



**MARITIME AND PORT AUTHORITY OF
SINGAPORE
SHIPPING CIRCULAR TO SHIPOWNERS
NO. 9 OF 2012**

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Applicable to: Ship owners, managers, operators, masters, crew members, surveyors, shipyards and the Shipping Community.

**RESOLUTIONS ADOPTED BY THE 63RD SESSION OF THE MARITIME
ENVIRONMENT PROTECTION COMMITTEE (MEPC) OF IMO**

1. This circular informs the Shipping Community on the resolutions adopted by the 63rd session of the Marine Environment Protection Committee (MEPC) of IMO and urges the Community to prepare for the implementation of these resolutions.

2. The details of the resolutions can be found in the MEPC 63 report which is available from the MPA website.

3. The mandatory resolutions include the following:

- a. [Resolution MEPC.216\(63\)](#) – Amendments to Annexes I, II, IV and V of MARPOL 73/78 (Regional arrangements for port reception facilities under MARPOL Annexes I, II, IV and V) (applicable from 1 Aug 2013);

The amendments provide for regional arrangements for Small Island Developing States (SIDS) when, because of these States' unique circumstances, such arrangements are the only practical means to satisfy the respective requirements of MARPOL Annexes I, II, IV and V. Parties participating in a regional arrangement shall develop a Regional Reception Facilities Plan, taking into account the guidelines developed by the Organization.

- b. [Resolution MEPC.217\(63\)](#) – Amendments to Annex VI of MARPOL 73/78 (Regional arrangements for port reception facilities under MARPOL Annex VI and certification of marine diesel engines fitted with selective catalytic

reduction systems under the NOx Technical Code 2008) (applicable from 1 Aug 2013);

The amendments provide for regional arrangements for Small Island Developing States (SIDS) to satisfy the requirements of paragraph 1 of regulation 17 of the MARPOL Annex VI when, because of these States' unique circumstances, such arrangements are the only practical means to satisfy these requirements. Parties participating in a regional arrangement shall develop a Regional Reception Facilities Plan, taking into account the guidelines developed by the Organization. The amendments related to the NOx Technical Code 2008 provide for more flexibility in the testing and certification processes of marine diesel engines fitted with selective catalytic reduction systems.

4. MEPC 63 also adopted the following resolutions:

- a. [Resolution MEPC.209\(63\)](#) – 2012 Guidelines on Design and Construction to facilitate Sediment Control on ships (G12) (revokes *MEPC.150(55)*);

The guidelines provide guidance to ship designers, shipbuilders, owners and operators in the development of ship structures and equipment to reduce possibility of introducing harmful aquatic organisms and pathogens.

- b. [Resolution MEPC.210\(63\)](#) – 2012 Guidelines for Safe and Environmentally Sound Ship Recycling;

The guidelines provide recommendations to ship recycling facilities to establish management systems, procedures, and techniques to prevent, reduce and minimise the adverse effects on the environment caused by ship recycling.

- c. [Resolution MEPC.211\(63\)](#) – 2012 Guidelines for the Authorization of Ship Recycling Facilities;

The guidelines provide recommendations for Parties on establishing mechanisms for authorising ship recycling facilities in accordance with requirements of the Ship Recycling Convention.

- d. [Resolution MEPC.212\(63\)](#) – 2012 Guidelines on the method of calculation of the Attained Energy Efficiency Design Index (EEDI) for new ships (revokes *MEPC.1/Circ.681*);

The amendments to MARPOL Annex VI to include a new chapter 4 on the regulations on energy efficiency for ships are expected to enter into force on 1 January 2013. The guidelines provide the method of calculation for the Attained EEDI as required under Regulation 20 of the new chapter and shall be followed.

- e. [Resolution MEPC.213\(63\)](#) – 2012 Guidelines for the Development of a Ship Energy Efficiency Management Plan (SEEMP) (revokes MEPC.1/Circ.683);

Regulation 22 of the new chapter 4 for regulations on energy efficiency for ships under MARPOL Annex VI requires each ship to keep onboard a ship specific Ship Energy Efficiency Management Plan (SEEMP). The guidelines provide assistance for development of the SEEMP and shall be taken into consideration by ships' masters, operators and owners for the development.

- f. [Resolution MEPC.214\(63\)](#) – 2012 Guidelines on Survey and Certification of the Energy Efficiency Design Index (EEDI) (revokes MEPC.1/Circ.682);

The purpose of the guidelines is to assist Administrations and Recognised Organisations in conducting the survey and certification of the EEDI and assist shipowners, shipbuilders and manufacturers related to the energy efficiency of ships to understand such procedures.

- g. [Resolution MEPC.215\(63\)](#) – Guidelines for Calculation of Reference Lines for use with the Energy Efficiency Design Index (EEDI);

Regulation 21 of the new chapter 4 for regulations on energy efficiency for ships under MARPOL Annex VI requires reference line to be established for each ship type to which the regulation is applicable. The guidelines provide the calculation method for the reference line and shall be followed.

- h. [Resolution MEPC.218\(63\)](#) – Development of Technical Onboard Equipment in relation to the Designation of the Baltic Sea as a Special Area under MARPOL Annex IV (for information);

The resolution calls for the development of proven, adequate and cost-effective technical onboard equipment, such as sewage treatment plants, to meet the discharge standards for passenger ships within a Special Area under MARPOL Annex IV.

- i. [Resolution MEPC.219\(63\)](#) – 2012 Guidelines for Implementation of MARPOL Annex V (revokes MEPC.59(33), as amended by MEPC.92(45));

The revised MARPOL Annex V is expected to enter into force on 1 January 2013. The guidelines provide guidance to the industry for implementing the requirements of the revised MARPOL Annex V and shall be followed.

- j. [Resolution MEPC.220\(63\)](#) – 2012 Guidelines for the Development of Garbage Management Plans (revokes MEPC.71(38));

Regulation 10.2 of the revised MARPOL Annex V requires applicable ships to carry a Garbage Management Plan. The guidelines are intended

to assist the shipowner/operator in the development of such a plan and shall be applied.

- k. [Resolution MEPC.221\(63\)](#) – 2012 Guidelines for the Development of a Regional Reception Facilities Plan (for information).

The guidelines provide guidance for the development of a regional reception facilities plan (RRFP) to assist Member States in specific geographical regions of the world in the effective implementation of regional arrangements for port reception facilities.

5. In addition to the adoption of resolutions, MEPC 63 approved, subject to MSC 90's concurrent decision, the draft amendments to the IBC Code. The amendments, disseminated through [Circular letter No. 3261](#), captured the changes and developments since the 2007 amendments. The amendments will be adopted at MEPC 64. The Shipping Community is urged to consider the amendments and invited to provide comments and feedback as necessary.

6. Resolutions [MEPC.216\(63\)](#) and [MEPC.217\(63\)](#) will be given effect through amendments to the Prevention of Pollution of the Sea (Oil) Regulations, Prevention of Pollution of the Sea (Noxious Liquid Substances in Bulk) Regulations, Prevention of Pollution of the Sea (Sewage) Regulations, Prevention of Pollution of the Sea (Garbage) Regulations and Prevention of Pollution of the Sea (Air) Regulations respectively from 1 August 2013.

7. The Shipping Community is urged to take early action to comply with the requirements on or before the date of entry into force of the amendments/resolutions.

8. Any queries relating to this circular should be directed to Mr Zafrul Alam (Tel: 6375 6204) or Mr Princet Ang (Tel: 6375 6259).

CHEONG KENG SOON
DIRECTOR OF MARINE
MARITIME AND PORT AUTHORITY OF SINGAPORE

RESOLUTION MEPC.209(63)

Adopted on 2 March 2012

**2012 GUIDELINES ON DESIGN AND CONSTRUCTION TO FACILITATE
SEDIMENT CONTROL ON SHIPS (G12)**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by the international conventions for the prevention and control of marine pollution,

RECALLING ALSO that the International Conference on Ballast Water Management for Ships held in February 2004 adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the Ballast Water Management Convention) together with four conference resolutions,

NOTING that regulation A-2 of the Ballast Water Management Convention requires that discharge of ballast water shall only be conducted through ballast water management in accordance with the provisions of the Annex to the Convention,

NOTING ALSO that regulation B-5.2 of the Ballast Water Management Convention provides that ships constructed in or after 2009 should, without compromising safety or operational efficiency, be designed and constructed with a view to minimize the uptake and undesirable entrapment of sediments, facilitate removal of sediments, and provide safe access to allow for sediment removal and sampling taking into account the guidelines developed by the Organization,

NOTING FURTHER resolution MEPC.150(55) by which the Committee adopted the Guidelines on design and construction to facilitate sediment control on ships (G12) and resolved to keep these guidelines under review,

HAVING CONSIDERED, at its sixty-third session, a revised text of the Guidelines on design and construction to facilitate sediment control on ships (G12), developed by the Ballast Water Review Group of the Committee at its sixty-second session,

1. ADOPTS the 2012 Guidelines on design and construction to facilitate sediment control on ships (G12), as set out in the Annex to this resolution;
2. INVITES Member Governments to apply the 2012 Guidelines (G12) as soon as possible or when the Convention becomes applicable to them; and
3. REVOKES the Guidelines (G12) adopted by resolution MEPC.150(55).

ANNEX

2012 GUIDELINES ON DESIGN AND CONSTRUCTION TO FACILITATE SEDIMENT CONTROL ON SHIPS (G12)

1 PURPOSE

1.1 Regulation B-5.2 of the Convention requires that ships described in regulations B-3.3 to B-3.5 should, without compromising safety or operational efficiency, be designed and constructed with a view to minimize the uptake and undesirable entrapment of sediments, facilitate removal of sediments and provide safe access to allow for sediment removal and sampling, taking into account these Guidelines. Ships described in regulation B-3.1 of the Convention should, to the extent practicable, also comply with regulation B-5.2, taking into account these Guidelines.

1.2 The purpose of these Guidelines is to provide guidance to ship designers, shipbuilders, owners and operators in the development of ship structures and equipment to achieve the objectives of paragraph 1.1 and, thereby, reduce the possibility of introducing harmful aquatic organisms and pathogens.

1.3 There may be a conflict between preventing accumulation of sediments and preventing the discharge of harmful aquatic organisms and pathogens.

2 INTRODUCTION

2.1 Water taken up as ships' ballast can contain solid alluvial matter that, once the water is baled in a ship's ballast tank, will settle out onto the bottom of the tank and other internal structures.

2.2 Aquatic organisms can also settle out of the ballast water and can continue to exist within the sediment. These organisms can survive for long periods after the water they were originally in has been discharged. They may thereby be transported from their natural habitat and discharged in another port or area where they may cause injury or damage to the environment, human health, property and resources.

2.3 Regulation B-5.1 of the Convention requires that all ships remove and dispose of sediments from spaces designated to carry ballast water in accordance with the Ballast Water Management Plans. These Guidelines are to assist ship designers, shipbuilders, owners and operators to design ships to minimize the retention of sediment. Guidance on the management of sediment is contained in the Guidelines for ballast water management and development of ballast water management plans (G4).

3 DEFINITIONS

3.1 For the purposes of these Guidelines, the definitions in the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the Convention) apply.

3.2 **Ballast water tank** – For the purposes of these Guidelines, a ballast water tank is any tank, hold or space used for the carriage of ballast water as defined in Article 1 of the Convention.

4 DESIGN FOR REDUCING ACCUMULATION OF SEDIMENT

4.1 Ballast water tanks and their internal structure should be designed to avoid the accumulation of sediment in a ballast tank. The following should, as far as is practicable, be taken into account when designing ballast tanks:

- .1 horizontal surfaces to be avoided wherever possible;
- .2 where longitudinals are fitted with face bar stiffeners, consideration should be given to fit the face bar stiffeners below the horizontal surfaces to aid drain off from the stiffeners;
- .3 arrange for induced flows of water, either by pump forces or gravitational forces, to wash along horizontal or near horizontal surfaces so that it re-suspends already settled sediment;
- .4 where horizontal stringers or webs are required, drainage holes to be as large as possible, especially if edge toe-stops are fitted where horizontal stringers are used as walkways, to encourage rapid flow of water off them as the water level in the tank falls;
- .5 internal girders, longitudinals, stiffeners, intercostals and floors, where fitted, should incorporate extra drain holes which allow water to flow with minimal restriction during discharge and stripping operations;
- .6 where inner members butt against bulkheads, their installation should be such as to prevent the formation of stagnant pools or sediment traps;
- .7 scallops should be located at the joints of the inner bottom (tank top) longitudinals or intercostals and floors to allow for good airflow, and thus drying out of an empty tank. This will also allow air to escape to the air pipe during filling so that minimum air is trapped within the tank;
- .8 pipeline systems should be designed such that, when deballasting, disturbance of the water in the tank is as powerful as possible, so that the turbulence re-suspends sediment; and
- .9 flow patterns in ballast water tanks should be studied (for example by the use of Computational Fluid Dynamics (CFD)) and considered, so that internal structure can be designed to provide effective flushing. The amount of internal structure in double bottom tanks will reduce the scope for improving flow patterns. The hydrodynamic performance of the ballast tank is crucial to ensure sediment scouring.

4.2 Any designs depending upon water flow to re-suspend sediment should, as far as possible, be independent of human intervention, in order that the workload of ships' crews is minimal when operating the system.

4.3 The benefits of design concepts for reducing sediment accumulation are that there is likely to be good sediment removal while deballasting, with minimum retention of sediment in the tanks, and therefore a reduction or no need for removal by other means.

4.4 The design of all ships should provide safe access to allow for sediment removal and sampling.

4.5 The design of ballast water systems should, as far as practicable, facilitate installation of high sea suction points on each side of the ship.

4.6 When practical, equipment to remove suspended matter at the point of uptake should be installed.

RESOLUTION MEPC.210(63)

Adopted on 2 March 2012

2012 GUIDELINES FOR SAFE AND ENVIRONMENTALLY SOUND SHIP RECYCLING

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by the international conventions for the prevention and control of marine pollution,

RECALLING ALSO that the International Conference on the Safe and Environmentally Sound Recycling of Ships held in May 2009 adopted the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (the Hong Kong Convention) together with six Conference resolutions,

NOTING that regulations 17.1 and 19 of the annex to the Hong Kong Convention require that Ship Recycling Facilities shall establish management systems, procedures and techniques which do not pose health risks to the workers or to the population in the vicinity of the Ship Recycling Facility and which will prevent, reduce, minimize and to the extent practicable eliminate adverse effects on the environment caused by Ship Recycling, taking into account guidelines developed by the Organization,

NOTING ALSO that regulation 18 of the annex to the Hong Kong Convention requires that Ship Recycling Facilities shall prepare a Ship Recycling Facility Plan, addressing worker safety and training; protection of human health and the environment; roles and responsibilities of personnel; emergency preparedness and response; and monitoring, reporting and record-keeping systems, taking into account the guidelines developed by the Organization,

NOTING FURTHER that regulations 20.2 and 22 of the annex to the Hong Kong Convention require that Ship Recycling Facilities shall ensure that all Hazardous Materials are identified, labelled, packaged and removed to the maximum extent possible prior to cutting, and shall also ensure that all workers at the Ship Recycling Facility have been provided with appropriate training and familiarization prior to performing any Ship Recycling operation, taking into account the guidelines developed by the Organization,

BEARING IN MIND that the International Conference on the Safe and Environmentally Sound Recycling of Ships, in its resolution 4, invited the Organization to develop Guidelines for global, uniform and effective implementation and enforcement of the relevant requirements of the Convention as a matter of urgency,

HAVING CONSIDERED, at its sixty-third session, the draft 2012 Guidelines for safe and environmentally sound ship recycling developed by the Working Group on Ship Recycling,

1. ADOPTS the 2012 Guidelines for safe and environmentally sound ship recycling, as set out in the annex to this resolution;

2. INVITES Governments to bring the Guidelines to the attention of ship recycling facilities and to encourage their application as soon as possible; and to apply them when the Hong Kong Convention becomes applicable to them; and
3. REQUESTS the Committee to keep the Guidelines under review.

ANNEX

2012 GUIDELINES FOR SAFE AND ENVIRONMENTALLY SOUND SHIP RECYCLING

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1 INTRODUCTION

1.1 Objectives of the guidelines

These guidelines provide stakeholders, particularly Ship Recycling Facilities, with recommendations for the safe and environmentally sound recycling of ships and implementation of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (hereafter "the Convention").

It should be noted that article 6 and regulations 9 and 17 to 25 of the annex to the Convention provide requirements for Ship Recycling Facilities and require these guidelines to be taken into account.

These guidelines should be used primarily by Ship Recycling Facilities, but other stakeholders such as the Competent Authority(ies) and the organizations recognized by it may also find them useful in implementing the Convention.

1.2 Approach of the guidelines

Article 6 of the Convention requires the authorization of Ship Recycling Facilities that recycle ships to which the Convention applies or ships treated similarly pursuant to article 3.4 of the Convention. Regulation 18 specifies that such authorized Ship Recycling Facilities shall develop a comprehensive Ship Recycling Facility Plan (SRFP) that, among others, should cover worker safety and training, protection of human health and the environment, roles and responsibilities of personnel, emergency preparedness and response and systems for monitoring, reporting and record-keeping.

These guidelines describe the recommended content of the SRFP, and information is provided where appropriate to illustrate the performance standards anticipated by specific regulations of the Convention.

2 DEFINITIONS

The terms used in these guidelines have the same meaning as those defined in the Convention. The following additional definitions apply to these guidelines only.

2.1 "Adjacent space" means those spaces bordering a space in all directions, including all points of contact, corners, diagonals, decks, tank tops and bulkheads.

2.2 "Dangerous atmosphere" means an atmosphere that may expose workers to the risk of death, incapacitation, impairment of ability to self-rescue (i.e. to escape unaided from a space), injury or acute illness.

2.3 "Enclosed space" means a space that has any of the following characteristics:

- .1 limited openings for entry and exit;
- .2 inadequate ventilation; and/or
- .3 is not designed for continuous worker occupancy.

Enclosed spaces include, but are not limited to, cargo spaces, double bottoms, fuel tanks, ballast tanks, cargo pump-rooms, cargo compressor rooms, cofferdams, void spaces, duct keels, inter-barrier spaces, boilers, engine crankcases, engine scavenge air receivers, sewage tanks and adjacent connected spaces.

2.4 "Entry" means the action by which a person passes through an opening into a space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

2.5 "Hot work" means any activity requiring the use of electric arc or gas welding equipment, cutting burner equipment or other forms of flame, as well as heating or spark-generating tools, regardless of where it is carried out on board a ship.

2.6 "Space" means a permanent or temporary three-dimensional structure or compartment on a ship such as, but not limited to, cargo tanks or holds; pump or engine rooms; storage lockers; tanks containing flammable or combustible liquids, gases, or solids; other rooms; crawl spaces; tunnels (i.e. shaft alleys); or access ways. The atmosphere within a space is the entire volume within its bounds.

3 SHIP RECYCLING FACILITY PLAN (SRFP)

The Ship Recycling Facility Plan (SRFP) shall be adopted by the board or appropriate governing body of the Recycling Company. The SRFP is the main document that the Competent Authority(ies), or organization recognized by it, will rely on in authorizing a Ship Recycling Facility. Site inspections are to be utilized to verify that Facility operations conform to the description in the SRFP. It is therefore critical that the SRFP should fully describe the operations and procedures that are in place at the Ship Recycling Facility to ensure compliance with the Convention.

The SRFP should demonstrate knowledge and understanding of all applicable statutory and regulatory requirements and a strong commitment to worker health and safety and protection of the environment. The SRFP should also describe the operational processes and procedures involved in ship recycling at the Ship Recycling Facility, demonstrating how the requirements of the Convention will be met. The recommended format for the SRFP is included in appendix 1.

3.1 Facility management

The SRFP should provide information regarding the organizational structure and management policies of the Recycling Company, an overview of the Ship Recycling Facility, and methodologies related to ship recycling. The SRFP should provide sufficient detail to demonstrate a thorough understanding of production processes and project management associated with ship recycling, and should demonstrate that the Ship Recycling Facility uses valid and practical solutions to the technical problems inherent in ship recycling.

The SRFP should anticipate alterations to recycling operational processes as a result of the discovery of previously unknown factors or items during ship recycling. Procedures should be established for identifying and dealing with previously unknown features. In addition, the decision-making process should lead to an approach that will ensure protection of the safety and health of workers and the environment.

3.1.1 Company information

The SRFP should provide detailed information on:

- .1 the operator of the Ship Recycling Facility, including the organizational structure and a detailed summary of the operator's experience relevant to ship recycling;
- .2 the name of the land or Facility owner, if different to the operator;
- .3 the roles, responsibilities and qualifications of management personnel;
- .4 the roles and responsibilities of the key personnel at the Ship Recycling Facility (key personnel should have the appropriate skills and experience for the intended job functions. The Ship Recycling Facility should have a dedicated environmental, safety and health manager and a person trained in first aid or medical care);
- .5 the Ship Recycling Facility's environmental, occupational safety and health management systems, including application of any formally recognized international standards for an environmental management system (e.g. ISO14001) and occupational safety and health management systems (e.g. OHSAS18001), and any certification awarded, as applicable;
- .6 the policy statement on the Facility's commitment to protection of the environment and occupational safety and health, including the objectives set by the Facility for the minimization and ultimate elimination of adverse effects on human health and the environment caused by ship recycling;
- .7 the methodologies used for ensuring compliance with the applicable statutory and regulatory requirements; and
- .8 the system by which the objectives and goals set out in the policy of the Recycling Company and the continuous improvement of the performance of the Facility are to be achieved.

The Ship Recycling Facility's environmental and occupational safety and health management programme, policies and objectives should be communicated to and understood by all personnel working at the Facility.

3.1.2 Training programme

Regulation 22 of the Convention specifies that the Ship Recycling Facility shall ensure that training programmes are provided. The SRFP should provide detailed information on the general workforce and job functions and on training procedures to ensure the appropriate level of worker safety and environmental protection. The training programmes should cover all workers and members of the Ship Recycling Facility, including contractor personnel and employees (regulation 22.3.1), and should identify the type and frequency of training. The training programme shall be reviewed periodically and modified as necessary (regulation 22.3.5).

The training programme should enable workers to safely undertake all operations that they are tasked to do and ensure that all workers at the Ship Recycling Facility have been provided with the appropriate training prior to performing any ship recycling operation.

The programme should include appropriate training for tasks and operations performed by the employees including, but not limited to, the following:

- .1 awareness and communication of information about Hazardous Materials;
- .2 job hazard awareness, including handling and management of Hazardous Materials;
- .3 personal protective equipment;
- .4 fire protection and prevention;
- .5 emergency response and evacuation;
- .6 safety and health training;
- .7 environmental awareness; and
- .8 first-aid awareness.

3.1.3 Worker management

The SRFP should include specific information on worker responsibilities, including qualifications, training and monitoring responsibilities.

3.1.4 Records management

The SRFP should outline the policies and procedures for retaining vital records associated with Facility operations and, specifically, the recycling of each ship. The retention of records should include, but not be limited to, laboratory analytical results, manifests, shipping documents, truck receipts, waste shipment records, records of training and exercises/drills, worker accidents, injuries and medical or health records such as occupational health examinations carried out and occupational diseases contracted, and a description of any national requirements for records management and retention. If national requirements do not specify a time period, it is recommended that records should be kept for five years.

3.2 Facility operation

The SRFP should demonstrate an understanding of the regulations, production processes, project management and other requirements associated with performing recycling operations in accordance with applicable laws and regulations, and demonstrate how the Ship Recycling Facility plans to prevent adverse effects to human health and the environment (regulation 19).

3.2.1 Facility information

The SRFP should provide a clear and concise description of the physical location of the Facility, including acreage and Facility access routes. A detailed Ship Recycling Facility drawing or map should be included, with information regarding the area where recycling will occur. The SRFP should include a clear and concise description of the pertinent details of the Ship Recycling Facility, such as Facility layout, water depth, accessibility, maintenance and dredging.

The SRFP should include a clear and concise description of the total estimated ship recycling capacity, the production throughput/capacity of recyclables including steel and engineering features for material segregation and processing. Temporary and permanent buildings such as offices, workers' complex, drinking water supply, sanitation, medical and first-aid facilities, gas storage and Hazardous Materials storage and processing facilities should be identified, as should the floor construction, other structures, roadways and emergency access routes.

The SRFP should include a clear and concise description of the pertinent details of the principle operational equipment in use at the Ship Recycling Facility. It is recommended that this should include the quantity, capacity and type of such equipment and other pertinent information such as test certificates, safe working loads and qualifications of operators, in relation to worker safety and protection of the environment.

An example of Facility information is given in appendix 2, which also covers the guidance contained in section 3.2.2 ("Permits, licences and certification").

3.2.2 Permits, licences and certification

The SRFP should document the procedures in place to ensure that the Ship Recycling Facility is operated and maintained in a manner that complies with all applicable laws and regulations.

The SRFP should include information on site-specific permits, licences, and/or certificates that are in effect or obtained prior to the start of ship recycling, including any lease or authorization from a landowner, port or other entity granting authorization to use the Facility for ship recycling purposes.

The SRFP should include procedures to ensure the appropriate level of certification and/or verification in order that all subcontractors (including those involved in handling, transport, treatment, storage and disposal) hold valid permits, registrations and/or certificates, as applicable.

