

# INTERNATIONAL MARITIME ORGANIZATION

IMO Resolution A.586(14)

## REVISED GUIDELINES AND SPECIFICATIONS FOR OIL DISCHARGE MONITORING AND CONTROL SYSTEMS FOR OIL TANKERS.

### ANNEX

This document quote sections 1, 2, 3 and 4 of the  
Annex to Res. A.586(14) of Nov. 1985.

#### 1. INTRODUCTION

##### 1.1 Purpose

1.1.1 These Guidelines and Specifications contain requirements regarding the design, installation, performance and testing of oil discharge monitoring and control systems on oil tankers as required by regulation 15(3)(a) of Annex I to MARPOL 73/78.

1.1.2 The purpose of these Guidelines and Specifications is:

- .1 to provide a uniform interpretation of the requirements of regulation 15(3)(a) of Annex I to MARPOL 73/78;
- .2 to assist Administrations in determining appropriate design, construction and operational parameter for oil discharge monitoring and control systems, hereafter referred to as the "monitoring systems" for oil tankers when such systems are fitted in ships flying the flag of their State;
- .3 to define test and performance requirements for oil content meters and control sections forming part of the monitoring systems;
- .4 to define requirements for plan approval of installations and functional testing of installed equipment; and
- .5 to provide guidance for survey of installations on board.

1.1.3 These Guidelines and Specifications also apply to oil content monitoring of certain Category C and D oil-like noxious liquid substances carried in accordance with regulation 14 of Annex II of MARPOL 73/78. Wherever in these Guidelines and Specifications reference is made to oil being monitored this applies likewise to such oil-like noxious liquid substances.

##### 1.2 Applicability

1.2.1 These Revised Guidelines and Specifications apply to installations being made in oil tankers, the keels of which are laid or which are in a similar stage of construction on or after 2 October 1986. The Guidelines and Specifications adopted under resolutions A.393(X), A.496(XII) and MEPC.13(19) are not applicable to oil tankers to which these new Guidelines and Specifications apply.

**NOTE** : Res. A.393(X) is superseded by res. MEPC.60(33) adopted on 30 October 1992.

1.2.2 Installation made in "existing" tankers as defined in regulation 1(7) before 2 October 1986, and installations made in "new" tankers as defined in regulation 1(6) of Annex I of MARPOL 73/78, and the keels of which are laid or which are at a similar stage of construction before 2 October 1986, should comply with the

requirements contained in the Guidelines and Specifications adopted under resolutions A.393(X), A.496(XII) and MEPC.13(19) or may comply with the requirements contained in these Guidelines and Specifications.

### **1.3 Summary of requirements**

1.3.1 The approval requirements for various parts of a monitoring system as specified in these Guidelines and Specifications are summarized below:

- .1 the oil content meter should be tested for type approval in accordance with the procedures contained in part 1 of the Annex;
- .2 the oil content meter and the control section of a monitoring system should be subjected to environmental tests as contained in part 2 of the Annex;
- .3 documentation for plan approval, as specified in section 8, should be submitted to the Administration prior to the installation of the monitoring system;
- .4 the component parts of the system should undergo the workshop functional tests as contained in section 7; and
- .5 the complete monitoring system should be surveyed in accordance with procedures contained in section 10.

COMMENT: Parts 1 and 2 are not included in IMO-Vega.

## **2 BACKGROUND**

2.1 The requirements of Annex I of MARPOL 73/78 relating to oil content monitoring of oil tanker ballast and tank washing water as contained in regulation 15(3) stipulate that oil tankers of 150 gross tonnage and above should be equipped with an approved monitoring system and that such system should record continuously:

- .1 the discharge of oil in litres and nautical mile; and
- .2 total quantity of oil discharged, the oil content of the effluent and rate of discharge.

In both cases the record should be identifiable as to time and date and should be kept for at least three years.

2.2 Regulation 15 also stipulates that the system should come into operation when there is any discharge of effluent into the sea and should be such as will ensure that any discharge of oily mixture is automatically stopped when the instantaneous rate of discharge of oil exceeds that permitted by regulation 9(1)(a).

