes and 100 minutes after conditioning. At the end of this test, an air cock should be opened on the suction side of the pump and, if necessary, the Test Fluid "C" and water valves should be slowly closed together, and a sample taken at the effluent discharge as the flow ceases (this point can be checked from the observation window).

1.2.12 Sampling should be carried out as shown in figure 4 so that the sample taken will suitably represent the fluid issuing from the effluent outlet of the 15 ppm Bilge Separator.

1.2.13 Samples should be taken in accordance with ISO 9377-2:2000. The sample is to be extracted on the same day of collection, and be sealed and labelled in the presence of a representative of the national authority and arrangements should be made for analysis as soon as possible and in any case within seven days provided the samples are being kept between 2°C and 6°C at laboratories approved by the Administration.

1.2.14 The oil content of the samples should be determined in accordance with part 4 of the annex.

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* Percentage of volume.

1.2.15 When accurate and reliable oil content meters are fitted at inlet and outlet of the 15 ppm Bilge Separator, one sample at inlet and outlet taken during each test will be considered sufficient if they verify, to within ± 10%, the meter readings noted at the same instant.

1.2.16 In the presentation of the results, the following data testing methods and readings should be reported:

.1 Properties of test fluids A and B:

- density at 15°C;
- kinematic viscosity (centistokes @ 100°C /40°C);
- flashpoint;
- ash; and
- water content;

.2 Properties of test fluid C:

- type of surfactant;
- particle size percentage of the non soluble suspended solids; and
- surfactant and iron oxide quality verification;

.3 Properties of the water in the water tank:

- density of water at 20°C; and
- details of any solid matter present;

.4 Temperature at the inlet to the 15 ppm Bilge Separator;

.5 A diagram of the test rig;

.6 A diagram of the sampling arrangement; and

.7 The method used in analysis of all samples taken and the results thereof, together with oil content meter readings, where appropriate.

PART 2 - TEST AND PERFORMANCE SPECIFICATIONS FOR TYPE APPROVAL OF 15 PPM BILGE ALARMS

2.1 General

2.1.1 These Test and Performance Specifications relate to 15 ppm Bilge Alarms. In addition, the electrical and electronic section of these systems should be in accordance with the Specifications for Environmental Testing contained in part 3 of this annex.

2.1.2 The 15 ppm Bilge Alarm being tested should comply with all the relevant requirements of the technical specifications contained in section 4.2 of these Guidelines and Specifications.

2.2 Test specifications

2.2.1 For a 15 ppm Bilge Alarm, the accuracy should be within ± 5 ppm. The accuracy of a 15 ppm Bilge Alarm should remain within the above limits despite the presence of contaminants other than oil, and the power supply varying by 10% from the design value – i.e. in respect of electricity, compressed air, etc.

2.2.2 The sampling arrangement for the test rig should be such that a representative homogeneous sample is obtained under all conditions of operation and under all operational proportions of oil content. The sample should be obtained from the full flow through the 15 ppm Bilge Alarm, but when this is impracticable the sampling arrangements shown in figure 4 in part 1 should be used. Special care should be given to this stage of the process and the validity of the resultant findings.

2.2.3 During the various tests, the response time of the 15 ppm Bilge Alarm should be checked and it should be noted whether alarms operate adequately when a pre-stated threshold is exceeded.

2.2.4 A diagrammatic arrangement of a test facility for evaluating the performance of the 15 ppm Bilge Alarm is given in figure 5. The accuracy of the 15 ppm Bilge Alarm will be determined by comparing its readings against a known flow of Test Fluid injected into a known flow of water. The grab samples taken will be analysed in a laboratory by the methods specified in part 4 of this annex. The results of the laboratory analysis will be used for correction and to indicate sampling and test equipment variability. The water flow rate will be adjusted so that the entire Test Fluid-water flow passes through the 15 ppm Bilge Alarm, except the intermittent grab sample stream. Special care should be given to keep, continuously, a constant Test Fluid content in the water that flows into the 15 ppm Bilge Alarm. The metering pumps should be adjusted to deliver a nearly continuous quantity of Test Fluid. If Test Fluid injection becomes intermittent at low concentrations, the Test Fluid may be pre-mixed with water to provide continuous flow. The Test Fluid injection point should be immediately up-stream of the 15 ppm Bilge Alarm inlet to minimize time lags.