The use of subcontractors for any part of the process of working with or managing Hazardous Materials in the Ship Recycling Facility does not relieve the Ship Recycling Facility of its responsibilities. In all matters covered by these guidelines, the Ship Recycling Facility should ensure and maintain records to document safe and environmentally sound management by subcontractors.

3.2.3 Acceptability of ships

The Convention contains requirements for the acceptance of ships for recycling. The SRFP should describe the processes and procedures to be implemented before the ship arrives at the Ship Recycling Facility for recycling.

When preparing to receive a ship for recycling, the first step shall be to notify the Competent Authority(ies) of the intent (see regulation 24.2). When the ship destined to be recycled has acquired the International Ready for Recycling Certificate, the Ship Recycling Facility shall report to its Competent Authority(ies) the planned start date of the ship recycling, using the reporting format in appendix 6 of the Convention. The procedures to be followed by stakeholders from the recycling preparation phase to the completion of recycling, as required by the Convention, are illustrated in appendix 3 of these guidelines.

3.2.4 Ship Recycling Plan (SRP) development

Under regulation 9 of the Convention, a ship-specific Ship Recycling Plan (SRP) shall be developed by the Ship Recycling Facility before any recycling of a ship can take place. The operational processes that are indicated in the SRFP can be used to prepare the SRP. The Convention requires that the SRP should be approved, in accordance with regulation 9, prior to issuance of an International Ready for Recycling Certificate. The SRFP should describe the process for developing a SRP, taking into account the *Guidelines for the Development of the Ship Recycling Plan (SRP)*.

3.2.5 Vessel arrival management

The SRFP should describe the procedures to be implemented to secure vessels upon arrival at the Ship Recycling Facility, including provisions for mooring, heavy and/or severe weather contingencies, afloat monitoring, stability during recycling and flooding and/or sinking prevention methods. Provisions may be different depending on the ship recycling method.

3.2.6 Ship recycling methodology

The SRFP should provide a comprehensive description of the Ship Recycling Facility's ship recycling methodology, covering the entire process of recycling a vessel including management of Hazardous Materials and wastes and a description of the methodology and procedures for identifying and segregating materials. The SRFP should also include a detailed description of how recycled materials, reusable items and wastes are handled and/or disposed of in a safe and environmentally sound manner.

The SRFP should include procedures for conducting assessments of the hazards associated with the safe and environmentally sound recycling of ships and should identify the subsequent process for minimizing and eliminating any such hazards.

Where materials or wastes are removed from the Ship Recycling Facility for further processing and/or disposal, the SRFP should provide details of the procedures that will be used to ensure that they are transferred only to a facility that is authorized to deal with their treatment and/or disposal in an environmentally sound manner.

3.2.7 Reporting upon completion

Regulation 25 of the Convention contains requirements for reporting upon completion. The SRFP should describe the procedures in place for such reporting, including how the Ship Recycling Facility will document and report any incidents and accidents.

3.3 Worker safety and health compliance approach

3.3.1 Worker health and safety

In this section of the SRFP, the Ship Recycling Facility should provide a comprehensive description of the Facility's plans and procedures for protecting worker health and safety and should reflect applicable requirements of the Convention (particularly regulations 19 and 21 to 23) and national legislation. The Ship Recycling Facility should also take into account, as appropriate, guidelines developed by international organizations. A reference list of these guidelines is provided in appendix 4. The SRFP should identify and demonstrate the Ship Recycling Facility's knowledge and understanding of applicable worker safety and occupational health processes, procedures, laws, regulations and guidance. Further, the SRFP should demonstrate that the safety and health programme supports the activities necessary for environmental compliance and for recycling and disposal at the Ship Recycling Facility.

3.3.2 Key safety and health personnel

The SRFP should identify one or more key personnel who possess the level of training and experience necessary to effectively ensure that safe conditions are maintained during operations at the Ship Recycling Facility, including one or more Competent persons for the performance of specific work. Depending upon the size of the Ship Recycling Facility and the number of workers, the SRFP could include a hierarchy of safety and health management staff, including an overall manager, supervisory staff and general workers.

3.3.3 Job hazard assessment

The SRFP should include the procedures to be implemented to conduct a job-hazard assessment to determine the proper approach to maximizing worker safety. Responsibility for job hazard assessments should be assigned to a Competent person for the specific hazards of each job. It is recommended that the assessments should be conducted by a team of personnel including the Competent person, a representative of management and workers with the appropriate level of expertise.

3.3.4 Prevention of adverse effects to human health

Regulation 19 of the Convention specifies that the Ship Recycling Facility shall establish and utilize procedures to prevent explosions by ensuring that Safe-for-hot-work and Safe-for-entry conditions are established and maintained throughout the ship recycling process; to prevent other accidents that cause or have the potential to cause damage to human health; and to prevent spills of cargo residues and other materials which may cause harm to human health and/or the environment. Since these are among the more critical aspects for the safe operation of Ship Recycling Facilities, it is important that the SRFP clearly demonstrates that it has procedures in place to prevent workplace accidents and injuries. The guidelines below outline the key considerations that should be included in the SRFP.

3.3.4.1 Safe-for-entry procedures

Throughout the entire recycling process, the Ship Recycling Facility should ensure that, prior to entry and during work, enclosed spaces and other areas where the atmosphere is dangerous are monitored to ensure that they remain Safe-for-entry and safe for continued activity. The Ship Recycling Facility should ensure that shipboard spaces are not entered until a Safe-for-entry certificate has been issued by a Competent person. A Competent person should visually inspect and test each space on the ship to determine the areas which are safe for entry before issuing a certificate and before recycling activities are commenced.

Safe-for-entry certification, inspection and testing should be conducted in all spaces that have the potential to pose harm to human health as a result of the space's oxygen content, flammability or atmospheric toxicity, with particular attention paid to enclosed spaces and to spaces and adjacent spaces where hot work has been or will be performed during the course of the daily recycling work.

Designation as "Safe-for-entry" is not sufficient for hot work, as additional criteria should be met to address safety issues related to hot work.

3.3.4.1.1 Safe-for-entry criteria

For entry purposes, steady readings of all the following should be obtained:

- .1 the oxygen content of the atmosphere is 21 per cent by volume, measured using an oxygen content meter (Note: National requirements may determine a safe atmosphere range);
- .2 where the preliminary assessment has determined that there is potential for flammable gases or vapours, the concentration of those gases or vapours is not higher than 1 per cent of their lower flammable limit (LFL), measured using a suitably sensitive combustible gas indicator; and
- .3 the concentration of any toxic vapours and gases is not higher than 50 per cent of their occupational exposure limit (OEL)¹.

If these conditions cannot be met, the space should be ventilated further and retested after a suitable interval.

3.3.4.1.2 Competent person for Safe-for-entry determination

Regulation 1 of the Convention defines "Competent person". The Competent Authority should define the appropriate criteria for designation of a Competent person. However, the Competent person(s) for Safe-for-entry and/or Safe-for-hot-work determination should be able to determine oxygen content, concentration of flammable vapours and gases and the presence of toxic, corrosive, irritant or fumigated atmospheres and residues. The Competent person should possess sufficient knowledge and practical experience to make an informed assessment based on the structure, location and designation of spaces where work is done. The Competent person should possess the ability to inspect, test and evaluate spaces to determine the need for further testing. The Competent person should also monitor the maintenance of appropriate conditions in spaces.

3.3.4.1.3 Safe-for-entry inspection and testing procedures

Designation as "Safe-for-entry" is not sufficient for hot work, as additional criteria must be met to address safety issues related to hot work. Testing should be carried out by a Competent person using appropriate and properly certified and calibrated equipment, including, but not limited to, an oxygen content meter, combustible gas indicator, toxicity meter and gas or vapour detection equipment.

3.3.4.1.4 Oxygen

The Ship Recycling Facility should ensure that spaces are tested by a Competent person to determine the atmosphere's oxygen content prior to initial entry into the space by workers, and also that the space is periodically monitored and recorded for as long as it is occupied. Spaces that warrant particular consideration include the following:

- spaces that have been sealed;

¹ It should be noted that the term occupational exposure limit (OEL) includes the permissible exposure limit (PEL), maximum allowable concentration (MAC) and threshold limit value (TLV), or any other internationally recognized terms.

- spaces and adjacent spaces that contain or have recently contained combustible or flammable liquids or gases;
- spaces and adjacent spaces that contain or have recently contained liquids, gases or solids that are toxic, corrosive, or irritant;
- spaces and adjacent spaces that have been fumigated; and
- spaces containing materials or residues of materials that create an oxygen-deficient atmosphere.

A worker should only enter a space where the oxygen content, by volume, has the value noted in 3.3.4.1.1. In such a case, the space should be labelled "Safe-for-entry". If an oxygen-deficient or oxygen-enriched atmosphere is found, ventilation should be provided at volumes and flow rates sufficient to ensure that the oxygen content is maintained at the value noted in 3.3.4.1.1. The label may be reattached when the oxygen content returns to the value noted in 3.3.4.1.1, and after it has been tested and inspected by the Competent person.

3.3.4.1.5 Flammable atmospheres

The Ship Recycling Facility should ensure that spaces and adjacent spaces that contain or have contained combustible or flammable liquids or gases are visually inspected and tested by the Competent person prior to entry by workers, and that they are periodically monitored and the results recorded throughout the time that the spaces are occupied.

If the concentration of flammable vapours or gases in the space to be entered is equal to or greater than 1 per cent of the lower flammable limit, then no one should enter the space and the label "Safe-for-entry" should be removed. Ventilation should be provided at volumes and flow rates sufficient to ensure that the concentration of flammable vapours is maintained below 1 per cent of the lower flammable limit. The label may be reattached when the concentration of flammable vapours falls below 1 per cent of the lower flammable limit and after it has been tested and inspected by the Competent person.

3.3.4.1.6 Toxic, corrosive, irritant or fumigated atmospheres and residues

The Ship Recycling Facility should ensure that spaces or adjacent spaces that contain or have contained liquids, gases or solids that are toxic, corrosive or irritant are visually inspected and tested by a Competent person prior to initial entry by workers.

If a space contains an air concentration of a material which exceeds 50 per cent of their OEL, then no one should enter the space and it should not be labelled "Safe-for-entry". Ventilation should be provided at volumes and flow rates sufficient to ensure that air concentrations are maintained below 50 per cent of their OEL. The label may be reattached when the concentration of contaminants is maintained below 50 per cent of their OEL and after it has been tested and inspected by the Competent person.

3.3.4.1.7 Safe-for-entry determination by a Competent person

A Competent person should visually inspect and test each space certified as "Safe-for-entry" as often as necessary to ensure that atmospheric conditions within that space are maintained within the conditions established by the certificate. However, at a minimum, the space should be inspected and tested at least once in an eight-hour shift period. The results of these tests should be recorded on the Safe-for-entry certificate.

When a change occurs that could alter conditions within a tested enclosed space or other dangerous atmosphere, work in the affected space or area should be stopped. Work may not be resumed until the affected space or area is visually inspected and retested by the Competent person and found to comply with the certification. It is recommended that the space should be ventilated and the atmospheric conditions returned to the acceptable limits after a space has been found to exceed limits.

If the Competent person has initially determined that a space is safe for an employee to enter and they subsequently find that the conditions within the tested space fail to meet the requirements, work should be stopped until the conditions in the tested space are corrected to comply with the certification requirements. If it is safe to do so, the Competent person may be asked to investigate the reason for the space's non-compliance and to ensure that the remedial action to be taken will prevent a reoccurrence.

3.3.4.1.8 Safe-for-entry certificate, warning signs and labels

Any determination of a space as "Safe-for-entry" should be accompanied by a certificate which, at a minimum, should clearly indicate the following information:

- name and title of the Competent person performing the test(s) and inspection(s);
- signature of the above person;
- name of vessel and location;
- the areas of the ship that are Safe-for-entry;
- date and time of the inspection;
- location of inspected spaces;
- tests performed;
- type of equipment used in testing;
- test results;
- period of retesting of the spaces;
- results of periodic retesting undertaken;
- conditions when the Competent person should be recalled or conditions that void the certificate;
- safety designation(s) ("Safe-for-entry", "Not Safe-for-entry");
- validity period and expiration date of the certificate, recommended to be a maximum of 24 hours, with periodic retesting intervals not exceeding eight hours;
- type of ventilation; and
- any additional relevant information or instructions.

Safe-for-entry certificates should be posted at every access point between ashore and the ship. A record of inspection of atmospheric tests should be appended to the certificate.

The certificate and/or the spaces themselves should be clearly marked and presented in a manner that can be seen and understood by all workers in the working language of the yard and, if possible, with pictorial representations.

If an entire work area has been tested and labelled with the proper signage (for example, as being "Safe-for-entry") at all points of access to the work area, an individual tank or other space located within the work area need not be labelled separately.

The certificate, updates and any other records should be kept on file for a period of at least three months from the completion date of the specific job for which they were generated.

If a space at any time ceases to meet the Safe-for-entry criteria, the label "Safe-for-entry" should be removed.

3.3.4.1.9 Safe-for-entry operational measures

In addition to ensuring certification as "Safe-for-entry", the following operational measures should also be observed:

- no person may open or enter an enclosed space unless authorized by the Competent person of the Ship Recycling Facility and unless the appropriate safety procedures have been followed;
- a permit for entry has been issued for those intended to enter the space by the same individual(s) who is/are responsible for maintaining the certificate on behalf of the Ship Recycling Facility, confirming that all certification processes and operational measures for safe entry have been completed and are in effect;
- the space is properly illuminated;
- there is appropriate access and egress to the space and the working area in the enclosed space is suitable for the work that is being considered, specifically for heavy, large or complex lifting operations;
- a suitable system of communication between all parties for use during entry is agreed upon, tested and used;
- the space is adequately isolated from gases, liquids or other identified hazardous substances that could inadvertently be released into the space in which work is being undertaken;
- a fully-trained supervisor, who may be in charge of one or more work teams, has oversight of the area and frequently monitors the conditions to which the workers are exposed;
- the style of ventilation equipment is such that no ignition sources are introduced into a hazardous space;
- the ventilation provided for the space is adequate for the work to be undertaken and for any diurnal variation in environmental conditions that may be experienced in hot or humid regions;
- the ventilation system is designed to prevent the persistence of gas pockets within tanks/spaces – owing either to the complex structure of the tank/space or to the fact that the gas pockets are heavier than air vapours in the tank – which may be achieved by suction/evacuation style ventilation rather than blower ventilation;

- in the event of ventilation system failure, some means of alert is provided so that any persons in the space can leave immediately;
- appropriate rescue and fire control plans are in place;
- appropriate personal protective equipment (PPE), protective clothing and safety equipment (including harnesses and lifelines) are provided to the workers, and used during entry to and work in the designated spaces; and
- adequate and functioning rescue and resuscitation equipment has been provided and is positioned ready for use at the entrance of the space.

If the fire alarm is activated, the space should be evacuated until the all-clear for re-entry is given by the Competent person.

3.3.4.2 Safe-for-hot-work procedures

The Ship Recycling Facility should ensure that no hot work commences on a ship unless the area is deemed "Safe-for-hot-work".

Safe-for-hot-work certification, inspection and testing apply to all of the following:

- enclosed spaces and all other spaces enclosed by bulkheads and decks (including cargo holds, tanks, quarters, and machinery and boiler spaces) that potentially contain dangerous atmospheres;
- within, on, or immediately adjacent to spaces that contain or have contained combustible or flammable liquids or gases;
- within, on, or immediately adjacent to fuel tanks that contain or have last contained fuel;
- on pipelines, heating coils, pump fittings or other accessories connected to spaces that contain or have last contained fuel; and
- bilges, cargo holds, engine room spaces and boiler spaces not containing dangerous atmospheres.

The Ship Recycling Facility should ensure that no hot work commences in any of these spaces until Safe-for-hot-work certification has been issued by a Competent person; these inspections and tests should be entered on the record of inspection and testing and posted in a conspicuous place on board. A Competent person should visually inspect and test each space on the ship to determine the areas which are deemed "Safe-for-hot-work" before a certificate is issued and before recycling activities commence.

3.3.4.2.1 Safe-for-hot-work criteria

A space that is "Safe-for-hot-work" is one that meets all the Safe-for-entry criteria and also the following criteria:

- any residues or materials in the space are not capable of producing an oxygen-enriched or oxygen-deficient environment, and are not capable of generating flammable or explosive vapours;

- all adjacent spaces have been cleaned, rendered inert or sufficiently treated to prevent the risk of explosion, the release of noxious or toxic fumes or gases and the spread of fire; and
- work in adjacent spaces is not affected by the hot work, such as tank entry, lifting operations or deconstruction by hand.

3.3.4.2.2 Competent person for Safe-for-hot-work determination

A Competent person for matters related to Safe-for-hot-work determination should meet the criteria identified in 3.3.4.1 and possess the additional knowledge and skills required to handle hot work activities.

3.3.4.2.3 Safe-for-hot-work inspection, testing and determination

Each space should be certified by a Competent person as "Safe-for-hot-work" as often as necessary to ensure that conditions within that space are maintained as established by the certificate. The frequency with which a space should be monitored to determine whether conditions are being maintained is a function of the following, but should in any event not exceed an eight-hour shift period:

- temperature: any changes in temperature in the space could result in a change in its atmospheric conditions, and hotter days can cause residues to produce more vapours, resulting in a greater risk of flammable or explosive conditions;
- work in the space: activity in the space can change its atmospheric conditions; gas leaks from a hose or torch or manual tank cleaning by scraping or using hand-held high-pressure spray devices can stir up residues, which can result in a greater risk of flammable or explosive conditions;
- period of elapsed time: if a sufficient period of time (not to exceed 24 hours) has elapsed since Safe-for-hot-work certificate was issued, the condition of the space should be retested prior to entry and commencement of work;
- unattended spaces: a tank or space that has been certified as "Safe-for-hot-work" then subsequently left unattended for a sufficient period of time should be retested prior to entry and commencement of work;
- work break: tanks or spaces should be checked for equipment left behind when workers take a break or leave at the end of the shift, and the condition of the tank or space should be retested prior to entry and resumption of work; and
- ballasting or trimming: changing the position of the ballast or moving or trimming the ship in any way can produce a change in the atmosphere of the spaces; the condition of the spaces should be retested prior to entry and resumption of work.

3.3.4.2.4 Safe-for-hot-work certificate, warning signs and labels

Any determination of a space as "Safe-for-hot-work" should be accompanied by a certificate which, at a minimum, should include the information identified in section 3.3.4.1.8 ("Safe-for-entry certificate, warning signs and labels"). Warning signs and labels should be posted in the manner described in section 3.3.4.1.8 for Safe-for-entry determination, clearly indicating that the space is "Safe-for-hot-work".

3.3.4.2.5 Safe-for-hot-work operational measures

In addition to the measures identified in section 3.3.4.1.9 ("Safe-for-entry operational measures"), the following should also be applied in order to achieve certification as "Safe-for-hot-work":

- each area where hot work is to be performed should be carefully prepared and isolated before hot work commences;
- all trash, debris, oil residues or other materials that could generate flammable or explosive vapours should be removed from the space prior to commencing hot work. The space and adjacent spaces should be kept free of any trash, debris, oil residues or other materials that could result in a risk of flammable or explosive conditions;
- drums and similar small containers which have contained flammable substances should, before they are cut, be either filled with water or thoroughly cleaned of such substances;
- deck tanks should be appropriately cleaned, gas freed and certified as Safe-for-entry and tested for hot work as described in the general sections (see sections 3.3.4.1 and 3.3.4.2). A suitable supply of fresh air should be maintained, given that oxygen from the atmosphere may be removed in the combustion process. The tanks should be isolated and tested in accordance with the guidance given in these guidelines. Particular attention should be paid to access and egress and to the unique challenges presented by these spaces regarding tank rescue in an emergency situation;
- fixed cargo or fuel tanks should be cleaned and ventilated before any work commences and after having been passed as "Safe-for-entry" and "Safe-for-hot-work". Cleaning should be sufficient to remove any hazardous liquids, light solids and clinkage to allow the tank to be gas freed. Complex structures may require additional preparation before being certified as "Safe-for-hot-work". The need for localized manual cleaning should be considered. Ventilation should allow an adequate flow of air to all parts of the space to prevent a build-up of gases either from the hot work or from the tank coatings;
- ventilation should be provided at volumes and flow rates sufficient to ensure that the concentration of flammable vapours is maintained below 1 per cent of the lower flammable limit;
- general mechanical ventilation should be of sufficient capacity and so arranged as to produce sufficient air changes to maintain safe levels of welding fumes and smoke; and
- the Ship Recycling Facility's fire safety procedures should be followed.

3.3.4.3 Welding, cutting, grinding and heating

The SRFP should include procedures for ventilation, personnel monitoring for heavy-metals exposure, protection of personnel, training, respiratory protection, torch cutting, permits and inspections (including hot-work certification). The SRFP should include procedures for transporting, moving, securing, storing and using hoses and torches.

3.3.4.4 Drums, containers and pressure vessels

The SRFP should include procedures for handling, transporting and storing pressure vessels containing flammable gases, such as acetylene (C₂H₂), propane gas (C₃H₈) or oxygen (O₂) for welding, heating and cutting works, in order to avoid any human injuries, caused by external forces, shock or heat to such vessels.

Procedures for removing pressure vessels containing carbon dioxide (CO₂), nitrogen (N₂) and other ozone-depleting substances used in fire-fighting and refrigeration systems should also be included.

Procedures for transporting and storing drums and containers containing hazardous liquids, using appropriate PPEs, should also be described in the SRFP.

3.3.4.5 Prevention of falling from heights and accidents caused by falling objects

The SRFP should include procedures for using personal flotation devices, guarding deck openings, deck edges and platforms, utilizing personal fall arrest systems and guard rails and ensuring safe access to ships to prevent slip-and-fall accidents and the dropping and scattering of objects.

3.3.4.6 Gear and equipment for rigging and materials handling

The SRFP should include procedures for testing and inspecting ropes, chains, slings, hooks, chain-falls and hoisting and hauling equipment. It should further include a description of operations using cranes, machines, mobile equipment and aerial and man-lift systems and a list of qualifications required for the operators.

3.3.4.7 Housekeeping and illumination

The SRFP should include procedures for work areas, such as aisles, passageways and temporary deck openings.

3.3.4.8 Maintenance and decontamination of tools and equipment

The SRFP should include procedures for inspection and maintenance of equipment, regulatory requirements for third-party inspections and decontamination procedures. These activities and the result of the inspections should be recorded.

The Ship Recycling Facility should ensure that the quantity and the deployment of tools and equipment are suitable for the corresponding recycling activities, especially when a number of ships are to be recycled at the same time.

3.3.4.9 Health and sanitation

The SRFP should include a description of washing facilities, showers, eating and recreation areas, toilet facilities and changing rooms. It is recommended that appropriate changing rooms and sanitary and washing facilities should be provided by the Ship Recycling Facility to control exposure and avoid the spread of Hazardous Materials. Sanitary and washing facilities should be conveniently accessible and situated so that they are not at risk of contamination from the workplace. Separate and appropriate changing rooms and sanitary and washing facilities should be provided for exclusive use by workers handling asbestos. It is also recommended that the Ship Recycling Facility should designate separate and uncontaminated areas for workers to use for eating, drinking and other breaks.

3.3.4.10 Personal protective equipment

The SRFP should include information on procedures and equipment used for the protection of employees from various risks associated with ship recycling.

Respiratory protection and hearing conservation programmes should be developed for all employees who could be exposed to excessive levels. The SRFP should describe how the programmes are in compliance with national regulations. In the absence of domestic law, the Ship Recycling Facility should utilize best industry practices to provide effective respiratory protection and hearing conservation programmes.

3.3.4.11 Worker exposure and medical monitoring

The SRFP should include procedures to be used for monitoring exposure and for medical surveillance.

3.3.5 Emergency preparedness and response plan (EPRP)

Regulations 18.5 and 21 of the Convention specify that Ship Recycling Facilities shall establish and maintain an emergency preparedness and response plan (EPRP). While the EPRP could be incorporated into the SRFP, it is highly recommended that the EPRP should be a separate, self-contained document. By having it as a self-contained document, the information contained within is more readily available and easily accessible, and the Ship Recycling Facility may want to distribute copies to several locations at the site. It is also helpful to have a summary page at the front of the document for quick access, showing 24-hour contact information (including telephone numbers) for the appropriate contact personnel (such as management personnel and emergency response personnel).

The SRFP should identify the locations where the EPRP will be readily available, and should contain a brief summary of the EPRP, so that the appropriate entities (such as those that are authorizing facilities) or other relevant stakeholders can easily confirm that it exists. The EPRP should take into consideration a wide variety of potential scenarios, including, but not limited to, human injuries, environmental accidents, extreme acts of nature and the activities of the surrounding community (such as an emergency at a nearby chemical processing plant).

The EPRP should, at a minimum, include the Facility's response to:

- fire or explosion or ingress of water on the ship being recycled or awaiting recycling, within the perimeter of the Facility, or in an adjacent facility;
- accidents to workers within the Facility;
- spillages of Hazardous Materials; and
- probable acts of nature in the area concerned, such as earthquakes or flooding.