2.3 Resolution A.445(XI) recognizes the need for early installation of oil discharge monitoring and control systems in order that operational experience may be gained. That resolution further invites the Marine Environment Protection Committee to develop guidelines for the progressive installation of monitoring systems for new and existing oil tankers.

2.4 An incentive scheme was adopted under resolution A.496(XII) specifying the standard of systems to be installed in tankers depending on their size and age. The implementation requirements in these Guidelines and Specifications conform with the requirements in that scheme as regards installations in new tankers as defined in regulation 1(6) of Annex I of MARPOL 73/78.

### **3 DEFINITIONS**

#### **3.1 "Oil Discharge Monitoring and Control System"**

3.1.1 An oil discharge monitoring and control system, referred to in these Guidelines and Specifications as a "monitoring system", is a system which monitors the discharge into the sea of oily ballast or other oil contaminated water from the cargo tank areas and comprises the item contained in paragraph 5.1.4.

#### **3.2 "Control Section"**

3.2.1 A control section of a monitoring system, is a unit composed of the items contained in paragraph 5.1.4.7 and capable to operate either as a "control unit" or a "computing unit" as specified in section 4.

#### **3.3 "Overboard Discharge Control"**

3.3.1 An overboard discharge control is a device which automatically initiates the sequence to stop the overboard discharge of the effluent at alarm conditions and prevents the discharge throughout the period the alarm condition prevails. The device may be arranged to close the overboard valves or to stop the relevant pumps as appropriate.

#### **3.4 "Starting Interlock"**

3.4.1 A starting interlock is a facility which prevents the initiation of the opening of the discharge valve or the operation of other equivalent arrangements before the monitoring system is fully operational when use of the monitoring system is required by the Convention.

#### **3.5 "Control unit"**

3.5.1 A control unit is a device which receives automatic signal of:

- .1 oil content of the effluent;
- .2 flow rate of discharge;
- .3 ship's speed in knots;
- .4 date and time (GMT); and
- .5 status of overboard discharge control.

3.5.2 The unit shall make automatic recordings of data as referred to in paragraph 5.8.2.

#### **3.6 "Computing unit"**

3.6.1 A computing unit is a device which receives automatic signals of:

- .1 oil content of the effluent; and
- .2 date and time (GMT);

The computing unit should additionally be arranged to accept manual input of:

- .3 status of the overboard discharge arrangement;
- .4 flow rate of discharge; and
- .5 ship's speed in knots.

3.6.2 The unit shall make automatic recordings of data as referred to in paragraph 5.8.2.

#### **3.7 "PPM"**

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

#### **4 IMPLEMENTATION REQUIREMENTS**

- 4.1 Detailed monitoring system requirements for oil tankers to which these Guidelines and Specifications apply are differentiated as detailed below:
- .1 Category A monitoring system
    - .1.1 This system should be fitted to oil tankers of 4,000 dwt and above. Such system should operate with a "control unit" and be fitted to operate with a "starting interlock" and with an "overboard discharge control".
  - .2 Category B monitoring system
    - .2.1 This system should be fitted to oil tankers of less than 4,000 dwt but more than 150 gross tonnage. Such system should operate with a "computing unit". No "starting interlock" is required and the overboard discharge arrangement may be activated manually.

#### **Guide**

or Oil tanker built on or after 1 January 2005 these guidelines are replaced by res. MEPC.108(49) adopted on 18 July 2003.

#### **Note**

Sub-paragraph 1.1.3 was added by Resolution MEPC.24(22) of December 1985.

#### **Port State Requirements**

For application of these requirements to ships flying the flags of states which are not parties to the Convention when such ships are within the jurisdictional area of a Party to the Convention, see Article 5(4).

## ANNEX

This document quotes section 5 of the Annex to  
Res. A.586(14) of Nov. 1985.