Calibration test

2.2.5 The 15 ppm Bilge Alarm will be calibrated and zeroed as per the manufacturer's instructions. It will then be tested with the three test fluids "A", "B" and "C", as specified in paragraph 1.2.4 of part 1 of the annex, at the following oil concentrations in parts per million: 0, 15, and at the full scale of the meter. Each concentration test will last for 15 min. Following each concentration test, the 15 ppm Alarm will be run on oil-free water for 15 min and the reading noted. If it proves necessary to re-zero or re-calibrate the 15 ppm Bilge Alarm during this test, this fact will be noted.

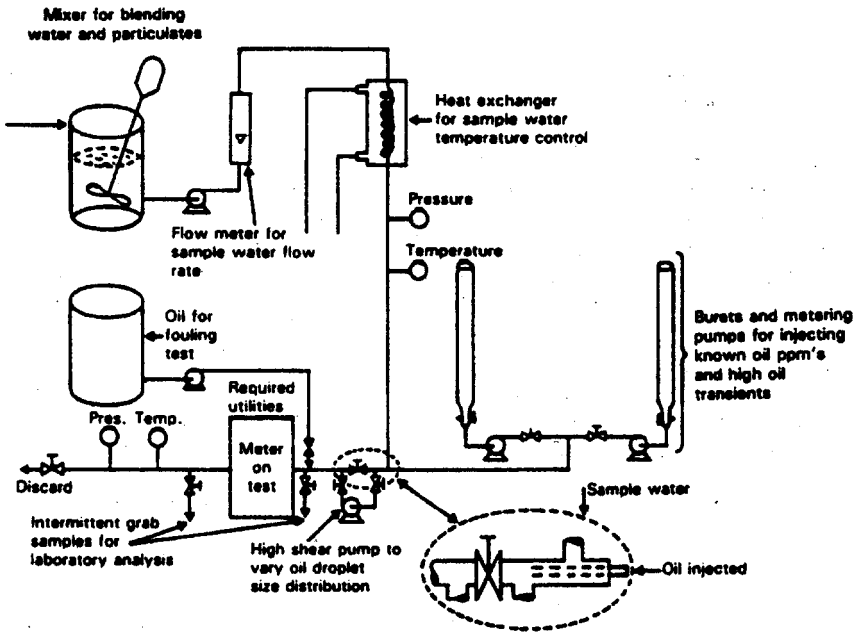


Figure 5 - Diagrammatic arrangements of test facilities

Contaminant and colour test

2.2.6 The 15 ppm Bilge Alarm should undergo contaminant and colour tests as follows:

.1 the 15 ppm Bilge Alarm should be run on a mixture of clean water and 10 ppm Test Fluid "B" and reading noted;

.2 the water supply should be changed from 10 ppm Test Fluid "B" and clean water to 10 ppm Test Fluid "B" and water contaminated with iron oxide in a concentration of 10 ppm;

.3 any shift in the 15 ppm Bilge Alarm reading should be noted. The reading should be within the accuracy limits specified in paragraph 2.2.1;

.4 the procedure specified in .2 and .3 above should be repeated with iron oxide concentrations of 50 ppm and 100 ppm respectively;

.5 the 15 ppm Bilge Alarm should be run on a mixture of clean water and 10 ppm Test Fluid "B" and its reading noted;

.6 the water supply should be changed from clean water to very salt water (a solution of 6% common salt with clean water);

.7 any shift in the 15 ppm Bilge Alarm reading should be noted. The reading should be within the accuracy limits specified in paragraph 2.2.1; and

.8 sufficient water should be available in the mixing tank to ensure an effective test of not less than 15 min.

Sample pressure or flow test

2.2.7 The 15 ppm Bilge Alarm should be run on a 15 ppm Test Fluid "B" sample. The water pressure or flow rate of the mixture should be adjusted from one half normal, normal and twice normal. Any effect of these changes on the 15 ppm Bilge Alarm ppm display reading should be noted and recorded on the Certificate. This test may require modification for 15 ppm Bilge Alarms with flow or pressure regulators or 15 ppm Bilge Alarms designed to discharge into an ambient pressure sump.