The location, physical and environmental characteristics of the Ship Recycling Facility and the size and nature of activities associated with each ship recycling operation should be taken into consideration during preparation of the EPRP. The EPRP should do the following:

- ensure that the necessary equipment – including fire hydrants, extinguishers, first-aid facilities, clean-up equipment, breathing apparatus, alarms and signals and details of training arrangements that are commensurate with the possible

emergency situations likely to occur at the Ship Recycling Facility – and emergency procedures are in place, and that drills are being held on a regular basis;

- provide for the information and internal communication and coordination necessary to protect all people in the event of an emergency at the Ship Recycling Facility;
- provide information to and ensure communication with the relevant Competent Authority(ies) or organization recognized by it, the surrounding community and the emergency response services;
- provide for first-aid and medical assistance, fire-fighting, evacuation of all people from the Ship Recycling Facility (including emergency escape route and muster station) and pollution prevention measures such as the response to spills of Hazardous Materials (including the safe handling of spilled or emitted materials and the procedure for cleaning contaminated areas);
- provide visible indications of location of first aid stations, fire control stations and evacuation routes;
- further ensure the provision of relevant information and training to all workers at the Ship Recycling Facility, at all levels and according to their competence, including regular exercises in emergency prevention, preparedness and response procedures; and
- include procedures for recording of an emergency incident and investigation and corrective actions following an emergency incident.

3.3.6 Fire and explosion prevention, detection and response

The Ship Recycling Facility should have systems in place for preventing fires and explosions and for fire-fighting, by controlling any outbreak of fire quickly and efficiently and by quickly and safely evacuating all personnel at the Facility. The SRFP should provide for the following:

- sufficient and secure storage areas for flammable liquids, solids, and gases;
- procedures for the prohibition of smoking through "no smoking" notices;
- precautions to be implemented in spaces where flammable gases, vapours or dust can cause danger (no naked light or flame or hot work should be permitted unless the space has been tested and deemed safe by a Competent person); and
- procedures for the proper storage of combustible materials, greasy or oily wastes and scrap wood or plastics.

The SRFP should also include procedures for regular inspections of spaces where there are risks of fire and explosion. This includes the vicinity of heating appliances, electrical installations, conductors, stores of flammable and combustible materials and areas where operations involving hot welding, cutting, grinding and heating are conducted. The appropriate precautions to reduce the risk of fire and explosions from welding, flame cutting and other hot work should be identified.

The SRFP should include procedures for the provision and selection of fire-extinguishing equipment according to the provisions of applicable international and national laws and regulations, and should record the results of the initial hazard identification and risk assessment of the Ship Recycling Facility operations. Equipment deployment should take account of the following: any restrictions to access or egress to spaces inside the ship; the quantity and characteristics of hazardous, flammable and explosive substances handled in ship recycling operations; site transport and storage facilities; and first-stage fire-fighting demands (such as hand-held or trolley-mounted portable fire extinguishers).

The SRFP should identify the locations of the fire-extinguishing equipment, ensuring that they are readily available, easily visible and in accessible areas. Adequate water supply should be provided in places where the danger of fire exists (in accordance with national laws and regulations).

The SRFP should include procedures for the provision, proper operation, maintenance and regular inspection of all fire-extinguishing equipment by a Competent person. Access to fire-extinguishing equipment, such as hydrants, portable extinguishers, and connections for hoses, should be kept clear at all times.

The SRFP should describe procedures for providing suitable training, instruction and information to all supervisors and workers (including details of the frequency of such training) about the hazards of fires, appropriate precautions to be taken and use of fire-extinguishing equipment, so that adequately trained personnel are readily available during all working periods. Records of training and drills/exercises should be maintained, including such information as type of training/drill, role of person trained, equipment used, duration, location, date and time.

The SRFP should include procedures for the installation of sufficient, suitable and effective warning signals (such as sight and sound signals) in case of fire. There should be an effective evacuation plan so that all personnel are evacuated speedily and safely. The SRFP should include procedures for posting notices in conspicuous places indicating, if applicable, the nearest fire alarm, the telephone number and address of the nearest emergency services and the nearest first-aid station.

3.4 Environmental compliance approach

The SRFP should provide a description of the Ship Recycling Facility's plan and procedures for protecting the environment. The SRFP should demonstrate that the Ship Recycling Facility understands the environmental risks associated with ship recycling, understands and is implementing the environmental requirements imposed by applicable international and national laws and regulations, is capable of managing and disposing of all the materials in the ship in an environmentally sound manner, and is implementing controls to protect the environment, including with respect to handling and disposing of Hazardous Materials. The SRFP should reflect applicable requirements of the Convention (particularly regulations 20 to 22).

The SRFP should describe dedicated infrastructure for the treatment and disposal of Hazardous Materials generated from ship recycling operations pursuant to national laws and regulations. The Ship Recycling Facility should also take account of guidelines developed by international organizations as appropriate. A reference list of such guidelines is provided in appendix 5.

3.4.1 Environmental monitoring

The SRFP should describe the environmental monitoring programme aimed at preventing possible negative impacts to the environment during ship recycling.

Possible negative impacts during ship recycling may be divided into four main categories:

- releases of Hazardous Materials to ground and sediments;
- releases of Hazardous Materials to water;
- emissions of Hazardous Materials to air; and
- noise/vibrations.

The monitoring programme, if included in the SRFP, should be Facility-specific, taking into account the Facility's characteristics, such as the use of dry dock, jetty/piers and/or recycling plots on land-sea interface, and should identify chemical, biological and physical changes in the environment surrounding the Ship Recycling Facility.

The monitoring programme, if included in the SRFP, should utilize well-established standards for the sampling and analysis of relevant environmental parameters.

3.4.2 Management of Hazardous Materials

Prior to recycling, the IHM shall, in addition to the properly maintained and updated Part I, incorporate Part II for operationally generated wastes and Part III for stores (regulation 5.4).

Ships destined to be recycled shall conduct operations in the period prior to entering the Ship Recycling Facility in a manner that minimizes the amount of cargo residues, fuel oil and wastes remaining on board (regulation 8.2).

The following Hazardous Materials, at the very least, should be addressed in the SRFP:

- (a) Hazardous materials contained in the ship's structure and equipment (IHM, Part I):

Asbestos
Polychlorinated biphenyls (PCBs)
Ozone-depleting substances (ODSs)
Anti-fouling compounds and systems
Cadmium and cadmium compounds
Hexavalent chromium and hexavalent chromium compounds
Lead and lead compounds
Mercury and mercury compounds
Polybrominated biphenyls (PBBs)
Polybrominated diphenyl ethers (PBDEs)
Polychlorinated naphthalenes (PCNs)
Radioactive substances
Certain short-chain chlorinated paraffins

(b) Operationally generated wastes (IHM, Part II):

Waste oil (sludge)
Bilge and/or waste water generated by the after-treatment systems fitted on machineries
Oily liquid cargo residues
Ballast water
Raw sewage
Treated sewage
Non-oily liquid cargo residues
Dry cargo residues
Medical/infectious waste
Incinerator ash
Garbage
Fuel tank residues
Oily solid cargo tank residues
Oily or chemical contaminated rags
Dry tank residues
Cargo residues

(c) Stores including regular consumable goods (IHM, Part III). A list of these is shown in appendix 6 to these guidelines.

Regular consumable goods potentially containing Hazardous Materials comprise goods which are not integral to a ship and are unlikely to be dismantled or treated at a Ship Recycling Facility.

The Ship Recycling Facility's approach for properly managing each of the Hazardous Materials found on board a ship should be described in its SRFP.

The SRFP should describe the Ship Recycling Facility's process, control procedures and abatement methodologies used for the removal, labelling, storage, segregation, transport, treatment and disposal of all such Hazardous Materials, which should be developed in accordance with national requirements, as applicable.

It is important to describe the sequence of removal of Hazardous Materials as part of the ship recycling activities.

It is recommended that the following aspects of proper management of Hazardous Materials should be clearly addressed for each of the potentially Hazardous Materials identified above:

- identification, marking and labelling and potential on-board locations;
- recycling approach;
- removal, handling and remediation;
- storage and labelling; and
- treatment, transportation and disposal.

The Facility's approach to the safe and environmentally sound removal and treatment of any non-hazardous wastes on board should be described in the SRFP. The SRFP should describe the Facility's processes, control procedures and capabilities for removing and treating all such non-hazardous wastes, taking into account applicable IMO guidance, including but not limited to the *Comprehensive Manual on Port Reception Facilities*.

3.4.2.1 Potentially containing Hazardous Materials

The prerequisite for classification as "potentially containing Hazardous Materials" (PCHM) is "a comprehensible justification such as the impossibility of conducting sampling without compromising the safety of the ship and its operational efficiency" (paragraph 4.2.3 of the *2011 Guidelines for the Development of the Inventory of Hazardous Materials*, hereafter "the Inventory Guidelines").

The SRFP should describe how PCHMs will be treated; either:

- they will be removed, stored and treated as Hazardous Materials in accordance with the requirements of the Convention; or
- sampling and analysis will be conducted and PCHMs will be treated accordingly, based on the findings of sampling and analysis.

The basis of such a decision on how to treat PCHMs should be transparent and consistent as far as practicable. This information will need to be fully described in the Ship Recycling Plan.

3.4.2.2 Additional sampling and analysis

If, during the recycling process or in preparation for it, the Ship Recycling Facility deems it necessary, sampling, analysis and/or visual inspection should be conducted, possibly with the cooperation of the shipowner, to enable the identification of Hazardous Materials. A sampling plan should be developed describing the sampling locations, number of samples to be taken, the name of the sampler (including subcontractors) and the type of analysis to be performed.

When conducting the sampling of any possible Hazardous Materials, the samplers should be protected from exposure by the worker-safety measures required for the Hazardous Materials in question. Analysis of the samples should be performed by an accredited laboratory.

It is recommended that, in conducting additional sampling, the Ship Recycling Facility should follow the relevant part on sampling and analysis of the Inventory Guidelines.

After the sampling and analysis results are known, the Ship Recycling Facility should manage the materials appropriately according to whether they have been found to be hazardous.

3.4.2.3 Identification, marking and labelling and potential onboard locations

The Ship Recycling Facility should utilize the information in the IHM for the purposes of identifying the type, location and quantity of any Hazardous Materials and for marking and/or labelling. Asbestos, PCBs, other Hazardous Materials and ship tanks – such as crude oil tank (COT), fuel oil tank (FOT), lubricating oil tank (LOT), fresh water tank (FWT) and water ballast tank (WBT) – should be clearly marked in an easily identifiable manner.

It is recommended that the Ship Recycling Facility should ensure that it is fully aware of all the potential locations of Hazardous Materials on board ships. Examples of typical locations for many of the Hazardous Materials are provided in section 2.2 ("Indicative List") of appendix 5 ("Example of the Development Process for Part I of the Inventory for Existing Ships") of the Inventory Guidelines.

3.4.2.4 Removal, handling and remediation

The SRFP should describe how to safely remove, handle and/or clean the Hazardous Materials that have been identified on the ship, taking account of their potential adverse effects on human health and/or the environment.

Removal of Hazardous Materials should only be conducted by appropriately trained personnel following the worker-safety measures required for the Hazardous Materials in question.

Whenever in use, the space where the removal work is occurring should be isolated from other work spaces and should be clearly marked to inform all persons of the hazards in the area.

After the removal of highly toxic, explosive or reactive Hazardous Materials, decontamination or remediation of the space should be performed by trained personnel.

Methods and procedures for the removal, handling and remediation of Hazardous Materials should be established to ensure safe and environmentally sound operations in accordance with the applicable national requirements.

Pursuant to section 2.2 of the Supplement to the Document of Authorization to conduct Ship Recycling (DASR) (appendix 5 of the Convention), the SRFP should indicate the responsible personnel authorized to carry out removal of Hazardous Materials, with the certificate number or other relevant information, for each of the Hazardous Materials identified.

In the normal handling of all hazardous materials due attention should be paid to relevant occupational exposure limits.

3.4.2.5 Storage and labelling after removal

The SRFP should describe how all wastes generated from recycling activity will be kept separate from recyclable materials and equipment, labelled for clear identification and stored in appropriate conditions either temporarily or for a longer term. The SRFP should describe how the Ship Recycling Facility will avoid waste being mixed or contaminated in a way that interferes with subsequent handling, storage, treatment, recycling or disposal.

3.4.2.6 Treatment, transportation and disposal

The SRFP should demonstrate how the Ship Recycling Facility will ensure environmentally sound management of all Hazardous Materials and wastes removed from a ship at the Ship Recycling Facility. If treatment or disposal is taking place at the Ship Recycling Facility, the SRFP should describe how the materials will be managed in an environmentally sound manner and in compliance with applicable national requirements.

In situations where the Hazardous Materials and wastes are sent off site, the SRFP should describe procedures to ensure that they are transferred only to a facility authorized to deal with their safe and environmentally sound treatment and disposal.

The SRFP should identify all off-site management and disposal facilities, describe how the materials will be managed at those facilities and identify all authorizations, permits, certificates, approvals and licences required by national and other agencies authorizing the facilities to manage the wastes. The SRFP should include procedures for tracking Hazardous Materials and wastes as they are transported from the Ship Recycling Facility to their ultimate destination, and for managing and storing documentation, including that of subcontractors.

The final waste-management facilities should adhere to national standards and requirements which should take into account applicable international standards and requirements.

3.4.3 Environmentally sound management of Hazardous Materials

3.4.3.1 Asbestos and materials containing asbestos

The Ship Recycling Facility should identify the location and quantity of asbestos and materials containing asbestos by actively utilizing the IHM. Identification, marking and labelling should be conducted by the Ship Recycling Facility before asbestos and materials containing asbestos are removed.

Indicative lists of shipboard locations for asbestos are provided in the Inventory Guidelines (section 2.2.2.1 of appendix 5), and can be used as supporting material if additional assessment and sampling are required.

In order to safely remove asbestos and materials containing asbestos, the following protective measures should be taken, and the SRFP should describe how they are implemented by the Ship Recycling Facility:

- .1 workers should be present who are trained and authorized in the removal of asbestos and materials containing asbestos in accordance with applicable national requirements;
- .2 the removal of the asbestos and materials containing asbestos should be conducted under the monitoring and management of the Competent person;
- .3 the number of workers exposed to asbestos should be limited to the necessary minimum;
- .4 the area in which the removal of asbestos and materials containing asbestos is to be conducted should be isolated from the other work areas, and entry should be allowed only to appropriately trained personnel. The area should be clearly posted with a caution that asbestos removal work is occurring;
- .5 if the removal work includes cutting, boring, grinding or otherwise disturbing friable asbestos and materials containing asbestos which may scatter into the environment, appropriate protection should be provided, so as not to release the asbestos in the air, by isolating the area in the room or space where the removal will occur; a common approach is as follows:
 - seal the room or space with plastic sheets;
 - the plastic sheets should be of sufficient strength;

- where the machines, equipment, pipes or spaces cannot be isolated or sealed (for example, a complex and narrow area under a floor plate in the engine room), partial protection may be provided with plastic sheets;
 - the isolated area should be maintained under negative pressure where possible; and
 - practices for dealing with materials containing asbestos under a partial pressure chamber system and the use of wet methods should be encouraged as far as possible;
- .6 materials containing friable asbestos in areas such as walls and ceilings should be carefully removed, and water or an appropriate wetting agent should be applied prior to the removal of materials containing asbestos in order to prevent the asbestos from scattering into the atmosphere;
- .7 personal protection equipment (PPE) for workers, including respiratory protection and special protective clothing for asbestos, should be provided;
- .8 after removal of asbestos, the area should be cleaned in the following manner:
- equipment and tools should be washed/cleaned and then removed from the area;
 - the asbestos and materials containing asbestos should be packed and sealed in plastic containers prior to being removed from the area;
 - the plastic sheets used for isolating the area should be moistened with water and handled carefully to prevent the asbestos from scattering;
 - an efficient vacuum cleaner should be used for cleaning the area, such as one equipped with a high efficiency particulate air (HEPA) filter; and
 - the airborne asbestos in the air and/or space should be checked before removing the plastic isolation sheets and allowing other work to continue in the area;
- .9 workers removing asbestos should properly prepare for entry into a contaminated area, and should be decontaminated before leaving the contaminated area, as follows:
- workers should not be allowed to wear street clothes in the isolated area or under their PPE;
 - after completing work in the isolated area, workers should shower to remove asbestos, and then enter a separate clean area to put on their clothes; and
 - work clothes should not be laundered at home; they should be bagged, labelled and laundered at an appropriate location at the Facility or off site;

- .10 containers used for packing and transporting the removed asbestos materials should be properly labelled and sufficiently strong and resilient as to minimize the possibility of accidental damage or breakage during transport, which could result in the uncontained release of asbestos fibres into the atmosphere; and
- .11 asbestos should not be reused or recycled, and its management and final disposal should comply with national requirements.

3.4.3.2 PCBs and materials containing PCBs

The Ship Recycling Facility should identify the location and quantity of the Hazardous Materials and wastes containing PCBs (polychlorinated biphenyls) by actively utilizing the IHM.

Indicative lists of shipboard locations for PCBs are provided in the Inventory Guidelines (section 2.2.2.2 of appendix 5), and can be used as supporting material if additional assessment and sampling are required. PCBs may be contained in the equipment and materials in both solid and liquid forms as shown on the IHM. Since PCB sampling and analytical procedures can be expensive and time consuming, it may be more economical to presume that the materials do contain PCBs and remove and manage them accordingly.

In order to safely remove PCBs and materials containing PCBs, the following protective measures should be taken and the SRFP should describe how they are implemented by the Ship Recycling Facility:

- .1 workers should be specifically trained and authorized in the removal of PCBs;
- .2 personal protection equipment (PPE) for workers, including respiratory protection and dermal protection, should be provided;
- .3 removal of Hazardous Materials and wastes containing PCBs should be carefully performed to avoid spills, volatilization or scattering, in the following manner:
 - spill prevention measures should be taken when draining or removing liquid-filled equipment, including booms, drip pans, liners and/or absorbent materials placed around the system or piece of equipment; and
 - most solid materials containing PCBs can be removed by using manual, chemical or mechanical means such as blasting, scraping, cutting, stripping or gouging;
- .4 thermal or "hot" methods of removal or recycling should not be used if the presence of PCB is known or suspected (for example, electric cable insulation, hydraulic oil, transformer oil and paints containing PCBs should not be burned);

- .5 equipment used to remove PCB-containing materials should be decontaminated appropriately after use (a common decontamination process for equipment would be to rinse with non-polar organic solvent such as kerosene or diesel, then wash with soap and water and rinse with clean water); any water or other liquid used should be appropriately managed as waste;
- .6 removed PCBs and materials containing PCBs should be appropriately stored in properly labelled, leak-proof containers that are made for transport and are sealed (liquids) or covered (solids);
- .7 a separate storage area should be set up for PCB wastes, in accordance with the following points:
 - Hazardous Materials and wastes containing PCBs should not be stored or kept with other Hazardous Materials and wastes;
 - the storage area should be clearly marked on the exterior with warnings that it contains PCBs;
 - the storage area should provide protection from rain; and
 - containers should be regularly inspected for leaks and damage;
- .8 containers or vehicles used for packing and transporting the removed PCB materials should be properly labelled and the possibility of accidental release during transport should be minimized; and
- .9 PCBs should not be reused or recycled and their management and final disposal should comply with national requirements.

3.4.3.3 Ozone-depleting substances (ODSs)

The Ship Recycling Facility should identify the location and quantity of ozone-depleting substances (ODSs) prior to removal by actively utilizing the IHM.

The indicative list for ODSs in the Inventory Guidelines (section 2.2.2.3 of appendix 5) can be used as the supporting material if an additional survey and sampling are required.

The SRFP should describe how the Ship Recycling Facility implements the following protective measures to safely remove and manage ODSs:

- .1 extraction of ODSs from the system should be done by persons who are trained and authorized for handling such materials;
- .2 ODSs on board in containers, equipment and piping systems should not be released into the atmosphere;
- .3 management or destruction of ODSs should comply with national requirements; and
- .4 ODSs used as blowing agents and trapped in insulation foam in refrigerated areas should not be released into the atmosphere and environmentally sound management should be observed while dismantling and disposing of the foam waste.

3.4.3.4 Paints and coatings

The SRFP should describe procedures for properly managing any paints and coatings that are highly flammable or that may release toxins during cutting.

3.4.3.4.1 Anti-fouling compounds and systems (organotin compounds including tributyltin (TBT))

The Convention applies to all anti-fouling compounds and systems regulated under annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships (hereafter "the Anti-Fouling Convention"). Since the only systems currently regulated by the Anti-Fouling Convention are organotin compounds, these guidelines address the proper management of organotins only. However, similar considerations should be applied to future anti-fouling compounds that become subject to the Anti-Fouling Convention.

Organotin compounds include tributyltin (TBT), triphenyltin (TPT) and tributyltin oxide (TBTO). Organotin compounds have been commonly used as anti-fouling paint on the bottom of ships. Some ships applied the organotin compounds with a coating forming a barrier to stop such compounds from leaching into sea. Therefore, the Ship Recycling Facility should check the IHM carefully, and might inspect the hull paint.

Organotin paint should not be released into the sea or soil during the ship recycling process. If it is possible that organotin paint might be removed as a result of work (whether it is intentionally removed, or the collateral effect of some other effort, such as dragging), the work should be conducted in an environmentally sound manner to ensure that any organotin paint removed is not released into the sea.

Organotin paint may be removed using techniques such as blasting, chemical stripping or mechanical removal. However, special attention should be given to preventing scattering of the paint chips in the air or adjacent areas.

Blasted paints should be collected, stored and disposed of in an environmentally sound manner in accordance with national requirements.

3.4.3.4.2 Toxic and highly flammable paints

The removal of paints prior to cutting during ship recycling may not be necessary unless the process leads to the release of toxic compounds or the paint is highly flammable. Prior to cutting painted surfaces, the Ship Recycling Facility should check the flammability and toxicity of the paint or coating. If it is toxic or flammable, it is suggested that, prior to hot cutting, a sufficiently wide band of paint is mechanically or chemically removed (for example, through blasting, scraping or stripping) from along the cut line. Appropriate PPE should be worn, and a containment system for paint particles should be used (especially for blasting operations).

If removal is not possible or feasible, cutting can proceed in a controlled manner provided that the workers are well protected with PPEs specifically designed for breathing and eye protection.

3.4.3.5 Hazardous liquids, residues and sediments (such as oils, bilge and ballast water)

The Ship Recycling Facility should identify the location and volume of hazardous liquids remaining on board by actively utilizing the IHM. Identification, marking and labelling of the

tanks and other areas should be conducted by the Ship Recycling Facility before the liquids are removed.

The residual oil storage tank should be protected against leakage, overflow, fire and other potential accidents.

Hazardous liquids, residues and sediments in stores, tanks, machines, equipment and piping should be removed under safe and environmentally sound conditions.

Ballast water should be handled in accordance with relevant national requirements.

3.4.3.6 Heavy metals (lead, mercury, cadmium and hexavalent chromium)

As indicated in the Inventory Guidelines, heavy metals are found in batteries, galvanized materials, level switches, gyro compasses, thermometers, coatings, etc. Radioactive substances may be found in level indicators and smoke detectors.

Equipment and other instruments containing heavy metals should be removed carefully to ensure that they do not break and to avoid contamination of the environment. Reusable equipment and instruments should be stored properly. Broken equipment and instruments should be delivered to the appropriate companies for repair, recycling or disposal in accordance with national requirements.

Anodes fitted to the ship's hull as sacrificial metal should be removed in the course of block cutting and should be managed properly.

3.4.3.7 Other Hazardous Materials

Other Hazardous Materials not listed above and which are not part of the ship's structure – those materials listed in the IHM, Parts II and III – should be removed under safe conditions.

To the maximum extent possible, these materials should be removed prior to cutting according to the provisions of national laws and regulations. After the materials have been removed from ships, safe and environmentally sound methods should be used for storing and processing them; for example, electric cable insulation containing chlorinated compounds should not be burned.

3.4.4 Prevention of adverse effects to the environment

3.4.4.1 Spill prevention, control and countermeasures

The purpose of developing and implementing a programme for spill prevention, control and countermeasures is to minimize the risk of spills and leaks that could adversely impact the environment. The SRFP should include a programme that defines the Ship Recycling Facility's procedures for spill prevention, response and countermeasures. The programme should define proactive approaches to spill prevention and procedures to be implemented in the event of spills.

At a minimum, the programme should demonstrate that the Ship Recycling Facility has adequate containment and spill clean-up equipment and procedures, by identifying the following:

- containment and diversionary structures in place to prevent discharged Hazardous Materials from contaminating soil and water;
- Facility drainage areas;
- location of spill response equipment;
- environmental protection measures to be implemented during transfer and offloading of fuels;
- location of other oils and bilges;
- fuel storage locations;
- inspection and record-keeping procedures;
- security measures;
- personnel training programmes;
- spill prevention and reporting procedures; and
- the history of incidents at the Ship Recycling Facility.

As part of the procedures for spill prevention, response and countermeasures, the SRFP should identify the designated in-house and subcontracted personnel who will be responsible for managing the programme and for responding to spills or similar emergencies, as well as the local authorities (such as the fire department) that may have jurisdiction at the Ship Recycling Facility. This SRFP should include 24-hour contact information. The SRFP should include both a narrative and graphic description of the Facility layout, including the location of any water bodies or other routes of migration, the storage location of oil or other Hazardous Materials, procedures for fuel transfer from ship to shore, procedures to be implemented in the event of a spill and the types and locations of emergency-response equipment (such as absorbent materials, personal protective equipment and first-aid equipment).