**5. TECHNICAL SPECIFICATIONS****5.1 Oil discharge monitoring and control system.**

5.1.1 The monitoring system should be capable of effectively monitoring and controlling the discharge of any effluent into the sea through those overboard discharge outlets permitted by regulation 18 which in the opinion of the Administration are necessary to fulfil the operational requirements of the oil tanker.

5.1.2 The discharge of dirty ballast water or other oil-contaminated water from the cargo tank areas into the sea through outlets which are not controlled by the monitoring system is an infringement on the Convention.

5.1.3. The monitoring system should function effectively under all environmental conditions which oil tankers are normally assumed to encounter, and should be designed and constructed to satisfy the specifications for environmental testing specified in part 2 of the Annex to these Guidelines and Specifications and;

- .1 The system should, except as permitted for a category B system, be so designed that no discharge of dirty ballast or other oil-contaminated water from the cargo tank areas can take place unless the monitoring system is in normal operating mode and the relevant sampling point has been selected;
- .2 preferably the system should sample the effluent discharge from a minimum number of discharge outlets and the monitoring system be so arranged that discharge overboard can take place via only one outlet at a time.
- .3 where it is intended that more than one line is used for simultaneous discharging purposes, one oil content meter, together with a flow meter, should be installed in each discharge line. These instruments should be connected to a common processor; and
- .4 in order to avoid alarms due to short term high oil concentration signals (spikes) causing indication of high instantaneous rates of discharge, the short term high ppm may be suppressed for a maximum of 10 seconds. Alternatively, the instantaneous rate of discharge may be continuously averaged during the preceding 20 seconds or less as computed from instantaneous ppm values of the oil content meter readings received at intervals not exceeding 5 second.

5.1.4 The monitoring system should comprise the following:

- .1 An oil content meter to measure the oil content of the effluent in ppm. This meter should be approved in accordance with the provisions contained in the Annex to these Guidelines and be certified to take into account the range of cargoes carried;
- .2 a flow rate indicating system to measure the rate of effluent being discharged into the sea. For a category B monitoring system where the flow rate may be manually inserted into the

- computing unit the arrangements contained in paragraph 5.4.7 should be used;
- .3 a vessel speed indicating device to give the vessel's speed in knots. For a category B monitoring system where the vessel's speed may be manually inserted into the computing unit the arrangement contained in paragraph 5.5.2 should be used;
  - .4 a sampling system to convey a representative sample of the effluent to the oil content meter;
  - .5 an overboard discharge control arrangement affecting stopping of the overboard discharge. For a category B system the stopping of the overboard discharge may be effected manually;
  - .6 a starting interlock arrangement preventing the discharge overboard of any effluent unless the monitoring system is fully operational. For a category B system no starting interlock is required.
  - .7 a control section which includes:
    - .7.1 a processor, which accepts signals of oil content in the effluent, the effluent flow rate and the vessel's speed and computes these values into litres of oil discharged per nautical mile and the total quantity discharged;
    - .7.2 means to provide alarms and, for a category A monitoring system, command signals to the overboard discharge control arrangement;
    - .7.3 a recording device to provide a record of data in accordance with paragraph 5.8.2;
    - .7.4 a data display arrangement to provide a display of the current operational data in accordance with paragraph 5.9;
    - .7.5 a manual override system to be used in the event of failure of the monitoring system; and
    - .7.6 for a category A monitoring system, means to provide signals to the starting interlock arrangement to prevent the discharge of any effluent before the monitoring system is fully operational.

5.1.5 Each main component of the oil content monitoring system should be fitted with a name-plate, properly identifying the component by assembly drawing number, type or model number and serial number, as appropriate.

5.1.6 The electrical components of the monitoring system when installed in a hazardous area should meet the appropriate safety requirements\* provided for these areas.

\* As contained in the provision of IEC publication 92 or its equivalent.

## **5.2 Oil Content Meter**

5.2.1 An oil content meter should satisfy the Test and Performance Specifications contained in part I of the Annex to these Guidelines and Specifications and should conform with the general requirements contained in this paragraph.