Shut off tests

2.2.8 The 15 ppm Bilge Alarm should be run on a 15 ppm Test Fluid "B" sample. The water and Test Fluid injection pumps should be shut off. The 15 ppm Bilge Alarm will be left turned on with no other changes made. After 8 hours, the water and Test Fluid injection pump should be turned on and set to provide the mixture of 15 ppm. The 15 ppm Bilge Alarm ppm display readings before and after each test and any damage to the 15 ppm Alarm should be noted and recorded on the Certificate.

Utilities supply variation test

2.2.9 If the 15 ppm Bilge Alarm requires any utilities besides electricity, it should be tested with these utilities at 110% and 90% of the design figures.

Calibration and zero drift test

2.2.10 The 15 ppm Bilge Alarm should be calibrated and zeroed. A 15 ppm Test Fluid "B" sample will run through the 15 ppm Bilge Alarm for eight hours and any calibration drift noted. Following this, the 15 ppm Bilge Alarm should run on oil-free water and any zero drift noted and recorded on the Certificate. During this test grab samples should be taken 0, 2, 4, 6, and 8 hours into the test schedule to verify any calibration drift.

Response time test

2.2.11 The response time is to be taken for the 15 ppm Bilge Alarm to give an alarm at 15 ppm oil concentration after the supply to the 15 ppm Bilge Alarm is changed from clean water to oily water having a concentration of more than 15 ppm oil.

2.2.12 A specification of the instrument concerned and a diagrammatic presentation of the test arrangements should be provided and the following data should be reported.

.1 types and properties of Test Fluids used in the tests (refer to part 1, paragraphs 1.2.4 and 1.2.16 of this annex);

.2 details of contaminants used, in the form, for example, of a supplier's certificate or laboratory test protocol; and

.3 results of tests and analysis of grab samples.

PART 3 - SPECIFICATIONS FOR ENVIRONMENTAL TESTING FOR TYPE APPROVAL OF POLLUTION PREVENTION EQUIPMENT

3.1 General

The specifications for environmental testing for type approval relate to the electrical and electronic sections of:

.1 15 ppm Bilge Separator; and

.2 15 ppm Bilge Alarm.

The above-mentioned items, hereafter referred to as "equipment", when tested should comply with all the relevant requirements contained in section 5 of these Guidelines and Specifications.

3.2 Test specifications

3.2.1 *Testing requirements*

The electrical and electronic sections of the equipment in the standard production configuration should be subjected to the programme of environmental tests set out in this Specification at a laboratory approved for the purpose by the Administration or by the competent authority of the manufacturer's home country. A copy of the environmental test document, in a format similar to that specified in section 2 of part 5 of this annex, should be submitted to the Administration by the manufacturer, together with the application for type approval.

3.2.2 *Test specification details*

Equipment should operate satisfactorily on completion of each of the following environmental tests:

.1 Vibration tests:

.1.1 a search should be made for resonance over the following range of frequency and amplitude of acceleration:

.1.1.1 2 to 13.2 Hz with an amplitude of ± 1mm; and

.1.1.2 13.2 to 80 Hz with an acceleration of ± 0.7 g.

This search should be made in each of the three planes at a rate sufficiently low to permit detection of resonance;

.1.2 the equipment should be vibrated in the planes at each major resonant frequency for a period of 2 hours;

.1.3 if there is no resonant frequency, the equipment should be vibrated in each of the planes at 30 Hz with an acceleration of ± 0.7 g for a period of 2 hours;

.1.4 after completion of the tests specified in .1.2 or .1.3 of this paragraph a search should again be made for resonance and there should be no significant change in the vibration pattern.

.2 Temperature tests:

.2.1 equipment that may be installed in an enclosed space that is environmentally controlled, including an engine-room, should be subjected, for a period of not less than 2 h, to:

.2.1.1 a low temperature test at 0°C; and

.2.1.2 a high temperature test at 55°C.

At the end of each of the tests referred to, the equipment should be switched on and it should function normally under the test conditions.