By identifying the potential sources of spills or leaks, the Ship Recycling Facility can then identify proactive measures to be implemented in order to minimize the risk associated with Facility activities. It is helpful for the Ship Recycling Facility to review the potential sources for spills and leaks and to determine the types of failures associated with them in order to determine the most appropriate and effective prevention measures. For example, drums should not be left open unless being filled, should be within a secondary containment or beamed structure and should not be exposed to rainfall that could corrode them over time.

The programme for spill prevention, control and countermeasures can be used as a tool by the Ship Recycling Facility to communicate practices on preventing and responding to spills and leaks, as a resource during emergency response and as a repository for information on storage, inspection and testing. It is important to maintain records on maintenance, inspections and employee training. Periodic review of the programme for spill prevention, control and countermeasures is also an effective tool for determining which procedures are fulfilling their intended function and for identifying weaknesses in the programme.

3.4.4.2 Storm-water pollution prevention

Storm-water run-off from industrial facilities has the potential to adversely affect the environment. Improper storage and handling of Hazardous Materials and wastes could increase the risk of environmental degradation through contact with water. The SRFP should include a programme that defines measures to be implemented and maintained to minimize the potential for storm-water contamination at the Ship Recycling Facility.

A programme for the prevention of storm-water pollution should include the identification of all potential pollutant sources at the Ship Recycling Facility that could come into contact with storm water, with the nearby receiving waters and with storm water-conveyance systems. A site map should be developed that depicts such information.

Following compilation of the relevant site information, an assessment should be conducted in order to determine the appropriate control measures. Control measures should be implemented to reduce the threat of storm-water pollution, to control erosion and sediment and to protect nearby natural resources. Control measures can include best management practices, maintenance and inspection programmes, employee training and reporting.

As an example, a potential pollutant source at a Ship Recycling Facility is the storage of drums, tanks or other containers for the offloading of fuel from a ship. The activity of transferring and storing the fuel includes multiple potential pollutant sources, such as spills and leaks during transfer to the water or the ground, leaking drums or containers or run-off from the drum storage area. Control measures to minimize the risk to the environment from storm-water contamination could include storing drums and other containers under semi-permanent or permanent coverings, controlling spills or run-off from drum storage areas with appropriately sized secondary containment, conducting routine inspections of drum storage areas and establishing appropriate clean-up procedures in the event of spills or leaks.

The development of preventive measures is the most effective way to minimize the discharge of pollutants via storm water. It is important to maintain records on maintenance, inspections and employee training. Periodic review of the storm-water management programme is also an effective tool for determining which best management practices are fulfilling their intended function and for identifying weaknesses in the programme.

3.4.4.3 Debris prevention and control

The introduction of debris into the marine environment by ship recycling activities has the potential to adversely affect the environment. The SRFP should include a programme that defines measures to be implemented and maintained to minimize the potential for debris deposition into the water, including the maintenance of areas from which debris might be transported into the marine environment by wind, storm drains, tides or run-off. Control measures should be implemented to reduce the likelihood of debris deposition.

3.4.4.4 Incident and spills reporting procedures

The SRFP should describe the procedures for reporting incidents and spills, including at a minimum the following information:

- how duties and responsibilities are assigned to the Ship Recycling Facility's responsible team, department or persons and their reporting responsibilities in the event of an incident;

- how the reporting procedures relate to the emergency preparedness and response plan (EPRP);
- communication link to the local community for any necessary assistance; and
- procedures for providing information to the public and for carrying out post-incident surveys and releasing post-incident reports.

APPENDIX 1

RECOMMENDED FORMAT OF THE SHIP RECYCLING FACILITY PLAN

SHIP RECYCLING FACILITY PLAN

1 Facility management

- 1.1 Company information
- 1.2 Training programme
- 1.3 Worker management
- 1.4 Records management

2 Facility operation

- 2.1 Facility information
- 2.2 Permits, licences and certification
- 2.3 Acceptability of ships
- 2.4 Ship Recycling Plan (SRP) development
- 2.5 Vessel arrival management
- 2.6 Ship recycling methodology
- 2.7 Reporting upon completion

3 Worker safety and health compliance approach

- 3.1 Worker health and safety
- 3.2 Key safety and health personnel
- 3.3 Job hazard assessment
- 3.4 Prevention of adverse effects to human health
 - 3.4.1 Safe-for-entry procedures
 - 3.4.1.1 Safe-for-entry criteria
 - 3.4.1.2 Competent person for Safe-for-entry determination
 - 3.4.1.3 Safe-for-entry inspection and testing procedures
 - 3.4.1.4 Oxygen
 - 3.4.1.5 Flammable atmospheres
 - 3.4.1.6 Toxic, corrosive, irritant or fumigated atmospheres and residues
 - 3.4.1.7 Safe-for-entry determination by a Competent person
 - 3.4.1.8 Safe-for-entry certificate, warning signs and labels
 - 3.4.1.9 Safe-for-entry operational measures
 - 3.4.2 Safe-for-hot-work procedures
 - 3.4.2.1 Safe-for-hot-work criteria
 - 3.4.2.2 Competent person for Safe-for-hot-work determination
 - 3.4.2.3 Safe-for-hot-work inspection, testing and determination
 - 3.4.2.4 Safe-for-hot-work certificate, warning signs and labels
 - 3.4.2.5 Safe-for-hot-work operational measures
 - 3.4.3 Welding, cutting, grinding and heating
 - 3.4.4 Drums, containers and pressure vessels
 - 3.4.5 Prevention of falling from heights and accidents caused by falling objects
 - 3.4.6 Gear and equipment for rigging and materials handling
 - 3.4.7 Houskeeping and illumination

- 3.4.8 Maintenance and decontamination of tools and equipment
- 3.4.9 Health and sanitation
- 3.4.10 Personal protective equipment
- 3.4.11 Worker exposure and medical monitoring
- 3.5 Emergency preparedness and response plan
- 3.6 Fire and explosion prevention, detection and response

4 Environmental compliance approach

- 4.1 Environmental monitoring
- 4.2 Management of Hazardous Materials
 - 4.2.1 Potentially containing Hazardous Materials
 - 4.2.2 Additional sampling and analysis
 - 4.2.3 Identification, marking and labelling and potential on-board locations
 - 4.2.4 Removal, handling and remediation
 - 4.2.5 Storage and labelling after removal
 - 4.2.6 Treatment, transportation and disposal
- 4.3 Environmentally sound management of Hazardous Materials
 - 4.3.1 Asbestos and materials containing asbestors
 - 4.3.2 PCBs and materials containing PCBs
 - 4.3.3 Ozone-depleting substances (ODSs)
 - 4.3.4 Paints and coatings
 - 4.3.4.1 Anti-fouling compounds and systems (organotin compounds including tributyltin (TBT))
 - 4.3.4.2 Toxic and highly flammable paints
 - 4.3.5 Hazardous liquids, residues and sediments (such as oils, bilge, and ballast water)
 - 4.3.6 Heavy metals (lead, mercury, cadmium and hexavalent chromium)
 - 4.3.7 Other Hazardous Materials
- 4.4 Prevention of adverse effects to the environment
 - 4.4.1 Spill prevention, control and countermeasures
 - 4.4.2 Storm-water pollution prevention
 - 4.4.3 Debris prevention and control
 - 4.4.4 Incident and spills reporting procedures

Plan Attachments

Facility Map
Organizational Flow Chart
Permits, Licences and Certification
Resumes

APPENDIX 2

EXAMPLE FORMAT OF FACILITY INFORMATION IN SRFP

(relating to sections 3.2.1 (Facility information) and 3.2.2 (Permits, licences and certification))

Facility name and contact information			
Facility name			
Registered address			
Facility address			
Representative and communication address			
Number of employees			
Tel. No.		Fax No.	
E-mail address		URL	
Working language			

Capacity of Facility	
Maximum capacity of ship to be recycled	<div style="display: flex; justify-content: space-between;"> <div> Length Breadth Width Depth </div> <div> DWT GT LDT </div> </div>
Types of ship to be accepted	
Annual recycling capacity (in LDT)	

Waste management capacity	
Asbestos	removal storage process
Ozone-depleting substances	removal storage process
Polychlorinated biphenyls (PCB)	removal storage process
Anti-fouling compounds and system	removal storage process

Cadmium and Cadmium Compounds	removal storage process
Hexavalent Chromium and Hexavalent Chromium Compounds	removal storage process
Lead and Lead Compounds	removal storage process
Mercury and Mercury Compounds	removal storage treatment process
Polybrominated Biphenyl (PBBs)	removal storage treatment process
Polybrominated Diphenyl Ethers (PBDEs)	removal storage treatment process
Polychlorinated Naphthalenes (more than 3 chlorine atoms)	removal storage treatment process
Radioactive substances	removal storage treatment process
Certain Shortchain Chlorinated Paraffins (Alkanes, C10-C13, chloro)	removal storage treatment process
Hazardous liquids, residues and sediments	removal storage treatment process
Paints and coatings that are highly flammable and/or lead to toxic release	removal storage treatment process
Other Hazardous Materials not listed above and that are not a part of the ship structure (specify)	removal storage treatment process

Facility equipment and other information			
Area of Facility (m ²) [*]		Area of pavement (m ²)	
Description of ship recycling facility (layout, waterdepth, accessibility, etc.)			

Heavy lifting machines	e.g. Jib crane: 60 tons
	Mobile crane: 35 tons×1, 27 tons×1
	Hydraulic backhoe: SH400, ZX330, SK220, ZX200 With Shear, Magnet
	Hydraulic shear: 600 tons×1
	Weight bridge: 50 tons
Boat	e.g. Gross tonnage: 5 tons, Power: 240 PS
Shear	e.g. Capacity: 600 tons
O ₂ supply	e.g. Liquid O ₂ supply system: 10 m ³
Gas supply	e.g. LPG bottles
Compressed air	
Fire extinguisher	e.g. Portable fire extinguisher
Waste oil treatment	e.g. Oil water separation tank Tank capacity: abt. 20 tons
Wastes storage	e.g. Container for asbestos: 2
Incinerator	e.g. none
Electric power supply	e.g. Substation

Location	
Division and classification of the location	e.g. urbanization control area
Peripheral environment	e.g. factories: former quarry, two marinas in the vicinity
	Housing: private houses at the entrance and 200 m from entrance

Facility certificate and licence (if applicable specify: certifying authority; date of expiry; number of certificate; etc.)²	

Workers' certificates/licences	
Certificate/licence	Name
1) Manager of asbestos handling	Mr. Yxxxx ***** 1 person
2) Manager of PCB handling	Mr. Yxxxx ***** 1 person
3) Designated chemicals handling	None
4) Asbestos handling class	Mr. *****
	Mr. *****
	Mr. ***** 3 persons
5) Gas cutting	Mr. *****
	Mr. *****
	Mr. ***** 3 persons
6) Welding	Mr. ***** 1 person

² List here any applicable certificates, for example relevant to waste treatment, waste transportation, or other, such as certificates relevant to management systems of environmental performance, and/or occupational health and safety.

7) Zinc handling	Mr. ***** 1 person
8) Lifting	Mr. *****
	Mr. *****
	Mr. ***** 3 persons
9) Heavy lift machines	Mr. *****
	Mr. ***** 2 persons
10) Seafarer	Mr. ***** 1 person
11) Diver	None
12) Removal of Hazardous Materials (Material A)	Mr. ***** 2 persons
(Material B)	Mr. ***** 2 persons

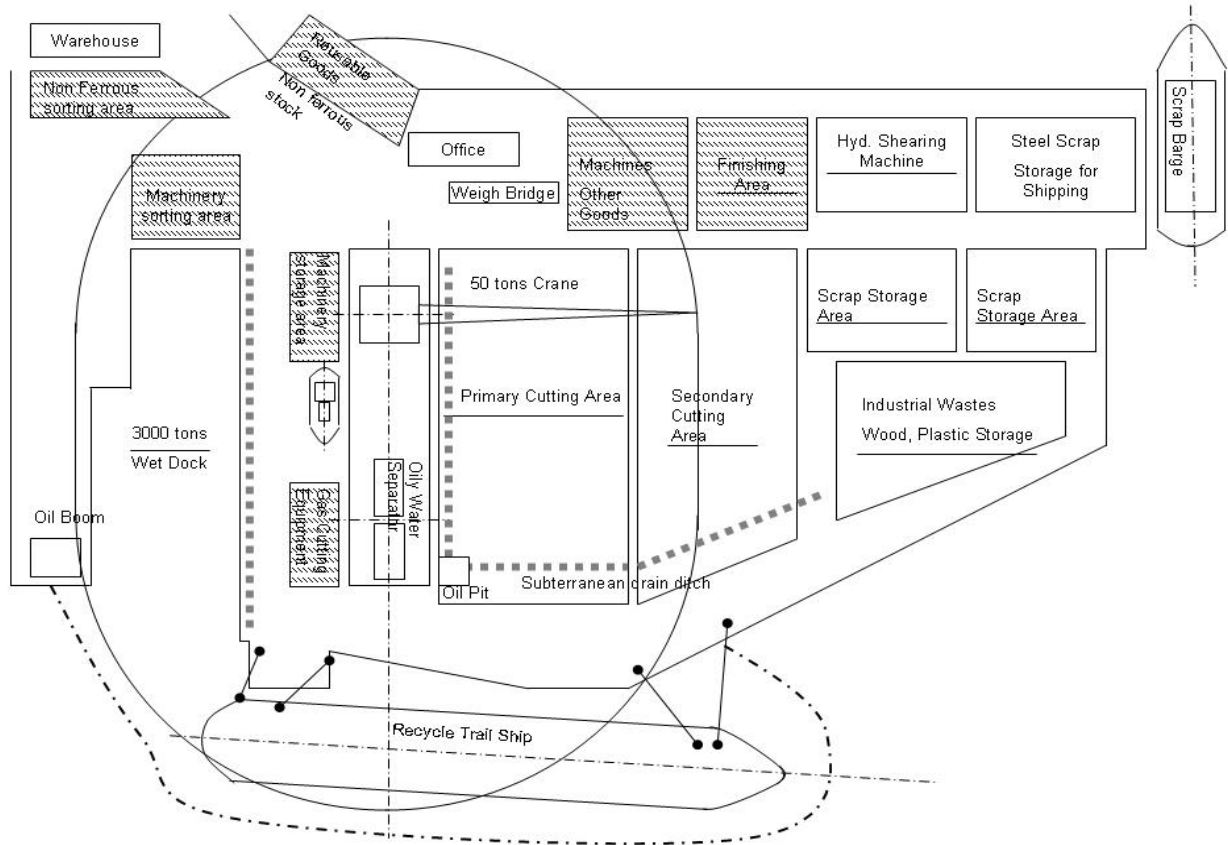
Subcontractor information³			
Subcontractor name			
Registered address			
Representative and communication address			
Field of services			
Licences for services			
Number of employees			
Tel. No.		Fax No.	
E-mail address		URL	

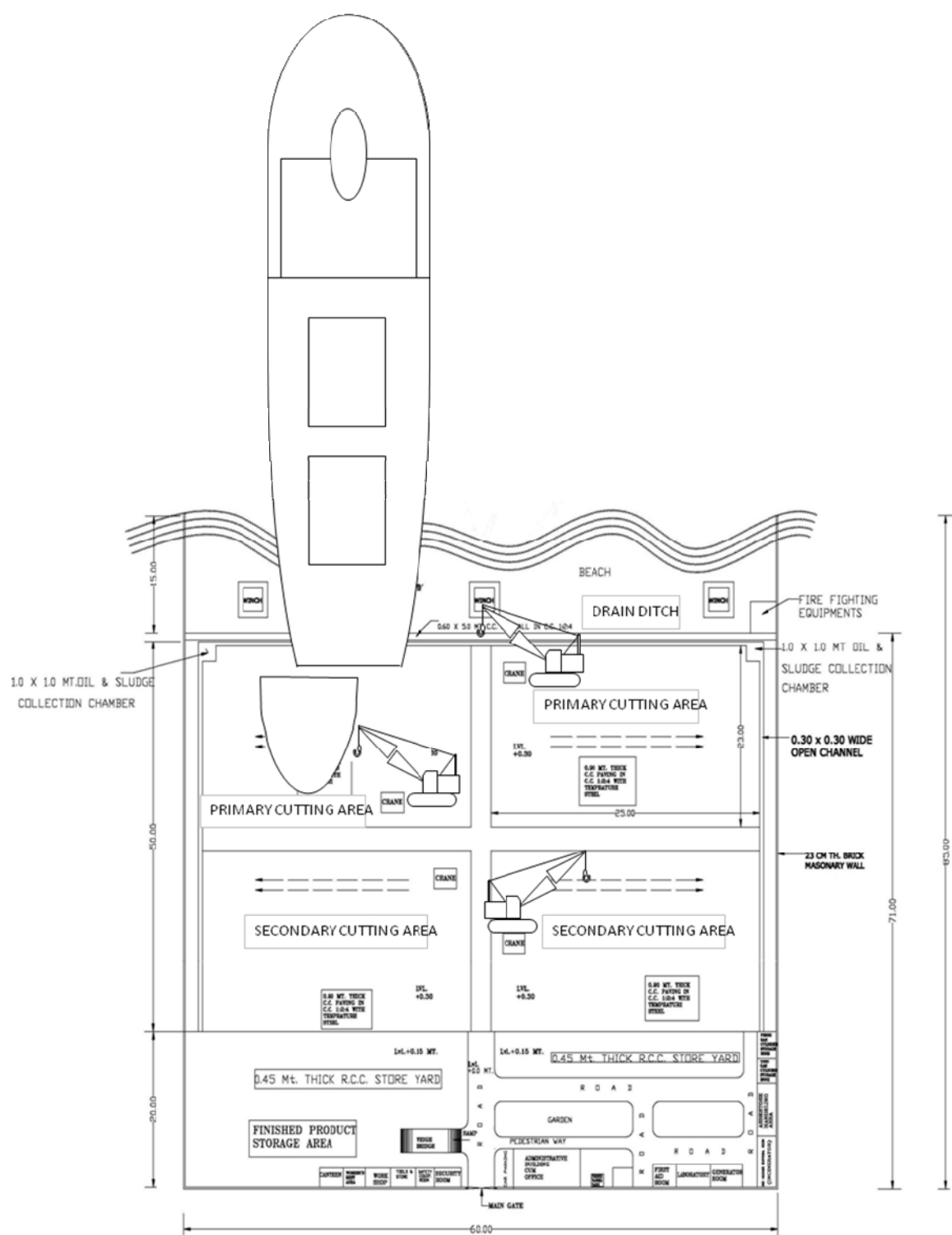
³ Supply all pertinent information relevant to the services of the subcontractor to the ship recycling facility.

Location Map

Yard plan (examples)

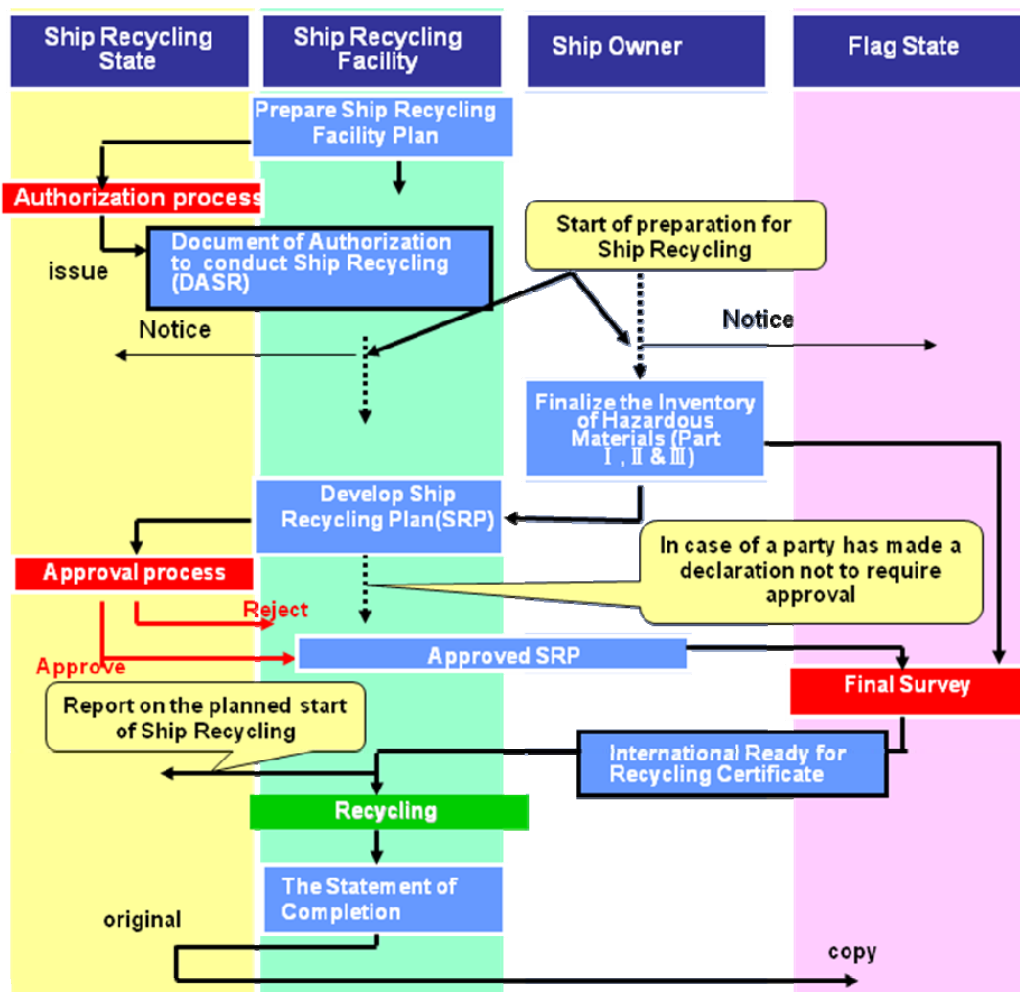
Yard plan should be included in Facility information.





APPENDIX 3

SHIP RECYCLING PROCESS FROM PREPARATION TO COMPLETION



Responsibility of Stakeholders			
Regulation 16 -Authorize the Ship Recycling Facilities Regulation 9 -Approve SRP Regulation 25 -Send a copy of the Statement to the flag State	Regulation 18 -Prepare an SRFP Regulation 9 -Develop a ship-specific SRP Regulation 24 -Notify its Competent Authority of the intent -Report to its Competent Authority the planned start of Ship Recycling Regulation 25 - Issue a statement of Completion and report to its Competent Authority	Regulation 5 -Have on board an Inventory of Hazardous Materials -Finalize Inventory of Hazardous Materials including Parts II & III Regulation 8 -Provide the information with the SRF	Regulation 10 -Verify Inventory of Hazardous Materials, SRP and DASR

APPENDIX 4

RELEVANT INSTRUMENTS OF THE INTERNATIONAL LABOUR ORGANIZATION (ILO)

Fundamental ILO Conventions

Worst Forms of Child Labour Convention, 1999 (No. 182)
Minimum Age Convention, 1973 (No. 138)
Discrimination (Employment and Occupation) Convention, 1958 (No. 111)
Abolition of Forced Labour Convention, 1957 (No. 105)
Equal Remuneration Convention, 1951 (No. 100)
Right to Organise and Collective Bargaining Convention, 1949 (No. 98)
Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)
Forced Labour Convention, 1930 (No. 29)

Conventions on occupational safety and health and working conditions

Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)
Prevention of Major Industrial Accidents Convention, 1993 (No. 174)
Night Work Convention, 1990 (No. 171)
Chemicals Convention, 1990 (No. 170)
Asbestos Convention, 1986 (No. 162)
Occupational Health Services Convention, 1985 (No. 161)
Protocol of 2002 to the Occupational Safety and Health Convention, 1981 (No. 155)
Occupational Safety and Health Convention, 1981 (No. 155)
Collective Bargaining Convention, 1981 (No. 154)
Occupational Safety and Health (Dock Work) Convention, 1979 (No. 152)
Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (No. 148)
Occupational Cancer Convention, 1974 (No. 139)
Benzene Convention, 1971 (No. 136)
Workers' Representatives Convention, 1971 (No. 135)
Maximum Weight Convention, 1967 (No. 127)
Employment Injury Benefits Convention, 1964 (No. 121)
Guarding of Machinery Convention, 1963 (No. 119)
Radiation Protection Convention, 1960 (No. 115)

ILO codes of practice

Safety and health in ports, 2005. ISBN 92-2-115287-1.

Contents overview: management of safety and health; safe systems of work; port infrastructure, plant and equipment; lifting appliances and loose gear; safe use of lifting appliances and loose gear; operations afloat; health; personal welfare facilities; emergency arrangements; testing of lifting appliances and loose gear.

Safety and health in shipbreaking: Guidelines for Asian countries and Turkey, 2004. ISBN 92-2-115289-8 (print version), ISBN 92-2-115671-0 (web version).

Contents overview: general responsibilities, duties and rights, and framework; Occupational safety and health management; occupational health services; operational planning; preventive and protective measures; management of hazardous substances; measures against physical, biological, ergonomic and psychosocial hazards; safety requirements for tools, machines and equipment; competence and training; personal protective equipment and protective clothing; contingency and emergency preparedness; special protection; welfare.