5.2.2 The accuracy of meters designed to monitor a wide range of oil content should be such that the reading will represent within +/- 10 ppm or +/- 20 per cent of the actual oil content of the sample being tested, whichever is the greater. The accuracy should remain within

the above limit despite the presence of contaminants other than oil, such as entrained air, rust, mud, and sand.

5.2.3 The meter should be designed so that it functions within the above limit when the power supply (i.e. in respect of electricity, compressed air, etc.) is varied by 10 per cent from the value for which the meter is design.

5.2.4 It is desirable that the reading should not be affected by the type of oil. If it is, it should not be necessary to calibrate the meter on board ship, but pre-set alterations in the calibration may be made in accordance with the manufacturer's instructions.

In the latter case, means should be available to check that the correct calibration has been selected for the oil in question. The accuracy of the readings should at all times remain within the limit specified in 5.2.2.

5.2.5 The response time of the meter, as defined in paragraph 1.2.8 part 1 of the Annex, should not exceed 20 seconds.

5.2.6 The meter may have several scales as appropriate for its intended use. The full scale range should not be less than 1,000 ppm.

5.2.7 The meter should have simple means to enable the ship's crew to check the functioning of the electrical and electronic circuitry of the meter by introduction of a simulated signal corresponding approximately to half the full scale reading of the meter. It should also be possible for qualified personnel to recalibrate the meter on board the oil tanker.

5.2.8 The meter 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 meter 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.

5.2.9 The meter should not contain or use any substance of a dangerous nature, unless adequate arrangements, acceptable to the Administration, are provided to eliminate any hazard introduced thereby.

5.2.10 The meter should resist corrosion in conditions of the marine environment.

5.2.11 The meter should be constructed from materials compatible with the liquids to be tested.

### **5.3 Sampling System**

5.3.1 Sampling points should be so located that relevant samples can be obtained from those outlets that are used for operational discharges in accordance with paragraph 5.1.1. The sampling probes located in the overboard discharge lines and the piping system

connecting the sampling probes to the oil content meter should meet the following requirements.

5.3.2 The piping and probes should be of a material resistant to fire, corrosion and oil and be of adequate strength, properly jointed and supported.

5.3.3 The system should have a stop valve fitted adjacent to each probe, except that where the probe is mounted in a cargo line, two stop valves shall be fitted, in series, in the sample line; one of these may be the remote controlled sample selector valve.

5.3.4 Sample probes should be arranged for easy withdrawal and should as far as practical be mounted at an accessible location in a vertical section of the discharge line. Should it be necessary to fit sampling probes in the horizontal section of the discharge line it should be ascertained, during the discharge of the effluent. Sampling probes should normally penetrate inside the discharge pipe to a distance of one quarter the diameter of that pipe.

5.3.5 Means should be provided for cleaning the probes and piping system by the provision of permanent clean water flushing arrangements or an equivalent method. The design of the probes and piping should be such as to minimize their clogging by oil, oily residue and other matter.

5.3.6 The velocity of the fluid in the piping should be such that, taking into consideration the length of the piping, the overall response time should be as short as possible between an alteration in the mixture being pumped and be as short as possible between an alteration in the mixture being pumped and the alteration in the meter reading and in any case, being summed up with the response time of the meter, not more than 40 seconds.

5.3.7 The location of sampling probes in relation to any point of flow diversion to a slop tank should be selected with regard to the need for sampling the oily-water in the recirculation mode.

5.3.8 The arrangements for driving the sampling pump or any other pumps used in the system should have regard to the safety requirements of the space in which the pump is located. Any bulkhead penetration between a hazardous and non-hazardous area should be of a design approved by the Administration.

5.3.9 The flushing arrangement should be such that where necessary it can be utilized for test running and stabilizing the oil content meter and correcting for zero setting.

5.2.10 Sample water when returned to the slop tank should not be allowed to free fall into the tank. In tankers equipped with inert gas system a U-seal of adequate height should be arranged in the piping leading to a slop tank.