.3 Humidity tests:

Equipment should be left switched off for a period of 2 h at a temperature of 55°C in an atmosphere with a relative humidity of 90%. At the end of this period the equipment should be switched on and should operate satisfactorily for 1 hour;

.4 Inclination test:

Equipment should operate satisfactorily at angles of inclination up to 22.5° in any plane from the normal operating position;

.5 Reliability of electrical and electronic equipment:

The electrical and electronic components of the equipment should be of a quality guaranteed by the manufacturer and suitable for their intended purpose.

PART 4 – METHOD FOR DETERMINATION OF OIL CONTENT

Scope and application

The International Standard ISO 9377-2:2000 "Water quality - Determination of hydrocarbon oil index – Part 2: Method using solvent extraction and gas chromatography" specifies a method for the sampling and subsequent determination of the hydrocarbon oil index in water using solvent extraction and gas chromatography. This method should be used for the determination of oil content requirements outlined in these Guidelines and Specification

PART 5 – DOCUMENTATION OF APPROVAL

5.1 Certificate of Type Approval for pollution prevention equipment.

5.1.1 Satisfactory compliance with all the test requirements enumerated in parts 1 and 2 of this annex should be shown in the Certificate of Type Approval issued by the Administration in the format specified in paragraph 5.1.2 below. An Administration may issue a Certificate of Type Approval based on separate testing or on testing already carried out under supervision by another Administration.

5.1.2 A Certificate of Type Approval should be in the format shown in appendix 1 or 2 to this annex. The Certificate should identify the type and model of the pollution prevention equipment to which it applies and identify equipment assembly drawings, duly dated. Each drawing should bear the model specification numbers or equivalent identification details. The Certificate should include the full performance test protocol on which it is based. If a Certificate of Type Approval is issued by an Administration based on a Certificate previously issued by another Administration, the Certificate should identify the Administration which conducted the tests on the pollution prevention equipment and a copy of the original test results should be attached to it.

5.2 Format of environmental test protocol

5.2.1 Satisfactory compliance with the environmental tests laid down in these Guidelines and Specifications, where applicable, should be shown on the environmental test protocol issued by the testing laboratory. The protocol should include at least the following details.

.1 identification of the equipment by type and drawing number, duly dated; and

.2 a statement of the tests conducted on the equipment, including the results thereof.

5.2.2 The environmental test protocol should be endorsed by either the Administration or a competent authority of the manufacturer's home country to confirm that the laboratory is approved to conduct such tests. The protocol should also be signed and dated by the person in charge of the laboratory.

Badge
or
Cipher

APPENDIX 1

NAME OF ADMINISTRATION

CERTIFICATE OF TYPE APPROVAL FOR 15PPM BILGE SEPARATOR

This is to certify that the 15 ppm Bilge Separator listed below has been examined and tested in accordance with the requirements of the specifications contained in part 1 of the annex to the guidelines and specifications contained in IMO resolution MEPC.107(49). This certificate is valid only for 15 ppm Bilge Separator referred to below.

15 ppm Bilge Separator supplied by
.....

Under type and model designation .....
and incorporating:

*15 ppm Bilge Separator manufactured by
to specification/assembly drawing No ..... date

*Coalescer manufactured by
to specification/assembly drawing No .....

*Filters manufactured by other means.....
to specification/assembly drawing No

*Other means .....
to specification/assembly drawing No.....

Control equipment manufactured by
to specification/assembly drawing No .....

Supply pump capacity.....m^3/h.....Motor kW
rating.....kW.....

Maximum throughput of system ..... m^3/h .....

If integral feed pump is not fitted state method proposed for ensuring maximum throughput of system is not exceeded.....

A copy of this Certificate should be carried aboard a vessel fitted with this Separator at all times.

Limiting conditions imposed.....

Test date and results attached in the appendix.

Official stamp

Signed.....
Administration of .....
Date this ..... day of .....20..

* Delete as appropriate.

APPENDIX

TEST DATA AND RESULTS OF TESTS CONDUCTED ON A 15 PPM BILGE SEPARATOR IN ACCORDANCE WITH PART 1 OF THE ANNEX TO THE GUIDELINES AND SPECIFICATIONS CONTAINED IN IMO RESOLUTION MEPC.107(49)

15 ppm Bilge Separator submitted by
.....