Safety and health in the non-ferrous metal industries, 2003. ISBN 92-2-111640-9.

Contents overview: general principles of prevention and protection; prevention and protection specific to non-ferrous metals production processes; recycling non-ferrous metals; occupational exposure limits for hazardous substances, electric and magnetic fields, optical radiation, heat noise and vibration.

Ambient factors in the workplace, 2001. ISBN 92-2-111628-X

Contents overview: general obligations, responsibilities, duties and rights; general principles of prevention and control; hazardous substances; ionising radiation; electric and magnetic fields; optical radiation; heat and cold; noise; vibration; occupational exposure limits.

Management of alcohol- and drug-related issues in the workplace, 1996. ISBN 92-2-109455-3.

Contents overview: development of an alcohol and drug policy for the work place; measures to reduce alcohol- and drug-related problems through good employment practices; restrictions on alcohol, legal and illegal drugs in the workplace; prevention through information, education and training programmes.

Accident prevention on board ship at sea and in port, 1996. ISBN 92-2-109450-2

Contents overview: shipboard emergencies and emergency equipment; safe access to ship; safe movement about the ship; entering and working in enclosed or confined spaces; manual lifting and carrying; tools and materials; welding, flame-cutting and other hot work; working aloft and over side; working with dangerous and irritating substances and radiations; upkeep of wire and fibre ropes; working in machinery spaces.

Recording and notification of occupational accidents and diseases, 1996. ISBN 92-2-109451-0.

Contents overview: recording, notification and investigation of occupational accidents, occupational diseases and dangerous occurrences, and related statistics.

Safety in the use of chemicals at work, 1993. ISBN 92-2-108006-4.

Contents overview: classification systems; labelling and marking; chemical safety data sheets; operational control measures; work systems and practices; personal protection; monitoring in the workplace; medical and health surveillance; investigation and reporting of accidents, occupational diseases and other incidents.

Safety, health and working conditions in the transfer of technology to developing countries, 1988. ISBN 92-2-106122-1

Contents overview: appendix A: Occupational safety and health check-list for hazard control in the design and operation of a plant or process.

Safety in the use of asbestos, 1984. ISBN 92-2-103872-6.

Contents overview: exposure limits; monitoring in the workplace; general preventive methods; personal protection; cleaning of premises and plant; packaging, transport and storage; disposal of asbestos waste; supervision of the health of workers; handling of asbestos fibre in ports and container terminals; construction, demolition and alteration work; exposure limits in various countries.

Occupational safety and health in the iron and steel industry, 1983. ISBN 92-2-103471-2

Contents overview: basic requirements for work stations, workplaces, traffic lanes and installations; maintenance, repair and demolition; electricity, tools, machine guarding and gas systems; transport and handling; substances and agents harmful to health; working clothes and personal protective equipment; medical services and supervision, safety and health organization, hygiene and welfare.

Safety and health in shipbuilding and ship repair, 1974. ISBN 92-2-101199-2.

Contents overview: workplaces, their approaches and equipment; scaffolding and staging; ladders, stairs, gangways and ramps; lifting appliances; ropes chains and accessories; hand tools, portable power-driven tools; work with dangerous and irritating substances and radiations; welding, flame cutting and other hot work; work in confined spaces and dangerous atmospheres; transport of workers by water; working clothes and personal protective equipment; medical services and supervision, safety and health organization, hygiene and welfare.

Other guidelines

Guidelines on occupational safety and health management systems, ILO-OSH 2001. ISBN 92-2-111634-4.

Contents overview: the occupational safety and health management system in the organisation; policy; organizing; planning and implementation; evaluation; action for improvement.

APPENDIX 5

RELEVANT INSTRUMENTS AND REFERENCE MATERIALS OF THE UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP) AND OTHERS

Instruments

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989

Stockholm Convention on Persistent Organic Pollutants (POPs), 2001

Montreal Protocol on Substances that Deplete the Ozone Layer, 1987

Reference Materials⁴

Technical Guidelines for the Environmentally Sound Management of the Full and Partial Dismantling of Ships

<http://www.basel.int/Portals/4/Basel%20Convention/docs/meetings/sbc/workdoc/techships-e.pdf>

Training Resource Pack for Hazardous Waste Management in Developing Countries

<http://www.basel.int/pub/pub.html>

Updated General Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of, Containing or Contaminated with Persistent Organic Pollutants (POPs)

<http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/techguid/tg-POPs.pdf>

Updated Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of, Containing or Contaminated with Polychlorinated Biphenyls (PCBs), Polychlorinated Terphenyls (PCTs) or Polybrominated Biphenyls (PBBs)

<http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/techguid/tg-PCBs.pdf>

Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of Elemental Mercury and Wastes Containing or Contaminated with Mercury

<http://www.basel.int/Implementation/TechnicalMatters/DevelopmentofTechnicalGuidelines/AdoptedTechnicalGuidelines/tabid/2376/Default.aspx>

Basel Convention Technical Guidelines on Waste Oils from Petroleum Origins and Sources

<http://www.basel.int/Portals/4/Basel%20Convention/docs/meetings/sbc/workdoc/old%20docs/tech-y8.pdf>

Technical Guidelines for the Environmentally Sound Management of Waste Lead-acid Batteries

<http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/techguid/tech-wasteacid.pdf>

Basel Convention Technical Guidelines on Used Oil Re-refining or Other Re-uses of Previously Used Oil

<http://www.basel.int/Portals/4/Basel%20Convention/docs/meetings/sbc/workdoc/old%20docs/tech-r9.pdf>

⁴ A full set of the Basel Convention Technical Guidelines can be accessed at: <http://www.basel.int/Implementation/TechnicalMatters/DevelopmentofTechnicalGuidelines/AdoptedTechnicalGuidelines/tabid/2376/Default.aspx>.

Technical Guidelines on the Environmentally Sound Recycling/Reclamation of Metals and Metal Compounds

<http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/techguid/r4-e.pdf>

Technical Guidelines on the Environmentally Sound Management of Biomedical and Healthcare Wastes

<http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/techguid/tech-biomedical.pdf>

Basel Convention Technical Guidelines on Specially Engineered Landfill

<http://www.basel.int/Portals/4/Basel%20Convention/docs/meetings/sbc/workdoc/old%20docs/tech-d5.pdf>

Basel Convention Technical Guidelines on Incineration on Land

<http://www.basel.int/Portals/4/Basel%20Convention/docs/meetings/sbc/workdoc/old%20docs/tech-d10.pdf>

Basel Convention Technical Guidelines on Hazardous Waste – Physico-Chemical Treatment — Biological Treatment

<http://www.basel.int/Portals/4/Basel%20Convention/docs/meetings/sbc/workdoc/old%20docs/tech-d8d9.pdf>

United Nations Recommendations on the Transport of Dangerous Goods

<http://www.unece.org/trans/danger/publi/unrec/English/Recommend.pdf>

United Nations Globally Harmonized System for the Classification and Labelling of Chemicals (GHS)

http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html

APPENDIX 6

MATERIALS FOUND ON BOARD SHIPS THAT THE SHIP RECYCLING FACILITY SHOULD BE PREPARED TO HANDLE (INCLUDED IN PART III OF THE INVENTORY OF HAZARDOUS MATERIALS)

Kerosene
White spirit
Lubricating oil
Hydraulic oil
Anti-seize compounds
Fuel additive
Engine coolant additives
Antifreeze fluids
Boiler and feed water treatment and test reagents
Deionizer-regenerating chemicals
Evaporator dosing and descaling acids
Paint stabilizers/rust stabilizers
Solvents/thinners
Paints
Chemical refrigerants
Battery electrolyte
Alcohol/methylated spirits
Acetylene
Propane
Butane
Oxygen
Carbon dioxide
Perfluorocarbons (PFCs)
Methane
Hydrofluorocarbons (HFCs)
Nitrous oxide (N₂O)
Sulfur hexafluoride (SF₆)
Bunkers, e.g. fuel oil
Grease
Fuel gas
Batteries (including lead-acid batteries)
Pesticides/insecticide sprays
Extinguishers
Chemical cleaner (including electrical equipment cleaner, carbon remover)
Detergent/bleacher (potentially a liquid)
Miscellaneous medicines
Fire-fighting clothing and personal protective equipment
Spare parts containing Hazardous Materials

RESOLUTION MEPC.211(63)

Adopted on 2 March 2012

2012 GUIDELINES FOR THE AUTHORIZATION OF SHIP RECYCLING FACILITIES

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by the international conventions for the prevention and control of marine pollution,

RECALLING ALSO that the International Conference on the Safe and Environmentally Sound Recycling of Ships held in May 2009 adopted the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (the Hong Kong Convention) together with six Conference resolutions,

NOTING that regulation 16.1 of the annex to the Hong Kong Convention requires that Ship Recycling Facilities which recycle ships to which the Convention applies, or ships treated similarly pursuant to article 3.4 of the Hong Kong Convention, shall be authorized by a Party taking into account the guidelines developed by the Organization,

NOTING ALSO that regulation 15.3 of the annex to the Hong Kong Convention requires that each Party shall establish a mechanism for ensuring that Ship Recycling Facilities comply with the requirements of the Convention including the establishment and effective use of inspection, monitoring and enforcement provisions, and that such a mechanism may include an audit scheme to be carried out by the Competent Authority(ies) or an organization recognized by the Party, taking into account guidelines developed by the Organization,

BEARING IN MIND that the International Conference on the Safe and Environmentally Sound Recycling of Ships, in its resolution 4, invited the Organization to develop Guidelines for global, uniform and effective implementation and enforcement of the relevant requirements of the Convention as a matter of urgency,

HAVING CONSIDERED, at its sixty-third session, the draft 2012 Guidelines for the authorization of ship recycling facilities, developed by the Working Group on Ship Recycling,

1. ADOPTS the 2012 Guidelines for the authorization of ship recycling facilities, as set out in the Annex to this resolution;
2. INVITES Governments to apply the Guidelines as soon as possible, or when the Hong Kong Convention becomes applicable to them; and
3. REQUESTS the Committee to keep the Guidelines under review.

ANNEX

2012 GUIDELINES FOR THE AUTHORIZATION OF SHIP RECYCLING FACILITIES

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4.1	General
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10	COMMUNICATION OF INFORMATION
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10.2	Violations and sanctions

1 INTRODUCTION

1.1 Objectives of the guidelines

These guidelines provide recommendations for Parties on establishing mechanisms for authorizing Ship Recycling Facilities in accordance with the requirements of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (hereafter referred to as "the Convention").

These guidelines should be used primarily by the Competent Authority(ies) and the organizations recognized by the Competent Authority(ies). The guidelines may also be useful for Ship Recycling Facilities in preparing for the authorization process.

1.2 Approach of the guidelines

Article 6 and regulation 16 of the Convention require Ship Recycling Facilities that recycle ships to which the Convention applies, or ships treated similarly pursuant to article 3.4 of the Convention, to be authorized taking into account the guidelines developed by the Organization.

The present guidelines provide guidance on establishing a scheme for authorizing Ship Recycling Facilities, covering the following areas: necessary documentation; verification of documentation; site inspection; audit scheme; specific procedural action relating to issuing, amending, suspending, withdrawing and renewing the Document of Authorization to conduct Ship Recycling (DASR); validity of the DASR; communication of information; and monitoring of the activities of the Ship Recycling Facility.

2 DEFINITIONS

The terms used in these guidelines have the same meaning as those defined in the Convention. For the purposes of these guidelines, the following additional definitions apply.

2.1 "Organization recognized by the Competent Authority(ies)" means an organization designated by the Competent Authority(ies) in accordance with regulation 16.2 and regulation 16.3 of the Annex to the Convention to undertake relevant tasks on behalf of the Competent Authority(ies).

2.2 "Determination" means the process by which the Competent Authority(ies) decides whether to issue, amend, suspend, withdraw or renew a DASR.

3 IDENTIFICATION OF COMPETENT AUTHORITY(IES) RESPONSIBLE FOR AUTHORIZATION

According to the Convention, the Party shall designate one or more Competent Authorities as responsible for authorizing Ship Recycling Facilities within its jurisdiction. The Competent Authority(ies) should identify a single contact point to act as central communicating partner between the Competent Authority(ies), Administrations and Ship Recycling Facilities. The Competent Authority(ies) may entrust the authorization of Ship Recycling Facilities to organizations recognized by it (regulation 16.2). The Party should determine the extent to which it delegates the authorization of the Ship Recycling Facility to organizations recognized by the Competent Authority(ies), and notify the Organization of the specific responsibilities and conditions of the authority delegated to such organizations, for circulation to Parties (regulation 16.3). The extent to which authority is delegated to the organization recognized by the Competent Authority(ies) therefore varies according to each Party's decision. In every case, the Competent Authority retains full responsibility for the authorization (regulation 16.3).

Hereafter in these guidelines, the term "Competent Authority(ies)" should be interpreted as "Competent Authority(ies)" or "organization recognized by the Competent Authority(ies)", depending upon the extent to which authority is delegated to such organizations in each Party.

Organizations recognized by the Competent Authority(ies) should work in harmony with the Competent Authority(ies) while undertaking the responsibilities that it has entrusted to them.

The Competent Authority(ies) should ensure that the organization recognized by it has the appropriate qualifications and expertise to conduct the tasks delegated to it, taking into account guidance to be developed by the Organization.

Where the organization recognized by the Competent Authority(ies) is delegated to authorize Ship Recycling Facilities, a system for tracking the flow of information between the organization and the Competent Authority(ies) should be established.

The Competent Authority(ies) should establish systems for evaluating, controlling and auditing the organization recognized by it.

4 APPLICATION FOR AUTHORIZATION

4.1 General

The Ship Recycling Facility should submit an application for authorization to conduct ship recycling to the Competent Authority(ies). The formal application should be accompanied by a completed Ship Recycling Facility Plan (SRFP). The Ship Recycling Facility and Competent Authority(ies) may hold preliminary discussions before the formal application is submitted.

The Competent Authority(ies) should be aware of any requirements and obligations outside the scope of the Convention that have been established under regional and/or national law and regulations and are applicable to Ship Recycling Facilities operating under its jurisdiction.

Nothing in the Convention or these guidelines precludes a Party from supplementing the requirements of the Convention with technical standards, codes of practice and/or guidelines that might take account of technological developments, advanced practice, norms and standards, in order to further reduce risks to occupational health and safety and to the environment and any other adverse effects related to ship recycling, or from using such supplementary requirements during the process of authorizing a Ship Recycling Facility.

The Ship Recycling Facility should submit a formal application, ensuring that it is complete. The onus is on the Ship Recycling Facility to assess the effects of its operations and to demonstrate how ship recycling operations should be managed so as to meet the requirements of the Convention and of relevant national and/or regional legislation.

The Competent Authority(ies) may ask for additional documentation and/or return the application if it is not complete. The Ship Recycling Facility may draw upon or attach other sources of information in its application, and indeed is encouraged to make use of existing information where appropriate.

5 NECESSARY DOCUMENTATION FOR ISSUING THE DOCUMENT OF AUTHORIZATION TO CONDUCT SHIP RECYCLING (DASR)

5.1 General

The SRFP, described in the *Guidelines for Safe and Environmentally Sound Ship Recycling* ("Facility Guidelines") and as required by regulation 18, shall be used as the main document in issuing the DASR.

Any other documentation and/or certification required under applicable international or national legislation, including those related to ship recycling activity, should be submitted with the application.

The Competent Authority(ies) should ensure that the Ship Recycling Facility has a management system in place and described in its documentation, together with the appropriate procedures and techniques, aimed at protecting human health and the environment without posing any unacceptable risks. The Competent Authority(ies) should check that the SRFP includes the policy, plans, systems and other factors set out in regulation 18 of the annex to the Convention.

5.2 Management of Hazardous Materials

The Competent Authority(ies) should check that the Ship Recycling Facility has established, implemented and maintained procedures for environmentally sound management of Hazardous Materials and wastes.

The Competent Authority(ies) should check that the Ship Recycling Facility has procedures in place to ensure that all Hazardous Materials detailed in the Inventory of Hazardous Materials are, to the maximum extent possible prior to cutting, identified, labelled, packaged and removed by properly trained and equipped workers, then stored and transported to waste management facilities by licensed vehicles.

The Competent Authority(ies) should check that the Ship Recycling Facility has established procedures to send all Hazardous Materials and wastes to authorized waste management and disposal sites before issuing a DASR. Documentation demonstrating these sites' compliance with national regulations⁵ should also be checked by the Competent Authority.

The Competent Authority(ies) should ensure that the Ship Recycling Facility has established procedures for managing all wastes generated by recycling activity, which should be kept separate from recyclable materials and equipment and labelled and stored under conditions that do not pose a risk to workers, human health or the environment.

5.3 Other requirements

The Ship Recycling Facility should undertake all necessary steps to fulfil the requirements of applicable international and national legislation.

The Ship Recycling Facility should ensure that planned and conducted activities respect the limits set out in applicable national laws and regulations on land use where the Ship Recycling Facility is located and is operating.

⁵ Where such regulations are based on applicable international agreements, these should also be referenced.

The Competent Authority(ies) may require an environmental impact study from Ship Recycling Facilities. In this case, the following guidance is to be considered.

A study may be conducted to assess the potential environmental impacts from the Ship Recycling Facility as a basis for identifying and prioritizing the Facility's environmental aspects. If a new Ship Recycling Facility is planned, the study may provide the basis to determine whether the location is appropriate and suitable for ship recycling activities. If the actual project involves a site already used for ship recycling or similar activities, the study may include an assessment of the environmental conditions of the location. It is advisable to conduct the study during the planning stage and to initiate it as early as possible.

The study may address in particular whether the Ship Recycling Facility has adverse effects on factors including, but not limited to, the following, and whether these effects are within acceptable limits as defined by applicable international and/or national legislation:

- flora and fauna of the specific area;
- hydrogeology;
- surface and ground water;
- soil structure;
- historical, cultural, social and economic values; and
- air quality.

The study may focus particularly on the significant environmental effects of releases, identifying and quantifying the possible release of polluting substances into any media and their effects. Most attention might be paid to large-scale releases and releases of the more hazardous pollutants, which are likely to have most significant effects. Conversely, any releases at levels so low that they are unlikely to have any serious effects do not need to be assessed. However, consideration may be given to other substances capable of causing pollution in the same way.

The study may pay special attention to:

- .1 Consumption and nature of raw materials:
Consideration may be given to options that use fewer resources or those that use materials that are less likely to create hazards or pollution risks;
- .2 Waste issues:
Consideration may be given to the annual material flow, consisting of incoming ships for recycling and the resultant waste leaving the Facility. This may cover the types of waste that the Facility can receive and store, depending on the ships that the Facility is planning to recycle, and for each type:
 - the maximum quantity that the Facility can receive;
 - the maximum storage capacity for each type of waste; and
 - the environmental hazards caused by waste during recycling activities and possible measures to mitigate the negative impact on the environment.

- .3 Accidents:
Consideration may be given to the environmental hazards posed by possible accidents and their associated risks, including the practicality of measures to reduce risks and hazards and to respond to accidents; and
- .4 Site restoration:
Consideration may be given as to whether there is a risk that the ship recycling operation will pollute the site, including planning in advance for decommissioning and restoring the site upon closure.

In some cases, a judgement will need to be made about the relative significance of different environmental effects. In making this comparison, certain basic parameters may help in reaching a conclusion. For example, long-term irreversible effects are worse than short-term reversible ones, if all other factors, such as immediate severity, are equal.

6 VERIFICATION OF DOCUMENTATION

The application, including its documentation, should be assessed and verified by the Competent Authority(ies). The assessment and verification should be concluded within a reasonable time frame, if possible within three months.

The assessment and verification process should include a site inspection, as described in section 7, after the documentation has been reviewed and evaluated.

If the application is rejected, the Competent Authority(ies) should inform the Ship Recycling Facility of the reason for the rejection.

7 SITE INSPECTION

Site inspections should be conducted at Ship Recycling Facilities. The Competent Authority(ies) is responsible for planning and undertaking the site inspection. The site inspection may involve, or use the guidance and reports of, local or national labour inspection services.

The main purpose of the site inspection is to check the consistency of the documentation with the actual arrangements and operations at the Ship Recycling Facility.

The first site inspection should be announced in advance to the Ship Recycling Facility, in order to ensure that it will be possible to meet all relevant persons.

In advance of, during and following the site inspection, any necessary information should be provided by the Ship Recycling Facility.

Safety issues should be considered and sufficient precautions taken throughout the site inspection, including with respect to personal protection.

The inspection should address the functionality of arrangements established, focusing on safety and environmental protection and the handling of all materials including hazardous wastes and debris. The inspection should cover situations in which the Ship Recycling Facility is operating at maximum capacity with a full body of staff, including subcontractors.

The site inspection should verify that a SRFP exists and that it is being fully implemented. In particular, the following factors should be verified:

- .1 availability of the SRFP to all personnel at the Ship Recycling Facility;
- .2 knowledge of the SRFP, as appropriate, among management, Competent persons and workers according to their designated tasks, roles and responsibilities, including those with special duties such as first-aid personnel and fire fighters, as assessed through interviews with all categories of personnel and supervision of drills if appropriate; and
- .3 implementation of the objectives of the SRFP, as demonstrated by implementation of operational procedures in:
 - ship preparation processes;
 - monitoring of Safe-for-entry and Safe-for-hot-work conditions;
 - deconstruction processes;
 - hot work processes;
 - management of Hazardous Materials and wastes (protective measures and removal, transport, storage and disposal); and
 - emergency preparedness.

The site inspection should identify procedures and routines for the following:

- .1 developing and using the Ship Recycling Plan;
- .2 accepting ships, taking into account relevant requirements and the required certificates;
- .3 reporting and following up incidents; and
- .4 conducting operations in a safe and environmentally sound manner, in accordance with the regulations of the Convention.

The site inspection should verify the availability, size, restrictions and general set-up of the Ship Recycling Facility as stated in the application. Any arrangements established for the purpose of facilitating the recycling process should be described in the inspection report, as should any limitations related to the operation of the Ship Recycling Facility.

All sites utilizing established procedures, methods, arrangements and facilities for the removal, storage, processing (incineration, reclamation and specific treatment), transport and disposal of Hazardous Materials and wastes should be inspected. The inspection should verify that the Ship Recycling Facility is designed and constructed to manage any Hazardous Materials and wastes that are included in their application.

In cases where the Ship Recycling Facility is engaging one or more contractors by means of subcontracting for any activities related to the requirements of the Convention, the contractors should be subject to the same verification as if the Ship Recycling Facility itself was undertaking the activities. The Ship Recycling Facility is responsible for providing the Competent Authority with information required to perform a verification on the aforementioned contractors, as part of the overall assessment of the Facility.

Furthermore, the site inspection should include a practical test for assessing the implementation of measures relating to emergency preparedness and response. This may involve an unannounced complete evacuation of the Ship Recycling Facility or a similar procedure described in the plans for emergency preparedness and response.

The Competent Authority(ies) should have procedures in place for providing detailed information and analysis of the authorization process to the Ship Recycling Facility. Such procedures could include a written report by the Competent Authority(ies), to be made available to the Ship Recycling Facility, containing inspection data and an evaluation of findings.

The supplement to the DASR (appendix 5 of the annex to the Convention) may be used as guidance in planning site inspections.

If the Ship Recycling Facility is under construction or not fully operational, the site inspection should be conducted as far as practicable, and the Competent Authority(ies) may issue the DASR subject to certain terms and conditions as appropriate. In such a case, an additional, follow-up site inspection should be conducted after the Ship Recycling Facility becomes fully operational. According to the results of the follow-up site inspection, the Competent Authority(ies) may suspend, amend or withdraw the DASR.

8 ISSUANCE, AMENDMENT, SUSPENSION, WITHDRAWAL AND RENEWAL OF DASR

8.1 General

As stated in regulation 16.5 of the annex to the Convention, the Party shall identify the terms on which the authorization will be issued, withdrawn, suspended, amended and renewed.

8.2 Mechanism for ensuring the establishment and effective use of inspection, monitoring and enforcement provisions

Under regulation 15.3 of the annex to the Convention, each Party shall establish a mechanism for ensuring the establishment and effective use of inspection, monitoring and enforcement provisions, including powers of entry and sampling. Such a mechanism may include an audit scheme to be carried out by the Competent Authority(ies) or an organization recognized by the Competent Authority(ies). If the Party establishes an audit scheme based on the national law and regulations, the Party should make available relevant information on the audit scheme in advance of any audit, including, but not limited to, the following:

- the frequency of the audit: at least one audit should be conducted, in the middle of the validity period of the DASR; and
- the audit process: this may include the submission by the Ship Recycling Facility of written reports containing summaries of ship recycling activities and interviews with representatives or managers of the Ship Recycling Facility and site inspections.

The Competent Authority(ies) should establish procedures for conducting follow-up site inspections at the Ship Recycling Facility as necessary, after the DASR has been issued.

8.3 Issuance

The Competent Authority(ies) should issue a DASR to the Ship Recycling Facility if the document verification process and site inspection prove satisfactory.

The DASR should not be issued until all required documentation has been received and the site inspection has been successfully completed.