5.3.11 A valve should be provided for the manual collection of samples from the inlet piping to the meter at a point downstream of any sampling pump or at an equivalent location satisfactory to the Administration.



#### **5.4 Flow Rate Indicating System**

5.4.1 A flow meter for measuring the rate of discharge should be installed in a vertical section of a discharge line or in any other section of a discharge line as appropriate, so as to be always filled with the liquid being discharged.

5.4.2 A flow meter should employ an operating principle which is suitable for shipboard use and, where relevant, can be used in large diameter pipes.

5.4.3 A flow meter should be suitable for the full range of flow rates that may be encountered during normal operation.

Alternatively, arrangements such as the use of two flow meters of different ranges or a restriction of the operational flow rate range may be necessary to meet this requirement.

5.4.4 The flow meter, as installed, should have an accuracy of +/-15 per cent, or better, of the instantaneous rate of discharge throughout the operating range for discharging the effluent.

5.4.5 Any component part of the flow meter in contact with the effluent should be of corrosion-resistant material of adequate strength.

5.4.6 The design of the flow metering arrangements should have regard to the safety requirements of the space in which such metering arrangements are located.

5.4.7 In oil tankers fitted with a category B monitoring system the flow rate may be determined from the pump characteristics and the data be manually inserted into the computing unit.

5.4.8 In oil tankers fitted with a category B monitoring system where it is intended to gravitate dirty ballast to the sea, as permitted by regulation 18(6)(d), means such as calibration curves should be provided to estimate the flow rate of discharge and the data be manually inserted into the computing unit.

#### **5.5 Ship's Speed Indicating System**

5.5.1 The automatic speed signal required for a category A monitoring should be obtained from the ship's indicating device\* by means of repeater signal. The speed information used may be either speed over the ground or speed through the water depending upon the speed measuring equipment installed on board.

\* See "Recommendation on Performance Standards for Devices to Indicate Speed and Distance" (Annex to resolution A.478(XII)).

5.5.2 In oil tankers fitted with a category B monitoring system, the ship's speed may be manually inserted into the computing unit. Such data should be obtained from the speed log or from an equivalent source.

#### **5.6 Overboard Discharge Control Arrangement**

5.6.1 In oil tankers fitted with a category A monitoring system the overboard discharge control arrangement should be able to automatically stop the discharge of the effluent into the sea by either closing all relevant overboard discharge valves or stopping of

all relevant pumps. The discharge control arrangement should be fail safe so that all effluent discharge is stopped when the monitoring system is not in operation, at alarm conditions, or when the monitoring system fails to function.

5.6.2 In oil tankers fitted with a category B monitoring system, the overboard discharge control arrangement may be activated manually.

### **5.7 Processor and Transmitting Device**

5.7.1 The processor of a control section should receive, at time intervals not exceeding 5 seconds, signal from the oil content meter, the flow rate indicating system and automatically compute the following:

- .1 instantaneous rate of discharge of oil in litres per nautical mile; and
- .2 total quantity of oil discharge during a voyage in cubic metres or litres.

5.7.2 In category B monitoring systems where the flow rate and ship's speed may be inserted manually, the current information should be retained in the processor for use in the continuous calculation of oil discharge rate and total quantity of oil discharged and be recorded at intervals specified in paragraph 5.8.3. The information currently inserted into the processor should remain visibly displayed.

5.7.3 When the limits imposed by regulation 9(1)(a)(iv) and (v) are exceeded, the processor should provide alarms and, in a category A system, provide command signals to the overboard discharge control arrangement which will cause the discharge of effluent into sea to stop.

5.7.4 The processor should normally include a device for continuous generation of time and date information. Alternative arrangements for automatic and continuous reception of time and date information from an external source may be accepted.

5.7.5 In case of power failure the processor should retain its memory in respect to computation of the total quantity of oil discharged, time and date. Print-out of data should be obtained when the monitoring system is operating with manual override, but is not required if, when the power fails the monitoring system activates the overboard discharge control to stop the effluent discharge.