Test location .....

Method of sample analysis .....
.....
.....
.....

Samples analysed by .....

Environmental testing of the electrical and electronic sections of the 15 ppm Bilge Separator has been carried out in accordance with part 3 of the annex to the guidelines and specifications contained in IMO resolution MEPC.107(49). The equipment functioned satisfactorily on completion of each test specified on the environmental test protocol.

.....
.....
.....
.....

Test fluid "A"

Density	at 15°C
Viscosity	Centistokes at 100°C
Flashpoint	°C
Ash content	%
Water content at start of test	%

Test fluid "B"

Density	at 15°C
Viscosity	Centistokes at 40°C
Flashpoint	°C
Ash content	%
Water content at start of test	%

Test fluid "C"

Surfactant - documentary evidence*

Iron oxides - documentary evidence*

Test water

Density	at 20°C
Solid matter present	

Test temperatures

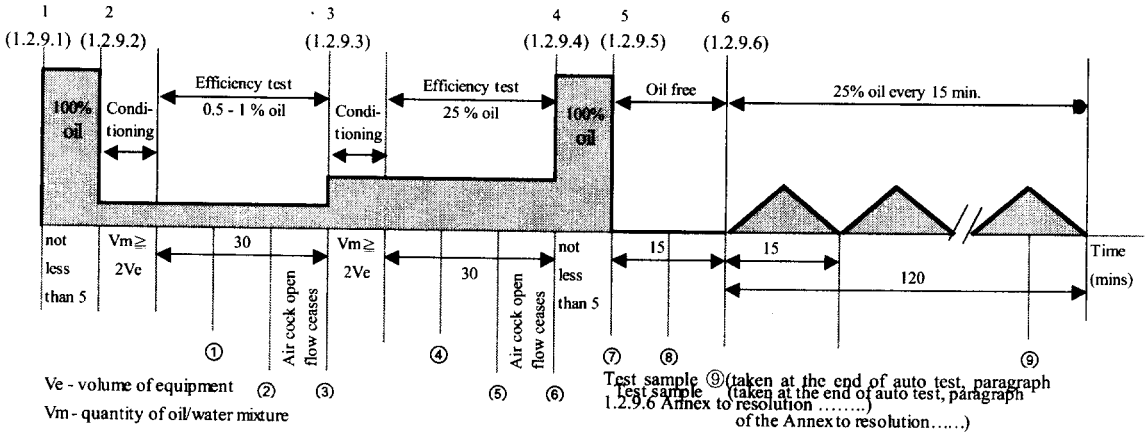
Ambient	°C
Test fluid "A"	°C
Test fluid "B"	°C
Test fluid "C"	°C
Test water	°C

Diagram of test rig attached
Diagram of sampling arrangement attached

* Certificate or laboratory analysis.

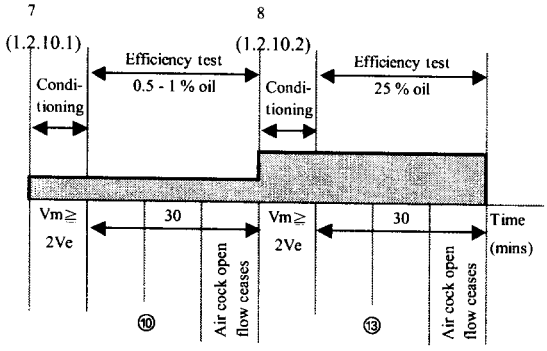
TEST RESULTS (IN PPM) AND TEST PROCEDURES

Test Fluid A

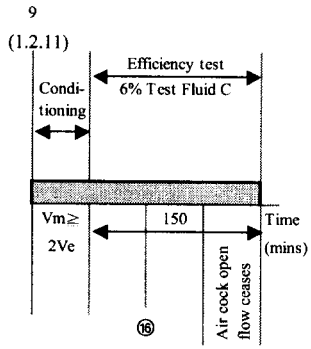


	1	2	3	4	5	6	7	8	9
Influent									
Effluent									

Test Fluid B



Test fluid C



	10	11	12	13	14	15
Influent						
Effluent						

16	17	18

1 – 9 steps refer to paragraph ① - ⑱ points where samples to be taken

Signed ..... Date ..... Official stamp

(Official stamp or equivalent identification and the date of approval to be placed on all pages of the test protocol.)