The supplement to the DASR (appendix 5 of the annex to the Convention) must be permanently attached to the DASR. Most of the information required for the supplement is available in the SRFP, as described in the Facility Guidelines.

The DASR should be available at the Ship Recycling Facility at all times.

8.4 Amendment

The Competent Authority(ies) may amend the DASR as appropriate. The amendment procedure may be initiated by the Competent Authority(ies) or the Ship Recycling Facility. The Competent Authority(ies) may require a site inspection to verify compliance with the Convention before it amends the DASR. The Ship Recycling Facility should provide the Competent Authority(ies) with appropriate documentation and updates to the SRFP.

Situations which may necessitate amendment of the DASR include, but are not limited to, the following:

1. the Ship Recycling Facility applies for the DASR amendment in order to widen the scope of authorization; for example, after having invested in the Facility and added new capabilities which should be reflected in the DASR;
2. the DASR amendment is triggered by compelling needs on the part of Competent Authority(ies); for example, when new domestic regulations are put into effect;
3. the DASR amendment is triggered by investigations conducted by the Competent Authority(ies) following accidents;
4. the DASR amendment is triggered by a deviation of practice at the Ship Recycling Facility from the SRFP, which thereby affect the contents of the DASR; and
5. the DASR amendment is triggered by a change in the hazardous materials which the Ship Recycling Facility can remove, store and process.

8.5 Suspension

The Competent Authority(ies) may suspend the DASR, or require corrective action by the Ship Recycling Facility, if it has information demonstrating that the Ship Recycling Facility no longer satisfies the terms and conditions of the DASR. The Competent Authority(ies) may suspend the DASR temporarily or indefinitely, depending on the Ship Recycling Facility's subsequent level of compliance. During any period of suspension, the Ship Recycling Facility is not authorized to conduct recycling activities, except insofar as the Competent Authority(ies) has specified that the Ship Recycling Facility should continue with certain activities that do not negatively affect the protection of human health or the environment.

The Competent Authority(ies) should suspend the DASR in cases where site inspections, conducted as part of the audit, are restricted by the Ship Recycling Facility without justification.

8.6 Withdrawal

The Competent Authority(ies) may withdraw the DASR if the Competent Authority(ies) has information demonstrating that the Ship Recycling Facility no longer satisfies the terms and conditions of the DASR. The Competent Authority(ies) should generally reserve withdrawal for cases when the Ship Recycling Facility has seriously or repeatedly failed to comply and when suspending the DASR does not present an adequate remedy. The Competent Authority(ies) may reinstate the Ship Recycling Facility's authorization only after the Ship Recycling Facility has submitted a new application to the Competent Authority(ies) demonstrating that the Ship Recycling Facility is in full compliance with the Convention's requirements and related Guidelines.

Any action or modification at the Ship Recycling Facility that may affect the conditions on which the authorization was granted should prompt a new inspection. If such an inspection reveals that the conditions for authorization are no longer in place, the DASR should be withdrawn.

8.7 Renewal

The Competent Authority(ies) may renew the DASR upon written request by the Ship Recycling Facility. The Ship Recycling Facility should support any such request with revised documents, as appropriate, as stated in section 6 above in relation to the Ship Recycling Facility's initial application for authorization. The Competent Authority(ies) may, at its discretion, conduct a site inspection before it renews the DASR.

9 VALIDITY

The DASR shall be issued for a period determined by the Party not exceeding five years.

If a Ship Recycling Facility changes ownership, the new owner should – within a reasonable time frame, if possible not exceeding 30 days – notify the Competent Authority(ies) so that it can amend the DASR accordingly. The new owner should confirm in writing that it will fully comply with all requirements, including the SRFP, and the Convention. The new owner should also provide any supporting documentation requested by the Competent Authority(ies). If operations at the Ship Recycling Facility are changed in such a way as to affect the conditions on which authorization was granted, the Competent Authority(ies) may amend, suspend or withdraw the DASR and inform the new owner accordingly.

10 COMMUNICATION OF INFORMATION

10.1 Organizations recognized by the Competent Authority(ies)

The Party shall notify the Organization of the specific responsibilities and conditions of the authority delegated to the organizations recognized by the Competent Authority(ies), for circulation to Parties. In every case, the Competent Authority(ies) retains full responsibility for the authorization issued (regulation 16.3).

The organization recognized by the Competent Authority(ies) may be asked to maintain a list of surveyors with adequate expertise for conducting the tasks requested by the Party.

Each Party shall report to the Organization and the Organization shall disseminate, as appropriate, a list of the organizations recognized by the Competent Authority(ies) and nominated surveyors that are authorized to act on behalf of that Party in the administration of matters relating to the control of ship recycling in accordance with the Convention, and the specific responsibilities and conditions of the authority delegated to organizations recognized by the Competent Authority(ies) or nominated surveyors (article 12.3).

10.2 Violations and sanctions

In case of an alleged violation, the Party having jurisdiction over the Ship Recycling Facility shall promptly inform the Party that reported the alleged violation, as well as the Organization, of any action taken.

If the Party has not taken any action within one year of receiving the information, it shall inform the Party that reported the alleged violation, and the Organization, of the reasons why no action has been taken.

If a request for an investigation is received from any Party, together with sufficient evidence that a Ship Recycling Facility is operating, has operated or is about to operate in violation of any provision of the Convention, the Party under whose jurisdiction the Ship Recycling Facility is operating should investigate it and produce a report. The report of any such investigation, including information on action taken or to be taken, if any, shall be sent to the requesting Party and to the Organization for appropriate action.

The Competent Authority(ies) should be promptly informed by the Ship Recycling Facility in cases of alleged violations covered by article 9 of the Convention.

RESOLUTION MEPC.212(63)

Adopted on 2 March 2012

2012 GUIDELINES ON THE METHOD OF CALCULATION OF THE ATTAINED ENERGY EFFICIENCY DESIGN INDEX (EEDI) FOR NEW SHIPS

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution,

RECALLING ALSO that, at its sixty-second session, the Committee adopted, by resolution MEPC.203(62), amendments to the annex of the Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (inclusion of regulations on energy efficiency for ships in MARPOL Annex VI),

NOTING the amendments to MARPOL Annex VI adopted at its sixty-second session by inclusion of a new chapter 4 for regulations on energy efficiency for ships, are expected to enter into force on 1 January 2013 upon their acceptance on 1 July 2012,

NOTING ALSO that regulation 20 (Attained EEDI) of MARPOL Annex VI, as amended, requires that the Energy Efficiency Design Index shall be calculated taking into account the guidelines developed by the Organization,

RECOGNIZING that the amendments to MARPOL Annex VI requires the adoption of relevant guidelines for smooth and uniform implementation of the regulations and to provide sufficient lead time for industry to prepare,

HAVING CONSIDERED, at its sixty-third session, the draft 2012 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships,

1. ADOPTS the 2012 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships, as set out at annex to the present resolution;
2. INVITES Administrations to take the annexed Guidelines into account when developing and enacting national laws which give force to and implement provisions set forth in regulation 20 of MARPOL Annex VI, as amended;
3. REQUESTS the Parties to MARPOL Annex VI and other Member Governments to bring the annexed Guidelines related to the Energy Efficiency Design Index (EEDI) to the attention of shipowners, ship operators, shipbuilders, ship designers and any other interested groups;
4. AGREES to keep these Guidelines under review in light of the experience gained; and
5. REVOKES the Interim Guidelines circulated by MEPC.1/Circ.681, as from this date.

ANNEX

2012 GUIDELINES ON THE METHOD OF CALCULATION OF THE ATTAINED ENERGY EFFICIENCY DESIGN INDEX (EEDI) FOR NEW SHIPS

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1 Definitions

MARPOL means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, as amended.

For the purpose of these Guidelines, the definitions in "REGULATIONS ON ENERGY EFFICIENCY FOR SHIPS" (RESOLUTION MEPC. 203(62)) apply.

2 Energy Efficiency Design Index (EEDI)

The attained new ship Energy Efficiency Design Index (EEDI) is a measure of ships energy efficiency (g/t*nm) and calculated by the following formula:

$$\frac{\left(\prod_{j=1}^n f_j \right) \left(\sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)} \right) + (P_{AE} \cdot C_{FAE} \cdot SFC_{AE}^*) + \left(\left(\prod_{j=1}^n f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} - \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{AEeff(i)} \right) C_{FAE} \cdot SFC_{AE} \right) - \left(\sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME}^{**} \right)}{f_i \cdot f_c \cdot Capacity \cdot f_w \cdot V_{ref}}$$

* If part of the Normal Maximum Sea Load is provided by shaft generators, SFC_{ME} and C_{FME} may – for that part of the power – be used instead of SFC_{AE} and C_{FAE}

** In case of $P_{PTI(i)} > 0$, the average weighted value of $(SFC_{ME} \cdot C_{FME})$ and $(SFC_{AE} \cdot C_{FAE})$ to be used for calculation of P_{eff}

Note: This formula may not be able to apply to diesel-electric propulsion, turbine propulsion or hybrid propulsion system.

Where:

.1 C_F is a non-dimensional conversion factor between fuel consumption measured in g and CO₂ emission also measured in g based on carbon content. The subscripts MEi and AEi refer to the main and auxiliary engine(s) respectively. C_F corresponds to the fuel used when determining SFC listed in the applicable test report included in a Technical File as defined in paragraph 1.3.15 of NO_x Technical Code ("test report included in a NO_x technical file" hereafter). The value of C_F is as follows:

Type of fuel	Reference	Carbon content	C_F (t-CO ₂ /t-Fuel)
1 Diesel/Gas Oil	ISO 8217 Grades DMX through DMB	0.8744	3.206
2 Light Fuel Oil (LFO)	ISO 8217 Grades RMA through RMD	0.8594	3.151
3 Heavy Fuel Oil (HFO)	ISO 8217 Grades RME through RMK	0.8493	3.114
4 Liquefied Petroleum Gas (LPG)	Propane	0.8182	3.000
	Butane	0.8264	3.030
5 Liquefied Natural Gas (LNG)		0.7500	2.750

- .2 V_{ref} is the ship speed, measured in nautical miles per hour (knot), on deep water in the condition corresponding to the *Capacity* as defined in paragraphs 2.3.1 and 2.3.3 (in case of passenger ships and ro-ro passenger ships, this condition should be summer load draught as provided in paragraph 2.4) at the shaft power of the engine(s) as defined in paragraph 2.5 and assuming the weather is calm with no wind and no waves.
- .3 *Capacity* is defined as follows:
 - .1 For bulk carriers, tankers, gas tankers, ro-ro cargo ships, general cargo ships, refrigerated cargo carrier and combination carriers, deadweight should be used as *Capacity*.
 - .2 For passenger ships and ro-ro passenger ships, gross tonnage in accordance with the International Convention of Tonnage Measurement of Ships 1969, Annex I, regulation 3 should be used as *Capacity*.
 - .3 For containerships, 70 per cent of the deadweight (DWT) should be used as *Capacity*. EEDI values for containerships are calculated as follows:
 - .1 attained EEDI is calculated in accordance with the EEDI formula using 70 per cent deadweight for *Capacity*.
 - .2 estimated index value in the Guidelines for calculation of the reference line is calculated using 70 per cent deadweight as:
$$Estimated\ Index\ Value = 3.1144 \cdot \frac{190 \cdot \sum_{i=1}^{NME} P_{MEi} + 215 \cdot P_{AE}}{70\% DWT \cdot V_{ref}}$$
 - .3 parameters a and c for containerships in Table 2 of regulation 21 of MARPOL Annex VI are determined by plotting the estimated index value against 100 per cent deadweight i.e. a=174.22 and c=0.201 were determined.
 - .4 required EEDI for a new containership is calculated using 100 per cent deadweight as:
$$Required\ EEDI = (1-X/100) \cdot a \cdot 100\% \text{ deadweight}^{-c}$$
Where X is the reduction factor (in percentage) in accordance with Table 1 in regulation 21 of MARPOL Annex VI relating to the applicable phase and size of new containership.
- .4 *Deadweight* means the difference in tonnes between the displacement of a ship in water of relative density of 1,025 kg/m³ at the summer load draught and the lightweight of the ship. The summer load draught should be taken as the maximum summer draught as certified in the stability booklet approved by the Administration or an organization recognized by it.

- .5 P is the power of the main and auxiliary engines, measured in kW. The subscripts $_{ME}$ and $_{AE}$ refer to the main and auxiliary engine(s), respectively. The summation on i is for all engines with the number of engines ($_{nME}$). (See diagram in appendix 1.)

- .1 $P_{ME(i)}$ is 75 per cent of the rated installed power (MCR^{*}) for each main engine (i).

The influence of additional shaft power take off or shaft power take in is defined in the following paragraphs.

.2 **Shaft generator**

In case where shaft generator(s) are installed, $P_{PTO(i)}$ is 75 per cent of the rated electrical output power of each shaft generator.

For calculation of the effect of shaft generators two options are available:

Option 1:

- .1 The maximum allowable deduction for the calculation of $P_{ME(i)}$ is to be no more than P_{AE} as defined in paragraph 2.5.6. For this case, $P_{ME(i)}$ is calculated as:

$$P_{ME(i)} = 0.75 \times (MCR_{ME(i)} - P_{PTO(i)})$$

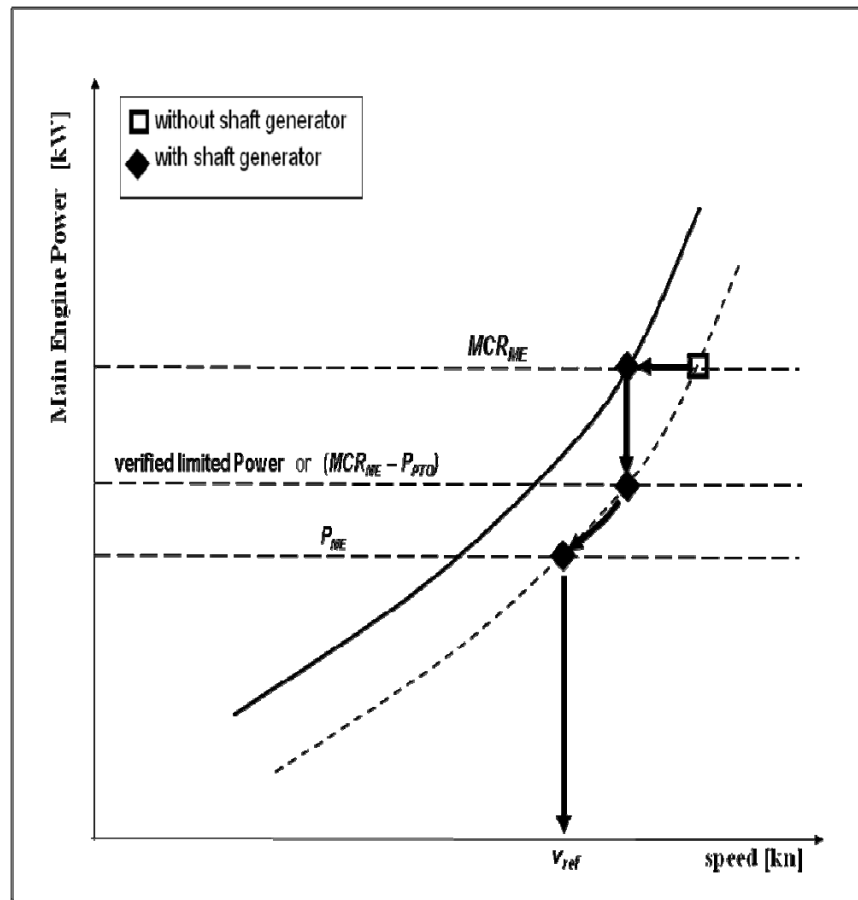
or

Option 2:

- .2 Where an engine is installed with a higher rated power output than that which the propulsion system is limited to by verified technical means, then the value of $P_{ME(i)}$ is 75 per cent of that limited power for determining the reference speed, V_{ref} and for EEDI calculation.

* The value of MCR specified on the EIAPP certificate should be used for calculation. If the main engines are not required to have an EIAPP certificate, the MCR on the nameplate should be used.

The following figure gives guidance for determination of $P_{ME(i)}$:



3 Shaft motor

In case where shaft motor(s) are installed, $P_{PT(i)}$ is 75 per cent of the rated power consumption of each shaft motor divided by the weighted average efficiency of the generator(s).

The propulsion power at which V_{ref} is measured, is:

$$\sum P_{ME(i)} + \sum P_{PT(i),Shaft}$$

Where:

$$\sum P_{PT(i),Shaft} = \sum (P_{PT(i)} \cdot \eta_{PT(i)}) \cdot \eta_{Gen}$$

$\eta_{PT(i)}$ is the efficiency of each shaft motor installed

η_{Gen} is the weighted average efficiency of the generator(s)

Where the total propulsion power as defined above is higher than 75 per cent of the power the propulsion system is limited to by verified technical means, then 75 per cent of the limited power is to be used as the total propulsion power for determining the reference speed, V_{ref} and for EEDI calculation.

In case of combined PTI/PTO, the normal operational mode at sea will determine which of these to be used in the calculation.

Note: The shaft motor's chain efficiency may be taken into consideration to account for the energy losses in the equipment from the switchboard to the shaft motor, if the chain efficiency of the shaft motor is given in a verified document.

- .4 $P_{eff(i)}$ is the output of the innovative mechanical energy efficient technology for propulsion at 75 per cent main engine power.

Mechanical recovered waste energy directly coupled to shafts need not be measured, since the effect of the technology is directly reflected in the V_{ref} .

In case of a ship equipped dual-fuel engine or a number of engines, the C_{FME} and SFC_{ME} should be the power weighted average of all the main engines.

- .5 $P_{AEff(i)}$ is the auxiliary power reduction due to innovative electrical energy efficient technology measured at $P_{ME(i)}$.

- .6 P_{AE} is the required auxiliary engine power to supply normal maximum sea load including necessary power for propulsion machinery/systems and accommodation, e.g. main engine pumps, navigational systems and equipment and living on board, but excluding the power not for propulsion machinery/systems, e.g. thrusters, cargo pumps, cargo gear, ballast pumps, maintaining cargo, e.g. reefers and cargo hold fans, in the condition where the ship engaged in voyage at the speed (V_{ref}) under the condition as mentioned in paragraph 2.2.

- .1 For ships with a main engine power of 10,000 kW or above, P_{AE} is defined as:

$$P_{AE(MCRME \geq 10000KW)} = \left(0.025 \times \left(\sum_{i=1}^{nME} MCR_{MEi} + \frac{\sum_{i=1}^{nPTI} P_{PTI(i)}}{0.75} \right) \right) + 250$$

- .2 For ships with a main engine power below 10,000 kW, P_{AE} is defined as:

$$P_{AE(MCRME < 10000KW)} = \left(0.05 \times \left(\sum_{i=1}^{nME} MCR_{MEi} + \frac{\sum_{i=1}^{nPTI} P_{PTI(i)}}{0.75} \right) \right)$$

- .3 For ship where the P_{AE} value calculated by paragraph 2.5.6.1 or 2.5.6.2 is significantly different from the total power used at normal seagoing, e.g. in cases of passenger ships (see NOTE under the formula of EEDI), the P_{AE} value should be estimated by the consumed electric power (excluding propulsion) in conditions when the ship is engaged in a voyage at reference speed (V_{ref}) as given in the electric power table¹, divided by the average efficiency of the generator(s) weighted by power (see appendix 2).
- .6 V_{ref} , *Capacity* and P should be consistent with each other.
- .7 *SFC* is the certified specific fuel consumption, measured in g/kWh, of the engines. The subscripts $ME(i)$ and $AE(i)$ refer to the main and auxiliary engine(s), respectively. For engines certified to the E2 or E3 test cycles of the NO_x Technical Code 2008, the engine Specific Fuel Consumption ($SFC_{ME(i)}$) is that recorded in the test report included in a NO_x technical file for the engine(s) at 75 per cent of MCR power of its torque rating. For engines certified to the D2 or C1 test cycles of the NO_x Technical Code 2008, the engine Specific Fuel Consumption ($SFC_{AE(i)}$) is that recorded on the test report included in a NO_x technical file at the engine(s) 50 per cent of MCR power or torque rating.

The *SFC* should be corrected to the value corresponding to the ISO standard reference conditions using the standard lower calorific value of the fuel oil (42,700kJ/kg), referring to ISO 15550:2002 and ISO 3046-1:2002.

For ships where the P_{AE} value calculated by paragraphs 2.5.6.1 and 2.5.6.2 is significantly different from the total power used at normal seagoing, e.g. conventional passenger ships, the Specific Fuel Consumption (SFC_{AE}) of the auxiliary generators is that recorded in the test report included in a NO_x technical file for the engine(s) at 75 per cent of MCR power of its torque rating.

SFC_{AE} is the power-weighted average among $SFC_{AE(i)}$ of the respective engines i .

For those engines which do not have a test report included in a NO_x technical file because its power is below 130 kW, the *SFC* specified by the manufacturer and endorsed by a competent authority should be used.

At the design stage, in case of unavailability of test report in the NO_x file, the *SFC* specified by the manufacturer and endorsed by a competent authority should be used.

For LNG driven engines of which *SFC* is measured in kJ/kWh should be corrected to the *SFC* value of g/kWh using the standard lower calorific value of the LNG (48,000 kJ/kg), referring to the 2006 IPCC Guidelines.

¹ The electric power table should be examined and validated by the verifier. Where ambient conditions affect any electrical load in the power table the contractual ambient conditions leading to the maximum design electrical load of the installed system for the ship in general should apply.

- .8 f_j is a correction factor to account for ship specific design elements:
- .1 The power correction factor, f_j , for ice-classed ships should be taken as the greater value of f_{j0} and $f_{j,min}$ as tabulated in Table 1 but not greater than $f_{j,max} = 1.0$.

For further information on approximate correspondence between ice classes, see HELCOM Recommendation 25/7².

Table 1: Correction factor for power f_j for ice-classed ships

Ship type	f_{j0}	$f_{j,min}$ depending on the ice class			
		IA Super	IA	IB	IC
Tanker	$\frac{0.308 L_{PP}^{1.920}}{\sum_{i=1}^{nME} P_{ME(i)}}$	$0.15 L_{PP}^{0.30}$	$0.27 L_{PP}^{0.21}$	$0.45 L_{PP}^{0.13}$	$0.70 L_{PP}^{0.06}$
Bulk carrier	$\frac{0.639 L_{PP}^{1.754}}{\sum_{i=1}^{nME} P_{ME(i)}}$	$0.47 L_{PP}^{0.09}$	$0.58 L_{PP}^{0.07}$	$0.73 L_{PP}^{0.04}$	$0.87 L_{PP}^{0.02}$
General cargo ship	$\frac{0.0227 \cdot L_{PP}^{2.483}}{\sum_{i=1}^{nME} P_{ME(i)}}$	$0.31 L_{PP}^{0.16}$	$0.43 L_{PP}^{0.12}$	$0.56 L_{PP}^{0.09}$	$0.67 L_{PP}^{0.07}$

- .2 The factor f_j , for shuttle tankers with propulsion redundancy should be $f_j = 0.77$. This correction factors applies to shuttle tankers with propulsion redundancy between 80,000 and 160,000 deadweight. The Shuttle Tankers with Propulsion Redundancy are tankers used for loading of crude oil from offshore installations equipped with dual-engine and twin-propellers need to meet the requirements for dynamic positioning and redundancy propulsion class notation.
- .3 For other ship types, f_j should be taken as 1.0.
- .9 f_w is a non-dimensional coefficient indicating the decrease of speed in representative sea conditions of wave height, wave frequency and wind speed (e.g. Beaufort Scale 6), and is determined as follows:
- .1 for attained EEDI calculated under regulations 20 and 21 of MARPOL Annex VI, f_w is 1.00;
- .2 when f_w is calculated according to the subparagraph .2.1 or .2.2 below, the value for attained EEDI calculated by the formula in paragraph 2 using the obtained f_w should be referred to as "*attained EEDI_{weather}*";
- .1 f_w can be determined by conducting the ship specific simulation on its performance at representative sea conditions. The simulation methodology should be based on the Guidelines developed by the Organization and the

² HELCOM Recommendation 25/7 may be found at <http://www.helcom.fi>.

method and outcome for an individual ship should be verified by the Administration or an organization recognized by the Administration; and

- .2 in cases where a simulation is not conducted, f_w should be taken from the "Standard f_w " table/curve. A "Standard f_w " table/curve is provided in the Guidelines³ for each ship type defined in paragraph 1, and expressed as a function of Capacity (e.g. deadweight). The "Standard f_w " table/curve is based on data of actual speed reduction of as many existing ships as possible under the representative sea condition.

f_w and attained $EEDI_{weather}$, if calculated, with the representative sea conditions under which those values are determined, should be indicated in the EEDI Technical File to make a distinction with the attained EEDI calculated under regulations 20 and 21 of MARPOL Annex VI.

- .10 $f_{eff(i)}$ is the availability factor of each innovative energy efficiency technology. $f_{eff(i)}$ for waste energy recovery system should be one (1.0)⁴.
- .11 f_i is the capacity factor for any technical/regulatory limitation on capacity, and should be assumed to be one (1.0) if no necessity of the factor is granted.
- .1 The capacity correction factor, f_i , for ice-classed ships should be taken as the lesser value of f_{i0} and $f_{i,max}$ as tabulated in Table 2, but not less than $f_{i,min} = 1.0$. For further information on approximate correspondence between ice classes, see HELCOM Recommendation 25/7⁵.