### **5.8 Recording Devices**

5.8.1 The recording device of a control section should include a digital printer. The recorded parameters should be explicitly identified on the print-out. The print-out should be legible and remain so once removed from the recording device and should be retained for at least three years.

5.8.2 The data to be automatically recorded should include at least the following:

- .1 instantaneous rate of discharge of oil (litres per nautical mile);
- .2 instantaneous oil content (ppm);
- .3 the total quantity of oil discharged (cubic metre or litres);
- .4 time and date (G.M.T.);

- .5 ship speed in knots;
- .6 effluent flow rate;
- .7 status of the overboard discharge control or arrangement;
- .8 oil type selector setting, where applicable;
- .9 alarm condition;
- .10 failure (i.e. no flow, fault, etc.); and
- .11 override action (i.e. manual override, flushing, calibration, etc.).

Any manually inserted information should be identified on the print-out as a manual input.

5.8.3 Data required in paragraph 5.8.2 of these Guidelines and Specifications should be printed out, as applicable, with the following minimum frequency:

- .1 when discharge is started;
- .2 when discharge is stopped;
- .3 at intervals of not more than 10 minutes (except when the system is in stand-by mode);
- .4 when an alarm condition is developed;
- .5 when normal conditions are restored;
- .6 when introducing input data;
- .7 whenever the computed rate of discharge varies by 10 litres per nautical mile;
- .8 when selecting zero setting or calibration mode; and
- .9 on manual command.

5.8.4 The recording device should be located in a position easily accessible to the person in charge of overboard discharge operation.

## **5.9 Data Display**

5.9.1 The current data should be visibly displayed, in addition to the recorded print-out, and should as a minimum contain the following:

- .1 instantaneous rate of discharge of oil in litres per nautical mile;
- .2 total quantity of oil discharged;
- .3 instantaneous oil content (ppm);
- .4 flow rate;
- .5 ship's speed; and
- .6 status of the overboard discharge control arrangement.

5.9.2 The data display should be located in a position easily observed by the person in charge of the overboard discharge operation.

## **5.10 Manually Operated Alternative**

5.10.1 The alternative means for obtaining information for use in case of a failure in the monitoring system should be as follows:

- .1 oil content meter or sampling system: visual observation of the surface of the water adjacent to the effluent discharge;
- .2 flow meter: pump discharge characteristics, etc;
- .3 oil tanker's speed indicating device: main engine r.p.m. etc;
- .4 processor: manual calculation and recording; and
- .5 overboard discharge control: manual operation of pumps and valves.

5.11 Alarm Conditions Resulting in the Stopping of Discharge.

5.11.1 Audio-visual alarms should be activated for any of the following conditions and the monitoring system be so arranged that the discharge of effluent into the sea is stopped:

- .1 whenever the instantaneous rate of discharge of oil exceeds 60 litres per nautical mile;
- .2 when the total quantity oil discharged reaches 1/30,000 of the previous cargo;
- .3 failure of the system's operation, such as:
  - .3.1 power failure;
  - .3.2 loss of sample;
  - .3.3 significant failure of the measuring or recording system;or
- .3.4 when the input of any sensor exceeds the effective capacity of the system.

5.12 Location of Alarm Indicator

5.12.1 The alarm indicator of the system should be installed in the cargo control room were provided and/or other places where it will attract immediate attention and action.

**ANNEX**

This document quotes sections 6 to 11 of the Annex to Res. A.586(14) of Nov. 1985.

**6 SPECIFICATIONS FOR TYPE APPROVAL TESTING OF AN OIL CONTENT METER AND OF THE CONTROL SECTION OF AN OIL DISCHARGE MONITORING AND CONTROL SYSTEM**

**6.1 Testing Requirements**

6.1.1 An oil content meter should be tested for ability to determine the oil content over a wide range of oil contents and types of oil and within the accuracy limits specified in paragraph 5.2.2. The meter which is to be identical in all respects with the production model for which the approval will apply, should be type tested in accordance with the Test and Performance Specifications contained in part 1 of the Annex to these Guidelines and Specifications.