APPENDIX 2

Badge
or
Cipher

NAME OF ADMINISTRATION

CERTIFICATE OF TYPE APPROVAL FOR 15 PPM BILGE ALARM

This is to certify that the 15 ppm Bilge Alarm, comprising the equipment listed below, has been examined and tested in accordance with the requirements of the specifications contained in part 2 of the annex to the Guidelines and Specifications contained in IMO resolution MEPC.107(49). This Certificate is valid only for the 15 ppm Bilge Alarm referred to below.

15 ppm Bilge Alarm supplied by .....

under type and model designation .....
and incorporating:

15 ppm Bilge Alarm analysing unit manufactured by .....

to specification/assembly drawing No. ..... date .....

Electronic section of 15 ppm Bilge Alarm manufactured by .....

to specification/assembly drawing No. ..... date.....

*Sample feed pump manufactured by .....

to specification/assembly drawing No. ..... date.....

*Sample conditioning unit manufactured by .....

to specification/assembly drawing No. ..... date.....

The 15 ppm Bilge Alarm is acceptable for use in accordance with regulation 16(5).

A copy of this Certificate should be carried aboard a vessel fitted with this 15 ppm Bilge Alarm at all times.

Test data and results attached as appendix.

Official stamp

Signed:.....

Administration of .....

Dated this ..... day of ..... 20....

* Delete as appropriate.

APPENDIX

TEST DATA AND RESULTS OF TESTS CONDUCTED ON A 15 PPM BILGE ALARM IN ACCORDANCE WITH PART 2 OF THE ANNEX TO THE GUIDELINES AND SPECIFICATIONS CONTAINED IMO RESOLUTION MEPC.107(49)

15 ppm Bilge Alarm submitted by .....

Test location .....

Method of sample analysis .....

Samples analysed .....

Environmental testing of the electronic section of the 15 ppm Bilge Alarm has been carried out in accordance with part 3 of the annex to the Guidelines and Specifications contained in IMO resolution MEPC.107(49). The equipment functioned satisfactorily on completion of each test specified on the environmental test protocol.

.....

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.....

.....

CALIBRATION TEST AND RESPONSE TIME

Test Fluid	A		B		C	
	Measured	Grab sample	Measured	Grab sample	Measured	Grab sample
0 ppm						
15 ppm						
Full scale (ppm)						
Water Temperature	°C		°C		°C	
Re-zero	Yes/No		Yes/No		Yes/No	
Recalibrate	Yes/No		Yes/No		Yes/No	
Response Time	sec		sec		sec	

CONTAMINANT(S) AND COLOUR TEST	
	Non-oil particulate matter Meter reading shift with ppm non-oil particulate contaminants and with very salt water .

		Oil Content Meter Reading
Clean water and 10 ppm Test Fluid "B"		ppm
Very salt water		ppm
Iron Oxide	10 ppm	ppm
Iron Oxide	50 ppm	ppm
Iron Oxide	100 ppm	ppm

SAMPLE PRESSURE OR FLOW TEST

15 ppm Bilge Alarm reading shift at 50% of normal ... ppm
15 ppm Bilge Alarm reading shift at 200% of normal ... ppm
Deviations from this test should be stated if necessary

SHUT OFF TEST

15 ppm Bilge Alarm reading before shut-off ... ppm
15 ppm Bilge Alarm reading after start-up
(minimum dry period 8 hours) ... ppm

Damage to 15 ppm Bilge Alarm as follows:
.....
.....
.....
.....

UTILITIES SUPPLY VARIATION TEST

110% voltage effects .....

90% voltage effects .....

110% air pressure effects .....

90% air pressure effects .....

110% hydraulic pressure effects .....

90% hydraulic pressure effects .....

OTHER COMMENTS

.....

.....

.....

.....

.....

.....

CALIBRATION AND ZERO DRIFT TEST

Calibration drift	... ppm
Zero drift	... ppm

Signed.....Dated.....Official stamp

(Official stamp or equivalent identification and the date of approval to be placed on all pages of the test protocol)

***