Table 2: Capacity correction factor f_i for ice-classed ships

Ship type	f_{i0}	$f_{i,max}$ depending on the ice class			
		IA Super	IA	IB	IC
Tanker	$\frac{0.00138 \cdot L_{PP}^{3.331}}{capacity}$	$2.10L_{PP}^{-0.11}$	$1.71L_{PP}^{-0.08}$	$1.47L_{PP}^{-0.06}$	$1.27L_{PP}^{-0.04}$
Bulk carrier	$\frac{0.00403 \cdot L_{PP}^{3.123}}{capacity}$	$2.10L_{PP}^{-0.11}$	$1.80L_{PP}^{-0.09}$	$1.54L_{PP}^{-0.07}$	$1.31L_{PP}^{-0.05}$
General cargo ship	$\frac{0.0377 \cdot L_{PP}^{2.625}}{capacity}$	$2.18L_{PP}^{-0.11}$	$1.77L_{PP}^{-0.08}$	$1.51L_{PP}^{-0.06}$	$1.28L_{PP}^{-0.04}$
Containership	$\frac{0.1033 \cdot L_{PP}^{2.329}}{capacity}$	$2.10L_{PP}^{-0.11}$	$1.71L_{PP}^{-0.08}$	$1.47L_{PP}^{-0.06}$	$1.27L_{PP}^{-0.04}$
Gas carrier	$\frac{0.0474 \cdot L_{PP}^{2.590}}{capacity}$	1.25	$2.10L_{PP}^{-0.12}$	$1.60L_{PP}^{-0.08}$	$1.25L_{PP}^{-0.04}$

Note: containership capacity is defined as 70% of the DWT.

³ Guidelines for the calculation of the coefficient f_w for the decrease of ship speed in respective sea conditions will be developed.

⁴ EEDI calculation should be based on the normal sea-going condition outside Emission Control Area designated under paragraph 6 of regulation 13 in MARPOL ANNEX VI.

⁵ HELCOM Recommendation 25/7 may be found at <http://www.helcom.fi>.

- .2 f_{iVSE} for ship specific voluntary structural enhancement is expressed by the following formula:

$$f_{iVSE} = \frac{DWT_{reference\ design}}{DWT_{enhanced\ design}}$$

Where:

$$DWT_{reference\ design} = \Delta_{ship} - lightweight_{reference\ design}$$

$$DWT_{enhanced\ design} = \Delta_{ship} - lightweight_{enhanced\ design}$$

For this calculation the same displacement (Δ) for reference and enhanced design should be taken.

DWT before enhancements ($DWT_{reference\ design}$) is the deadweight prior to application of the structural enhancements. DWT after enhancements ($DWT_{enhanced\ design}$) is the deadweight following the application of voluntary structural enhancement. A change of material (e.g. from aluminum alloy to steel) between reference design and enhanced design should not be allowed for the f_{iVSE} calculation. A change in grade of the same material (e.g. in steel type, grades, properties and condition) should also not be allowed.

In each case, two sets of structural plans of the ship should be submitted to the verifier for assessment. One set for the ship without voluntary structural enhancement; the other set for the same ship with voluntary structural enhancement. (Alternatively, one set of structural plans of the reference design with annotations of voluntary structural enhancement should also be acceptable.) Both sets of structural plans should comply with the applicable regulations for the ship type and intended trade.

- .3 for bulk carriers and oil tankers, built in accordance with Common Structural Rules (CSR) of the classification societies and assigned the class notation CSR, the following capacity correction factor f_{iCSR} should apply:

$$f_{iCSR} = 1 + (0.08 \cdot LWT_{CSR} / DWT_{CSR})$$

Where, DWT_{CSR} is the deadweight determined by paragraph 2.4 and LWT_{CSR} is the light weight of the ship.

- .4 for other ship types, f_i should be taken as 1.0.

- .12 f_c is the cubic capacity correction factor and should be assumed to be one (1.0) if no necessity of the factor is granted.

- .1 for chemical tankers, as defined in regulation 1.16.1 of MARPOL Annex II, the following cubic capacity correction factor f_c should apply:

$$f_c = R^{-0.7} - 0.014, \text{ where } R \text{ is less than } 0.98$$

or

$$f_c = 1.000, \text{ where } R \text{ is } 0.98 \text{ and above;}$$

where: R is the capacity ratio of the deadweight of the ship (tonnes) as determined by paragraph 2.4 divided by the total cubic capacity of the cargo tanks of the ship (m^3).

- .2 for gas carriers having direct diesel driven propulsion system constructed or adapted and used for the carriage in bulk of liquefied natural gas, the following cubic capacity correction factor f_{CLNG} should apply:

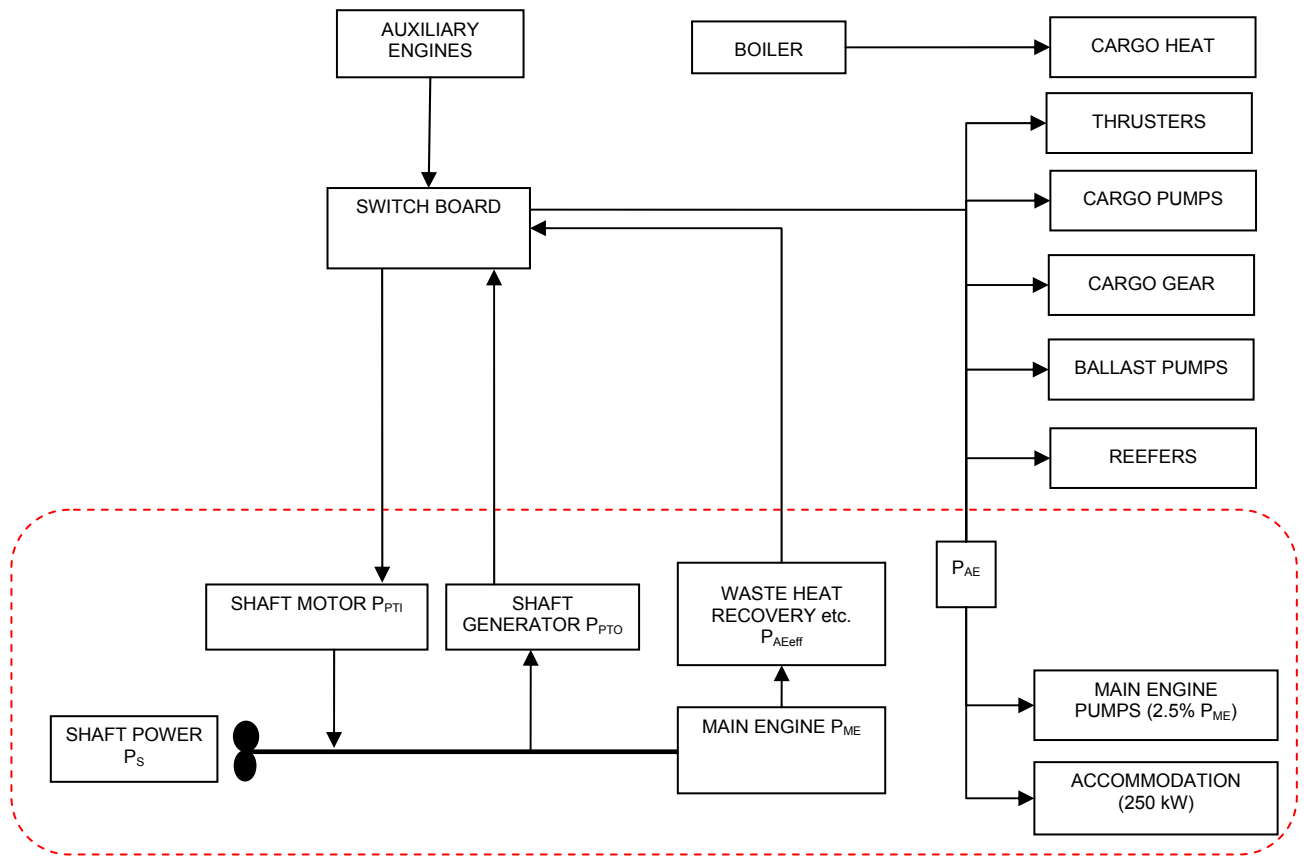
$$f_{\text{CLNG}} = R^{-0.56}$$

where, R is capacity ratio of deadweight of the ship (tonnes) as determined by paragraph 2.4 divided by the total cubic capacity of the cargo tanks of the ship (m^3).

- .13 *Length between perpendiculars*, L_{pp} means 96 per cent of the total length on a waterline at 85 per cent of the least moulded depth measured from the top of the keel, or the length from the foreside of the stem to the axis of the rudder stock on that waterline, if that were greater. In ships designed with a rake of keel the waterline on which this length is measured should be parallel to the designed waterline. The length between perpendiculars (L_{pp}) should be measured in metres.

APPENDIX 1

A GENERIC AND SIMPLIFIED MARINE POWER PLANT



Note 1: Mechanical recovered waste energy directly coupled to shafts need not be measured, since the effect of the technology is directly reflected in the V_{ref} .

Note 2: In case of combined PTI/PTO, the normal operational mode at sea will determine which of these to be used in the calculation.

APPENDIX 2

GUIDELINES FOR THE DEVELOPMENT OF ELECTRIC POWER TABLES FOR EEDI (EPT-EEDI)

1 Introduction to the document "Electric Power Table for EEDI"

1.1 This appendix contains a guideline for the document "Electric Power Table for EEDI" which is similar to the actual shipyards' load balance document, utilizing well defined criteria, providing standard format, clear loads definition and grouping, standard load factors, etc. A number of new definitions (in particular the "groups") are introduced, giving an apparent greater complexity to the calculation process. However, this intermediate step to the final calculation of P_{AE} stimulates all the parties to a deep investigation through the global figure of the auxiliary load, allowing comparisons between different ships and technologies and eventually identifying potential efficiencies improvements.

2 Auxiliary load power definition

2.2 P_{AE} is to be calculated as indicated in paragraph 2.5.6 of the Guidelines, together with the following additional three conditions:

- .1 no emergency situations (e.g. "no fire", "no flood", "no blackout", "no partial blackout");
- .2 evaluation time frame of 24 hours (to account loads with intermittent use); and
- .3 ship fully loaded of passenger and/or cargo and crew.

3 Definition of the data to be included in the Electric Power Table for EEDI

3.1 The Electric power table for EEDI calculation should contain the following data elements, as appropriate:

- .1 Load's group;
- .2 Load's description;
- .3 Load's identification tag;
- .4 Load's electric circuit Identification;
- .5 Load's mechanical rated power " P_m " [kW];
- .6 Load's electric motor rated output power [kW];
- .7 Load's electric motor efficiency " e " [/];
- .8 Load's Rated electric power " P_r " [kW];
- .9 Service factor of load " k_l " [/];
- .10 Service factor of duty " k_d " [/];
- .11 Service factor of time " k_t " [/];
- .12 Service total factor of use " k_u " [/], where $k_u = k_l \cdot k_d \cdot k_t$;
- .13 Load's necessary power " P_{load} " [kW], where $P_{load} = P_r \cdot k_u$;
- .14 Notes;
- .15 Group's necessary power [kW]; and
- .16 Auxiliaries load's power P_{AE} [kW].

4 Data to be included in the Electric Power Table for EEDI

Load groups

4.1 The Loads are put into defined groups, allowing a proper breakdown of the auxiliaries. This eases the verification process and makes it possible to identify those areas where load reductions might be possible. The groups are listed below:

- .1 A – Hull, Deck, Navigation and Safety services;
- .2 B – Propulsion service auxiliaries;
- .3 C – Auxiliary Engine and Main Engine Services;
- .4 D – Ship's General services;
- .5 E – Ventilation for Engine-rooms and Auxiliaries room;
- .6 F – Air Conditioning services;
- .7 G – Galleys, refrigeration and Laundries services;
- .8 H – Accommodation services;
- .9 I – Lighting and socket services;
- .10 L – Entertainment services;
- .11 N – Cargo loads; and
- .12 M – Miscellaneous.

All the ship's loads have to be delineated in the document, excluding only *PA_{eff}*, the shaft motors and shaft motors chain (while the propulsion services auxiliaries are partially included below in paragraph 4.1.2 B). Some loads (i.e. thrusters, cargo pumps, cargo gear, ballast pumps, maintaining cargo, reefers and cargo hold fans) still are included in the group for sake of transparency, however their service factor is zero in order to comply with rows 4 and 5 of paragraph 2.5.6 of the Guidelines, therefore making it easier to verify that all the loads have been considered in the document and there are no loads left out of the measurement.

4.1.1 A – Hull, Deck, Navigation and safety services

- .1 loads included in the Hull services typically are: ICCP systems, mooring equipment, various doors, ballasting systems, Bilge systems, Stabilizing equipment, etc. Ballasting systems are indicated with service factor equal to zero to comply with row 5 of paragraph 2.5.6 of the Guidelines;
- .2 loads included in the deck services typically are: deck and balcony washing systems, rescue systems, cranes, etc.;
- .3 loads included in the navigation services typically are: navigation systems, navigation's external and internal communication systems, steering systems, etc.; and
- .4 loads included in the safety services typically are: active and passive fire systems, emergency shutdown systems, public address systems, etc.

4.1.2 B – Propulsion service auxiliaries

This group typically includes: propulsion secondary cooling systems such as LT cooling pumps dedicated to shaft motors, LT cooling pumps dedicated to propulsion converters, propulsion UPSs, etc. Propulsion service Loads do not include shaft motors (*PTI(i)*) and the auxiliaries which are part of them (shaft motor own cooling fans and pump, etc.) and the shaft motor chain losses and auxiliaries which are part of them (i.e. shaft motor converters including relevant auxiliaries such as converter own cooling fans and pumps, shaft motor

transformers including relevant auxiliaries losses such as propulsion transformer own cooling fans and pumps, shaft motor Harmonic filter including relevant auxiliaries losses, shaft motor excitation system including the relevant auxiliaries consumed power, etc.). Propulsion service auxiliaries include manoeuvring propulsion equipments such as manoeuvring thrusters and their auxiliaries whose service factor is to be set to zero.

4.1.3 C – Auxiliary Engine and Main Engine Services

This group includes: cooling systems, i.e. pumps and fans for cooling circuits dedicated to alternators or propulsion shaft engines (seawater, technical water dedicated pumps, etc.), lubricating and fuel systems feeding, transfer, treatment and storage, ventilation system for combustion air supply, etc.

4.1.4 D – Ship's General services

This group includes Loads which provide general services which can be shared between shaft motor, auxiliary engines and main engine and accommodation support systems. Loads typically included in this group are: Cooling systems, i.e. pumping seawater, technical water main circuits, compressed air systems, fresh water generators, automation systems, etc.

4.1.5 E – Ventilation for Engine-rooms and Auxiliaries room

This group includes all fans providing ventilation for engine-rooms and auxiliary rooms that typically are: Engine-rooms cooling supply-exhaust fans, auxiliary rooms supply and exhaust fans. All the fans serving accommodation areas or supplying combustion air are not included in this group. This group does not include cargo hold fans, and garage supply and exhaust fans.

4.1.6 F – Air Conditioning services

All Loads that make up the air conditioning service that typically are: air conditioning chillers, air conditioning cooling and heating fluids transfer and treatment, air conditioning's air handling units ventilation, air conditioning re-heating systems with associated pumping, etc. The air conditioning chillers service factor of load, service factor of time and service factor of duty are to be set as 1 ($kl=1$, $kt=1$ and $kd=1$) in order to avoid the detailed validation of the heat load dissipation document (i.e. the chiller's electric motor rated power is to be used). However, kd is to represent the use of spare chillers (e.g. four chillers are installed and one out four is spare then $kd=0$ for the spare chiller and $kd=1$ for the remaining three chillers), but only when the number of spare chillers is clearly demonstrated via the heat load dissipation document.

4.1.7 G – Galleys, refrigeration and Laundries services

All Loads related to the galleys, pantries refrigeration and laundry services that typically are: Galleys various machines, cooking appliances, galleys' cleaning machines, galleys auxiliaries, refrigerated room systems including refrigeration compressors with auxiliaries, air coolers, etc.

4.1.8 H – Accommodation services

All Loads related to the accommodation services of passengers and crew that typically are: crew and passengers' transportation systems, i.e. lifts, escalators, etc., environmental services, i.e. black and grey water collecting, transfer, treatment, storage, discharge, waste systems including collecting, transfer, treatment, storage, etc., accommodation fluids transfers, i.e. sanitary hot and cold water pumping, etc., treatment units, pools systems, saunas, gym equipments, etc.

4.1.9 I – Lighting and socket services

All Loads related to the lighting, entertainment and socket services. As the quantity of lighting circuits and sockets within the ship may be significantly high, it is not practically feasible to list all the lighting circuits and points in the EPT for EEDI. Therefore circuits should be grouped into subgroups aimed to identify possible improvements of efficient use of power. The subgroups are:

- .1 Lighting for 1) cabins, 2) corridors, 3) technical rooms/stairs, 4) public spaces/stairs, 5) engine-rooms and auxiliaries' room, 6) external areas, 7) garages and 8) cargo spaces. All have to be divided by main vertical zone; and
- .2 Power sockets for 1) cabins, 2) corridors, 3) technical rooms/stairs, 4) public spaces/stairs, 5) engine-rooms and auxiliaries' room, 6) garages and 7) cargo spaces. All have to be divided by main vertical zone.

The calculation criteria for complex groups (e.g. cabin lighting and power sockets) subgroups are to be included via an explanatory note, indicating the load composition (e.g. lights of typical cabins, TV, hair dryer, fridge, etc., typical cabins).

4.1.10 L – Entertainment services

This group includes all Loads related to the entertainment services that typically are: public spaces audio and video equipments, theatre stage equipments, IT systems for offices, video games, etc.

4.1.11 N – Cargo Loads

This group will contain all cargo loads such as cargo pumps, cargo gear, maintaining cargo, cargo reefers loads, cargo hold fans and garage fans for sake of transparency. However, the service factor of this group is to be set to zero.

4.1.12 M – Miscellaneous

This group will contain all loads which have not been associated to the above-mentioned groups but still are contributing to the overall load calculation of the normal maximum sea load.

Loads description

4.2 This identifies the loads (for example "seawater pump").

Loads identification tag

4.3 This tag identifies the loads according to the shipyard's standards tagging system. For example, the "PTI1 fresh water pump" identification tag is "SYIA/C" for an example ship and shipyard. This data provides a unique identifier for each load.

Loads electric circuit Identification

4.4 This is the tag of the electric circuit supplying the load. Such information allows the data validation process.

Loads mechanical rated power " P_m "

4.5 This data is to be indicated in the document only when the electric load is made by an electric motor driving a mechanical load (for example a fan, a pump, etc.). This is the rated power of the mechanical device driven by an electric motor.

Loads electric motor rated output power [kW]

4.6 The output power of the electric motor as per maker's name plate or technical specification. This data does not take part of the calculation but is useful to highlight potential over rating of the combination motor-mechanical load.

Loads electric motor efficiency " e " [%]

4.7 This data is to be entered in the document only when the electric load is made by an electric motor driving a mechanical load.

Loads rated electric power " P_r " [kW]

4.8 Typically the maximum electric power absorbed at the load electric terminals at which the load has been designed for its service, as indicated on the maker's name plate and/or maker's technical specification. When the electric load is made by an electric motor driving a mechanical load the load's rated electric power is: $P_r = P_m / e$ [kW].

Service factor of load " kl " [%]

4.9 Provides the reduction from the loads rated electric power to loads necessary electric power that is to be made when the load absorb less power than its rated power. For example, in case of electric motor driving a mechanical load, a fan could be designed with some power margin, leading to the fact that the fan rated mechanical power exceeds the power requested by the duct system it serves. Another example is when a pump rated power exceed the power needed for pumping in its delivery fluid circuit. Another example in case of electric self-regulating semi-conductors electric heating system is oversized and the rated power exceeds the power absorbed, according a factor kl .

Service factor of duty " kd " [%]

4.10 Factor of duty is to be used when a function is provided by more than one load. As all loads have to be included in the EPT for EEDI, this factor provides a correct summation of the loads. For example when two pumps serve the same circuit and they run in duty/stand-by their Kd factor will be $\frac{1}{2}$ and $\frac{1}{2}$. When three compressors serves the same circuit and one runs in duty and two in stand-by, then kd is $\frac{1}{3}$, $\frac{1}{3}$ and $\frac{1}{3}$.

Service factor of time " kt " [%]

4.11 A factor of time based on the shipyard's evaluation about the load duty along 24 hours of ship's navigation as defined at paragraph 3. For example the Entertainment loads operate at their power for a limited period of time, 4 hours out 24 hours; as a consequence $kt = 4/24$. For example, the seawater cooling pumps operate at their power all the time during the navigation at V_{ref} . As a consequence $kt = 1$.

Service total factor of use "ku" [/]

4.12 The total factor of use that takes into consideration all the service factors:
 $ku=kl \cdot kd \cdot kt$.

Loads necessary power "Pload" [kW]

4.13 The individual user contribution to the auxiliary load power is $Pload=Pr \cdot ku$.

Notes

4.14 A note, as free text, could be included in the document to provide explanations to the verifier.

Groups necessary power [kW]

4.15 The summation of the "Loads necessary power" from group A to N. This is an intermediate step which is not strictly necessary for the calculation of *PAE*. However, it is useful to allow a quantitative analysis of the *PAE*, providing a standard breakdown for analysis and potential improvements of energy saving.

Auxiliaries load's power PAE [kW]

4.16 Auxiliaries load's power *PAE* is the summation of the "Load's necessary power" of all the loads divided by the average efficiency of the generator(s) weighted by power.

$$PAE = \sum Pload(i) / (\text{average efficiency of the generator(s) weighted by power})$$

Layout and organization of the data indicated in the "Electric power table for EEDI"

5 The document "Electric power table for EEDI" is to include general information (i.e. ship's name, project name, document references, etc.) and a table with:

- .1 one row containing column titles;
- .2 one Column for table row ID;
- .3 one Column for the groups identification ("A", "B", etc.) as indicated in paragraphs 4.1.1 to 4.1.12 of this guideline;
- .4 one Column for the group descriptions as indicated in paragraphs 4.1.1 to 4.1.12 of this guideline;
- .5 one column each for items in paragraphs 4.2 to 4.14 of this guideline (e.g. "load tag", etc.);
- .6 one row dedicated to each individual load;
- .7 the summation results (i.e. summation of powers) including data from paragraphs 4.15 to 4.16 of this guideline; and
- .8 explanatory notes.

An example of an Electric Power Table for EEDI for a cruise postal vessel which transports passenger and have a car garage and reefer holds for fish trade transportation is indicated below. The data indicated and the type of ship is for reference only.