COMMENT: Part 1 is not reproduced.

6.1.2 An oil content meter and a control section of the monitoring system which is to be identical in all respects with the production model for which the approval will apply, should be type tested in accordance with the Specification for Environmental Testing contained in part 2 of the Annex to these Guidelines and Specifications.

COMMENT: Part 2 is not reproduced.

**6.2 Approval and Certification Procedures**

6.2.1 Oil content meters which in every respect fulfil the requirements of these Guidelines and Specifications may be approved by the Administration for fitting on board tankers. 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 3 of the Annex to these Guidelines and Specifications. A copy of the Certificate of Type Approval for the Oil Content Meter should be carried aboard an oil tanker fitted with such an equipment at all times.

COMMENT: Part 3 is not reproduced.

6.2.2 A Certificate of Type Approval should be issued for the specific application for which the oil content meter is approved, i.e. for crude oil, "black" products, "white" products, other products or applications as listed on the Certificate.

6.2.3 Approved oil content meters 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 an oil content meter pass a test in one country, and fail a test of a similar nature in another country, then the two countries concerned should consult one another with a view to coming to agreement which could be mutually acceptable.

## **7 WORKSHOP FUNCTIONAL TEST REQUIREMENTS**

7.1 Each oil content meter and each control section of a monitoring system should be subjected to a functional test in a suitable test bench prior to delivery. The detailed programme for a functional test of such equipment should be developed by the manufacturer, taking into account the features and functions of the specific design of equipment. A completed workshop certificate including the delivery test protocol should be supplied with each unit being delivered.

7.2 A functional test conducted on an oil content meter should include at least the following:

- .1 check flow rate, pressure drop or an equivalent parameter as appropriate;
- .2 check all alarm functions built into the meter;
- .3 check all switching functions interconnecting with other parts of the system; and
- .4 check correct reading at several ppm values on all measurement scales when operated on an oil appropriate for the application of the meter or by an equivalent method.

7.3 A functional check conducted on a control section of a monitoring system should include at least all the following:

- .1 check all alarm functions;
- .2 check correct function of the signal processor and the recording equipment when simulated input signals of ppm, flow rate and speed are varied;
- .3 check that alarm is obtained when the input signals are varied so that the discharge limits contained in regulation

9(1)(a)(iv)

- and (v) are exceeded;
- .4 check that overboard discharge control signal is given when alarm conditions are reached; and

- .5 check that alarm is obtained when each one of the input signals is varied to exceed the capacity of the system.

## **8 PLAN APPROVAL REQUIREMENTS**

8.1 Adequate documentation should be prepared well in advance of the intended installation of a monitoring system and be submitted to the Administration for approval. The documentation to be submitted should include at least all the following:

- .1 A description of the monitoring system including identification of the category of monitoring system applicable to the oil tanker according to section 4. The description should include a diagrammatic drawing of the pumping and piping arrangements which should identify the operational outlets for dirty ballast and oil-contaminated water from the cargo tank area and which should be compatible with operational requirements as contained in the oil tanker's cargo and ballast handling manuals. Special considerations may have to be given to installations in oil tankers which have unusual pumping and piping arrangements;
- .2 equipment manuals, supplied by manufacturers, which should contain details of the major components of the monitoring system;
- .3 an operations and technical manual for the complete monitoring system proposed to be installed in the oil tanker. This manual should cover the arrangements and operation of the system as a whole and should specifically describe parts of the system which are not covered by the manufacturer's equipment manuals;
- .4 the operations section of the manual should include normal operational procedures and procedures for discharge of oily-water in case of malfunction of the equipment;
- .5 the technical section of the manual should include adequate information (description and diagrammatic drawings of the pumping and piping arrangements of the monitoring system and electrical/electronic wiring diagrams) to enable fault finding and should include instructions for the keeping of a maintenance record;
- .6 a technical installation specification including location and mounting of components, arrangements for maintaining the integrity of the boundary between safe and hazardous spaces, and arrangements of the sample piping including calculation of the sample response time which is referred to in paragraph 5.3.6;
- .7 a copy of the Certificate of Type Approval for the oil content meter and technical documentation relevant to other main components of the monitoring system; and
- .8 a recommended test and check-out procedure which should be specific for the monitoring system installed. This procedure should include all checks required in a functional test by the installation contractor and should provide guidance for the surveyor when carrying out the on board survey of the monitoring system.

## **9 GENERAL INSTALLATION REQUIREMENTS**

9.1 The onboard installation arrangements must be such that satisfactory function of the entire system is obtained and all safety regulations issued by the relevant Administration are complied with.

9.2 The installation arrangements must conform in each case with

those specified and approved under the procedure for plan approval outlined in section 8.

9.3 The installation arrangements must also satisfy all relevant parts of the technical specifications in section 5 and all relevant installation instructions provided by the manufacturer of the various equipments and components.

## **10 INSTALLATION SURVEY**

10.1 Verify that the following documentation is on board in a suitable format for permanent use:

- .1 copy of certificate of type approval for the oil content meter;
- .2 statement from the Administration, or from a laboratory authorized by an Administration, to confirm that the control section of the monitoring system has been type tested in accordance with the specifications for the Environmental Testing contained in part 2 of the Annex;
- .3 equipment manuals for major components of the system;
- .4 operations and technical manual approved by the Administration which should include technical description of the system, operational procedures and backup procedures in case of equipment malfunction;
- .5 installation specification; and
- .6 installation check-out procedures.

COMMENT: Part 2 is not reproduced.

10.2 Verify the completeness of the workshop certificate for the oil content meter and the control section of the monitoring system.

10.3 Verify that the system installation has been carried out in accordance with the approved technical installation specification referred to in paragraph 8.1.6.

10.4 Verify that:

- .1 the oil content meter is identical to the one for which the certificate of type approval has been issued;
- .2 the installation of the oil content meter and the control section of the monitoring system has been carried out in accordance with the manufacturer's specification; and
- .3 the operational outlets are located in the positions indicated on the drawing of the pumping and piping arrangements.

10.5 Verify that the workmanship of the installation is satisfactory and, in particular, that the bulkhead penetrations are to the relevant approved standard.

10.6 Verify that the monitoring system operates correctly when tested in accordance with the approved procedures contained in section 11 of these Guidelines and Specifications.

## **11 ON BOARD FUNCTIONAL TEST AND CHECKOUT PROCEDURE**

11.1 Functional test referred to in paragraph 8.1.8 should include at least all the following tests when the monitoring system is operating on water:

- .1 verify correct running of pumps, absence of leakage in the sample pumping and piping system, correct functioning of

- remote controlled sampling valves, etc;
- .2 verify by checking flow rates or pressure drops, as appropriate, that the system operates under correct flow conditions. This test should be repeated separately for each sampling point;
  - .3 verify that alarms function correctly when a malfunction occurs external to the monitoring system, such as no sample flow, no flow meter signal, power failure, etc;
  - .4 vary the simulated input signals manually whilst the monitoring system is operating on water and check the recordings for correct values and timing. Vary the simulated manual input signals until alarm conditions are obtained, and verify proper recordings. For a category A monitoring system ascertain that the overboard discharge control is activating and verify the action is being recorded;
  - .5 verify that normal operating condition can be reset when the value of the instantaneous rate of discharge is lowered below 60 litres per nautical mile;
  - .6 activate the manual override control and verify that recording is made and that the overboard discharge control, for a category A monitoring system, can be operated;
  - .7 turn off the system and verify for a category A monitoring system that the overboard discharge control cannot be operated;
  - .8 start up the system and check the zero and gain setting for the oil content meter, in accordance with the manufacturers' operations and technical manual; and
  - .9 check the accuracy of any installed flow meter, for example, by pumping water in a loop where the flow rate may be calculated from the level change in a tank. The check should be made at a flow rate of about 50 per cent of the rated flow of the flow meter.