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ELECTRIC POWER TABLE FOR EEDI			HULL "EXAMPLE"		PROJECT "EXAMPLE"		Load Rated electric power "Pr" [kW]	service factor of load "kl" [l]	service factor of duty "kd" [l]	service factor of time "kt" [l]	service total factor of use "ku" [l]	Load necessary power "Pload" [kW]	Note
id	Load group	Load description	Load identification tag	Load electric circuit identification	Load mechanical rated power "Pm" [kW]	Load electric motor rated output power [kW]	Load electric motor efficiency "e" [l]						
1	A	Hull cathodic protection Fwd	xxx	yyy	n.a.	n.a.	n.a.	5.2	1	1	1*	5.2	*in use 24hours/day
2	A	Hull cathodic protection mid	xxx	yyy	n.a.	n.a.	n.a.	7.0	1	1	1*	7	*in use 24hours/day
3	A	Hull cathodic protection aft	xxx	yyy	n.a.	n.a.	n.a.	4.8	1	1	1*	4.8	*in use 24hours/day
4	A	Ballast pump 3	xxx	yyy	30	36	0.92	32.6	0.9	0.5	1	0*	*not in use at NMSL see para 2.5.6 of Circ.681
5	A	Fwd Stb mooring winch motor n.1	xxx	yyy	90	150	0.92	97.8	0.8	1	0*	0	*not in use at NMSL see para 2.5.6 of Circ.681
6	A	WTDs system main control panel	xxx	yyy	n.a.	n.a.	n.a.	0.5	1	1	1*	0.5	*in use 24hours/day
7	A	WTD 1, deck D frame 150	xxx	yyy	1.2	3	0.91	1.3	0.7	1	0.104*	0.0728	*180 secs to open/close x 100 opening a day
8	A	WTD 5, deck D frame 210	xxx	yyy	1.2	3	0.91	1.3	0.7	1	0.156*	0.1092	*180 secs to open/close x 150 opening a day
9	A	Stabilisers control unit	xxx	yyy	n.a.	n.a.	n.a.	0.7	1	1	1*	0.7	*in use 24hours/day
10	A	Stabilisers Hydraulic pack power pump 1	xxx	yyy	80	90	0.9	88.9	0.9	1	0*	0	*NMSL=> calm sea,=> stabiliser not in use
11	A	S-band Radar 1 controller	xxx	yyy	n.a.	n.a.	n.a.	0.4	1	1	1*	0.4	*in use 24hours/day
12	A	S-band Radar 1 motor	xxx	yyy	0.8	1	0.92	0.9	1	1	1*	0.9	*in use 24hours/day
13	A	Fire detection system bridge main unit	xxx	yyy	n.a.	n.a.	n.a.	1.5	1	1	1*	1.5	*in use 24hours/day
14	A	Fire detection system ECR unit	xxx	yyy	n.a.	n.a.	n.a.	0.9	1	1	1*	0.9	*in use 24hours/day
15	A	High pressure water fog control unit	xxx	yyy	n.a.	n.a.	n.a.	1.2	1	1	1*	1.2	*in use 24hours/day
16	A	High pressure water fog engines rooms pump 1a	xxx	yyy	25	30	0.93	26.9	0.9	0.5	0*	0	*NMSL=> not emergency =>Load not in use
17	A	High pressure water fog engines rooms pump 1b	xxx	yyy	25	30	0.93	26.9	0.9	0.5	0*	0	* not emergency situations
18	B	PTI port fresh water pump 1	xxx	yyy	30	36	0.92	32.6	0.9	0.5*	1	14.7	* pump1,2 one is duty and one is stand-by
19	B	PTI port fresh water pump 2	xxx	yyy	30	36	0.92	32.6	0.9	0.5*	1	14.7	* pump1,2 one is duty and one is stand-by
20	B	Thrusters control system	xxx	yyy	n.a.	n.a.	n.a.	0.5	1	1	1*	0.5	in use 24hours/day (even if thruster motor isn't)
21	B	Bow thruster 1	xxx	yyy	3000	3000	0.96	3125.0	1	1	0*	0	*NMSL=>thrusters motor are not in use
22	B	PEM port cooling fan 1	xxx	yyy	20	25	0.93	21.5	0.9	1	n.a.	n.a.*	*this load is included in the propulsion chain data
23	C	HT circulation pump 1 DG 3	xxx	yyy	8	10	0.92	8.7	0.9	0.5*	1	3.9	* pump1,2 one is duty and one is stand-by
24	C	HT circulation pump 2 DG 3	xxx	yyy	8	10	0.92	8.7	0.9	0.5*	1	3.9	* pump1,2 one is duty and one is stand-by
25	C	DG3 combustion air fan	xxx	yyy	28	35	0.92	30.4	0.9	1	1*	27.4	*in use 24hours/day
26	C	DG3 exhaust gas boiler circulation pump	xxx	yyy	6	8	0.93	6.5	0.8	1	1*	5.2	*in use 24hours/day
27	C	Alternator 3 external cooling fan	xxx	yyy	3	5	0.93	3.2	0.8	1	1*	2.75	*in use 24hours/day
28	C	fuel feed fwd booster pump a	xxx	yyy	7	9	0.92	7.6	0.9	0.5*	1	3.4	* pump1,2 one is duty and one is stand-by
29	C	fuel feed fwd booster pump b	xxx	yyy	7	9	0.92	7.6	0.9	0.5*	1	3.4	* pump1,2 one is duty and one is stand-by
30	D	Fwd main LT cooling pump 1	xxx	yyy	120	150	0.95	126.3	0.9	0.5*	1	56.8	* pump1,2 one is duty and one is stand-by
31	D	Fwd main LT cooling pump 2	xxx	yyy	120	150	0.95	126.3	0.9	0.5*	1	56.8	* pump1,2 one is duty and one is stand-by
32	E	FWD engine room supply fan 1	xxx	yyy	87.8	110	0.93	94.4	0.95	1	1*	89.7	*in use 24hours/day
33	E	FWD engine room exhaust fan 1	xxx	yyy	75	86	0.93	80.6	0.96	1	1*	77.4	*in use 24hours/day
34	E	purifier room supply fan 1	xxx	yyy	60	70	0.93	64.5	0.96	0.5	1*	31.0	*in use 24hours/day
35	E	purifier room supply fan 2	xxx	yyy	60	70	0.93	64.5	0.96	0.5	1*	31.0	*in use 24hours/day
36	F	HVAC chiller a	xxx	yyy	1450	1600	0.95	1526.3	1	2/3*	1	1007.4	*1 Chiller is spare; see heat load dissipation doc.
37	F	HVAC chiller b	xxx	yyy	1450	1600	0.95	1526.3	1	2/3*	1	1007.4	*1 Chiller is spare; see heat load dissipation doc.
38	F	HVAC chiller C	xxx	yyy	1450	1600	0.95	1526.3	1	2/3*	1	1007.4	*1 Chiller is spare; see heat load dissipation doc.
39	F	A.H.U. Ac station 5.4 supply fan	xxx	yyy	50	60	0.93	53.8	0.9	1	1*	48.4	*in use 24hours/day
40	F	A.H.U. Ac station 5.4 exhaust fan	xxx	yyy	45	55	0.93	48.4	0.9	1	1*	43.5	*in use 24hours/day
41	F	Chilled water pump a	xxx	yyy	80	90	0.93	86.0	0.88	0.5*	1	37.8	* pump1,2 one is duty and one is stand-by
42	F	Chilled water pump b	xxx	yyy	80	90	0.93	86.0	0.88	0.5*	1	37.8	* pump1,2 one is duty and one is stand-by
43	G	Italian's espresso coffee machine	xxx	yyy	n.a.	n.a.	n.a.	7.0	0.9	1	0.2*	1.3	*in use 4.8hours/day
44	G	deep freezer machine	xxx	yyy	n.a.	n.a.	n.a.	20.0	0.8	1	0.16*	3.2	*in use 4hours/day
45	G	washing machine 1	xxx	yyy	n.a.	n.a.	n.a.	8.0	0.8	1	0.33*	3.2	*in use 8hours/day
46	H	lift pax mid 4	xxx	yyy	30	40	0.93	32.3	0.5	1	0.175*	0.9	*in use 4hours/day
47	H	vacuum collecting system 4 pump a	xxx	yyy	10	13	0.92	10.9	0.9	1	1*	8.7	*in use 24hours/day
48	H	sewage treatmet system 1 pump 1	xxx	yyy	15	17	0.93	16.1	0.9	1	1*	8.7	*in use 24hours/day
49	H	Gym running machine	xxx	yyy	n.a.	n.a.	n.a.	2.5	1	1	0.3*	0.8	*in use 7.2hours/day
50	I	Cabin's lighting MV23	n.a.	n.a.	n.a.	n.a.	n.a.	80*	1	1	1	80.0	* see explanatory note
51	I	corridors lighting MV23	n.a.	n.a.	n.a.	n.a.	n.a.	10*	1	1	1	10.0	* see explanatory note
52	I	Cabin's sockets MV23	n.a.	n.a.	n.a.	n.a.	n.a.	5*	1	1	1	5.0	* see explanatory note
53	L	Main Theatre audio booster amplifier	xxx	yyy	n.a.	n.a.	n.a.	15.0	1	1	0.3*	4.5	*in use 7.2hours/day
54	L	Video wall atrium	xxx	yyy	n.a.	n.a.	n.a.	2.0	1	1	0.3*	0.6	*in use 7.2hours/day
55	M	Car Garage supply fan1	xxx	yyy	28	35	0.92	30.4	0.9	1	1*	0	*not in use at NMSL see para 2.5.6 of Circ.681
56	M	Fish transportation refeed hold n.2	xxx	yyy	25	30	0.93	26.9	0.9	0.5	0*	0	*not in use at NMSL see para 2.5.6 of Circ.681
57	N	Sliding glass roof	xxx	yyy	30	40	0.93	32.3	0.9	1	0.3*	0.27	*in use 7.2hours/day
											ΣPload(i)=	3764	
PAE =3764/(weighted average efficiency of generator(s)) [kW] Group's necessary power (group A=22.9kW, B=29.8kW, C=49.9kW, D=113.7kW, E=229kW, F=3189kW, G=7.6kW, H=19kW, I=95kW, L=5.1kW, M=0kW, N=0.22kW)													

RESOLUTION MEPC.213(63)

Adopted on 2 March 2012

2012 GUIDELINES FOR THE DEVELOPMENT OF A SHIP ENERGY EFFICIENCY MANAGEMENT PLAN (SEEMP)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution,

RECALLING ALSO that, at its sixty-second session, the Committee adopted, by resolution MEPC.203(62), amendments to the Annex of the Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (inclusion of regulations on energy efficiency for ships in MARPOL Annex VI),

NOTING the amendments to MARPOL Annex VI adopted at its sixty-second session by inclusion of a new chapter 4 for regulations on energy efficiency for ships, are expected to enter into force on 1 January 2013 upon their acceptance on 1 July 2012,

NOTING ALSO that regulation 22 of MARPOL Annex VI, as amended, requires each ship to keep on board a ship specific Ship Energy Efficiency Management Plan taking into account guidelines developed by the Organization,

RECOGNIZING that the amendments to MARPOL Annex VI requires the adoption of relevant guidelines for smooth and uniform implementation of the regulations and to provide sufficient lead time for industry to prepare,

HAVING CONSIDERED, at its sixty-third session, the draft 2012 Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP),

1. ADOPTS the 2012 Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP), as set out at annex to the present resolution;
2. INVITES Administrations to take the annexed Guidelines into account when developing and enacting national laws which give force to and implement provisions set forth in regulation 22 of MARPOL Annex VI, as amended;
3. REQUESTS the Parties to MARPOL Annex VI and other Member Governments to bring the annexed Guidelines related to the Ship Energy Efficiency Management Plan (SEEMP) to the attention of masters, seafarers, shipowners, ship operators and any other interested groups;
4. AGREES to keep these Guidelines under review in light of the experience gained; and
5. REVOKES the Guidance circulated by MEPC.1/Circ.683, as from this date.

ANNEX

**2012 GUIDELINES FOR THE DEVELOPMENT OF A
SHIP ENERGY EFFICIENCY MANAGEMENT PLAN (SEEMP)**

CONTENTS

1	INTRODUCTION
2	DEFINITIONS
3	GENERAL
4	FRAMEWORK AND STRUCTURE OF THE SEEMP
5	GUIDANCE ON BEST PRACTICES FOR FUEL-EFFICIENT OPERATION OF SHIPS
APPENDIX – A SAMPLE FORM OF A SHIP ENERGY EFFICIENCY MANAGEMENT PLAN (SEEMP)	

1 INTRODUCTION

1.1 These Guidelines have been developed to assist with the preparation of Ship Energy Efficiency Management Plan (hereafter referred to as the "SEEMP") that are required by regulation 22 of Annex VI of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78) (hereafter referred to as the "Convention").

1.2 A SEEMP provides a possible approach for monitoring ship and fleet efficiency performance over time and some options to be considered when seeking to optimize the performance of the ship.

1.3 These Guidelines should be used primarily by ships' masters, operators and owners in order to develop the SEEMP.

1.4 A sample form of a SEEMP is presented in the appendix for illustrative purposes.

2 DEFINITIONS

2.1 For the purpose of these Guidelines, the definitions in the Annex VI of the Convention apply.

2.2 "Company" means the owner of the ship or any other organization of person such as the manager, or the bareboat charterer, who has assumed the responsibility for operation of the ship from the shipowner.

2.3 "Safety Management system" means a structured and documented system enabling company personnel to implement effectively the company safety and environmental protection policy, as defined in paragraph 1.1 of International Safety Management Code.

3 GENERAL

3.1 In global terms it should be recognized that operational efficiencies delivered by a large number of ship operators will make an invaluable contribution to reducing global carbon emissions.

3.2 The purpose of a SEEMP is to establish a mechanism for a company and/or a ship to improve the energy efficiency of a ship's operation. Preferably, the ship-specific SEEMP is linked to a broader corporate energy management policy for the company that owns, operates or controls the ship, recognizing that no two shipping companies are the same, and that ships operate under a wide range of different conditions.

3.3 Many companies will already have an environmental management system (EMS) in place under ISO 14001 which contains procedures for selecting the best measures for particular vessels and then setting objectives for the measurement of relevant parameters, along with relevant control and feedback features. Monitoring of operational environmental efficiency should therefore be treated as an integral element of broader company management systems.

3.4 In addition, many companies already develop, implement and maintain a Safety Management System. In such case, the SEEMP may form part of the ship's Safety Management System.

3.5 This document provides guidance for the development of a SEEMP that should be adjusted to the characteristics and needs of individual companies and ships. The SEEMP is intended to be a management tool to assist a company in managing the ongoing environmental performance of its vessels and as such, it is recommended that a company develops procedures for implementing the plan in a manner which limits any onboard administrative burden to the minimum necessary.

3.6 The SEEMP should be developed as a ship-specific plan by the company. The SEEMP seeks to improve a ship's energy efficiency through four steps: *planning, implementation, monitoring, and self-evaluation and improvement*. These components play a critical role in the continuous cycle to improve ship energy management. With each iteration of the cycle, some elements of the SEEMP will necessarily change while others may remain as before.

3.7 At all times safety considerations should be paramount. The trade a ship is engaged in may determine the feasibility of the efficiency measures under consideration. For example, ships that perform services at sea (pipe laying, seismic survey, OSVs, dredgers, etc.) may choose different methods of improving energy efficiency when compared to conventional cargo carriers. The length of voyage may also be an important parameter as may trade specific safety considerations.

4 FRAMEWORK AND STRUCTURE OF THE SEEMP

4.1 Planning

4.1.1 Planning is the most crucial stage of the SEEMP, in that it primarily determines both the current status of ship energy usage and the expected improvement of ship energy efficiency. Therefore, it is encouraged to devote sufficient time to planning so that the most appropriate, effective and implementable plan can be developed.

Ship-specific measures

4.1.2 Recognizing that there are a variety of options to improve efficiency – speed optimization, weather routing and hull maintenance, for example – and that the best package of measures for a ship to improve efficiency differs to a great extent depending upon ship type, cargoes, routes and other factors, the specific measures for the ship to improve energy efficiency should be identified in the first place. These measures should be listed as a package of measures to be implemented, thus providing the overview of the actions to be taken for that ship.

4.1.3 During this process, therefore, it is important to determine and understand the ship's current status of energy usage. The SEEMP then identifies energy-saving measures that have been undertaken, and determines how effective these measures are in terms of improving energy efficiency. The SEEMP also identifies what measures can be adopted to further improve the energy efficiency of the ship. It should be noted, however, that not all measures can be applied to all ships, or even to the same ship under different operating conditions and that some of them are mutually exclusive. Ideally, initial measures could yield energy (and cost) saving results that then can be reinvested into more difficult or expensive efficiency upgrades identified by the SEEMP.

4.1.4 Guidance on Best Practices for Fuel-Efficient Operation of Ships set out in chapter 5, can be used to facilitate this part of the planning phase. Also, in the planning process, particular consideration should be given to minimize any onboard administrative burden.

Company-specific measures

4.1.5 The improvement of energy efficiency of ship operation does not necessarily depend on single ship management only. Rather, it may depend on many stakeholders including ship repair yards, shipowners, operators, charterers, cargo owners, ports and traffic management services. For example, "Just in time" – as explained in 5.5 – requires good early communication among operators, ports and traffic management service. The better coordination among such stakeholders is, the more improvement can be expected. In most cases, such coordination or total management is better made by a company rather than by a ship. In this sense, it is recommended that a company also establish an energy management plan to manage its fleet (should it not have one in place already) and make necessary coordination among stakeholders.

Human resource development

4.1.6 For effective and steady implementation of the adopted measures, raising awareness of and providing necessary training for personnel both on shore and on board are an important element. Such human resource development is encouraged and should be considered as an important component of planning as well as a critical element of implementation.

Goal setting

4.1.7 The last part of planning is goal setting. It should be emphasized that the goal setting is voluntary, that there is no need to announce the goal or the result to the public, and that neither a company nor a ship are subject to external inspection. The purpose of goal setting is to serve as a signal which involved people should be conscious of, to create a good incentive for proper implementation, and then to increase commitment to the improvement of energy efficiency. The goal can take any form, such as the annual fuel consumption or a specific target of Energy Efficiency Operational Indicator (EEOI). Whatever the goal is, the goal should be measurable and easy to understand.

4.2 Implementation

Establishment of implementation system

4.2.1 After a ship and a company identify the measures to be implemented, it is essential to establish a system for implementation of the identified and selected measures by developing the procedures for energy management, by defining tasks and by assigning them to qualified personnel. Thus, the SEEMP should describe how each measure should be implemented and who the responsible person(s) is. The implementation period (start and end dates) of each selected measure should be indicated. The development of such a system can be considered as a part of *planning*, and therefore may be completed at the planning stage.

Implementation and record-keeping

4.2.2 The planned measures should be carried out in accordance with the predetermined implementation system. Record-keeping for the implementation of each measure is beneficial for self-evaluation at a later stage and should be encouraged. If any identified measure cannot be implemented for any reason(s), the reason(s) should be recorded for internal use.

4.3 Monitoring

Monitoring tools

4.3.1 The energy efficiency of a ship should be monitored quantitatively. This should be done by an established method, preferably by an international standard. The EEOI developed by the Organization is one of the internationally established tools to obtain a quantitative indicator of energy efficiency of a ship and/or fleet in operation, and can be used for this purpose. Therefore, EEOI could be considered as the primary monitoring tool, although other quantitative measures also may be appropriate.

4.3.2 If used, it is recommended that the EEOI is calculated in accordance with the Guidelines developed by the Organization (MEPC.1/Circ.684), adjusted, as necessary, to a specific ship and trade.

4.3.3 In addition to the EEOI, if convenient and/or beneficial for a ship or a company, other measurement tools can be utilized. In the case where other monitoring tools are used, the concept of the tool and the method of monitoring may be determined at the planning stage.

Establishment of monitoring system

4.3.4 It should be noted that whatever measurement tools are used, continuous and consistent data collection is the foundation of monitoring. To allow for meaningful and consistent monitoring, the monitoring system, including the procedures for collecting data and the assignment of responsible personnel, should be developed. The development of such a system can be considered as a part of *planning*, and therefore should be completed at the planning stage.

4.3.5 It should be noted that, in order to avoid unnecessary administrative burdens on ships' staff, monitoring should be carried out as far as possible by shore staff, utilizing data obtained from existing required records such as the official and engineering log-books and oil record books, etc. Additional data could be obtained as appropriate.

Search and Rescue

4.3.6 When a ship diverts from its scheduled passage to engage in search and rescue operations, it is recommended that data obtained during such operations is not used in ship energy efficiency monitoring, and that such data may be recorded separately.

4.4 Self-evaluation and improvement

4.4.1 *Self-evaluation and improvement* is the final phase of the management cycle. This phase should produce meaningful feedback for the coming first stage, i.e. planning stage of the next improvement cycle.

4.4.2 The purpose of self-evaluation is to evaluate the effectiveness of the planned measures and of their implementation, to deepen the understanding on the overall characteristics of the ship's operation such as what types of measures can/cannot function effectively, and how and/or why, to comprehend the trend of the efficiency improvement of that ship and to develop the improved SEEMP for the next cycle.

4.4.3 For this process, procedures for self-evaluation of ship energy management should be developed. Furthermore, self-evaluation should be implemented periodically by using data collected through monitoring. In addition, it is recommended to invest time in identifying the cause-and-effect of the performance during the evaluated period for improving the next stage of the management plan.

5 GUIDANCE ON BEST PRACTICES FOR FUEL-EFFICIENT OPERATION OF SHIPS

5.1 The search for efficiency across the entire transport chain takes responsibility beyond what can be delivered by the owner/operator alone. A list of all the possible stakeholders in the efficiency of a single voyage is long; obvious parties are designers, shipyards and engine manufacturers for the characteristics of the ship, and charterers, ports and vessel traffic management services, etc., for the specific voyage. All involved parties should consider the inclusion of efficiency measures in their operations both individually and collectively.

Fuel-Efficient Operations

Improved voyage planning

5.2 The optimum route and improved efficiency can be achieved through the careful planning and execution of voyages. Thorough voyage planning needs time, but a number of different software tools are available for planning purposes.

5.3 IMO resolution A.893(21) (25 November 1999) on "Guidelines for voyage planning" provides essential guidance for the ship's crew and voyage planners.

Weather routeing

5.4 Weather routeing has a high potential for efficiency savings on specific routes. It is commercially available for all types of ship and for many trade areas. Significant savings can be achieved, but conversely weather routeing may also increase fuel consumption for a given voyage.

Just in time

5.5 Good early communication with the next port should be an aim in order to give maximum notice of berth availability and facilitate the use of optimum speed where port operational procedures support this approach.

5.6 Optimized port operation could involve a change in procedures involving different handling arrangements in ports. Port authorities should be encouraged to maximize efficiency and minimize delay.

Speed optimization

5.7 Speed optimization can produce significant savings. However, optimum speed means the speed at which the fuel used per tonne mile is at a minimum level for that voyage. It does not mean minimum speed; in fact, sailing at less than optimum speed will consume more fuel rather than less. Reference should be made to the engine manufacturer's power/consumption curve and the ship's propeller curve. Possible adverse consequences of slow speed operation may include increased vibration and problems with soot deposits in combustion chambers and exhaust systems. These possible consequences should be taken into account.

5.8 As part of the speed optimization process, due account may need to be taken of the need to coordinate arrival times with the availability of loading/discharge berths, etc. The number of ships engaged in a particular trade route may need to be taken into account when considering speed optimization.

5.9 A gradual increase in speed when leaving a port or estuary whilst keeping the engine load within certain limits may help to reduce fuel consumption.

5.10 It is recognized that under many charter parties the speed of the vessel is determined by the charterer and not the operator. Efforts should be made when agreeing charter party terms to encourage the ship to operate at optimum speed in order to maximize energy efficiency.

Optimized shaft power

5.11 Operation at constant shaft RPM can be more efficient than continuously adjusting speed through engine power (see paragraph 5.7). The use of automated engine management systems to control speed rather than relying on human intervention may be beneficial.

Optimized ship handling

Optimum trim

5.12 Most ships are designed to carry a designated amount of cargo at a certain speed for a certain fuel consumption. This implies the specification of set trim conditions. Loaded or unloaded, trim has a significant influence on the resistance of the ship through the water and optimizing trim can deliver significant fuel savings. For any given draft there is a trim condition that gives minimum resistance. In some ships, it is possible to assess optimum trim conditions for fuel efficiency continuously throughout the voyage. Design or safety factors may preclude full use of trim optimization.

Optimum ballast

5.13 Ballast should be adjusted taking into consideration the requirements to meet optimum trim and steering conditions and optimum ballast conditions achieved through good cargo planning.

5.14 When determining the optimum ballast conditions, the limits, conditions and ballast management arrangements set out in the ship's Ballast Water Management Plan are to be observed for that ship.

5.15 Ballast conditions have a significant impact on steering conditions and autopilot settings and it needs to be noted that less ballast water does not necessarily mean the highest efficiency.

Optimum propeller and propeller inflow considerations

5.16 Selection of the propeller is normally determined at the design and construction stage of a ship's life but new developments in propeller design have made it possible for retrofitting of later designs to deliver greater fuel economy. Whilst it is certainly for consideration, the propeller is but one part of the propulsion train and a change of propeller in isolation may have no effect on efficiency and may even increase fuel consumption.

5.17 Improvements to the water inflow to the propeller using arrangements such as fins and/or nozzles could increase propulsive efficiency power and hence reduce fuel consumption.

Optimum use of rudder and heading control systems (autopilots)

5.18 There have been large improvements in automated heading and steering control systems technology. Whilst originally developed to make the bridge team more effective, modern autopilots can achieve much more. An integrated Navigation and Command System can achieve significant fuel savings by simply reducing the distance sailed "off track". The principle is simple; better course control through less frequent and smaller corrections will minimize losses due to rudder resistance. Retrofitting of a more efficient autopilot to existing ships could be considered.

5.19 During approaches to ports and pilot stations the autopilot cannot always be used efficiently as the rudder has to respond quickly to given commands. Furthermore at certain stage of the voyage it may have to be deactivated or very carefully adjusted, i.e. heavy weather and approaches to ports.

5.20 Consideration may be given to the retrofitting of improved rudder blade design (e.g. "twist-flow" rudder).

Hull maintenance

5.21 Docking intervals should be integrated with ship operator's ongoing assessment of ship performance. Hull resistance can be optimized by new technology-coating systems, possibly in combination with cleaning intervals. Regular in-water inspection of the condition of the hull is recommended.

5.22 Propeller cleaning and polishing or even appropriate coating may significantly increase fuel efficiency. The need for ships to maintain efficiency through in-water hull cleaning should be recognized and facilitated by port States.

5.23 Consideration may be given to the possibility of timely full removal and replacement of underwater paint systems to avoid the increased hull roughness caused by repeated spot blasting and repairs over multiple dockings.

5.24 Generally, the smoother the hull, the better the fuel efficiency.

Propulsion system

5.25 Marine diesel engines have a very high thermal efficiency (~50%). This excellent performance is only exceeded by fuel cell technology with an average thermal efficiency of 60 per cent. This is due to the systematic minimization of heat and mechanical loss. In particular, the new breed of electronic controlled engines can provide efficiency gains. However, specific training for relevant staff may need to be considered to maximize the benefits.

Propulsion system maintenance

5.26 Maintenance in accordance with manufacturers' instructions in the company's planned maintenance schedule will also maintain efficiency. The use of engine condition monitoring can be a useful tool to maintain high efficiency.

5.27 Additional means to improve engine efficiency might include:

Use of fuel additives;
Adjustment of cylinder lubrication oil consumption;
Valve improvements;
Torque analysis; and
Automated engine monitoring systems.

Waste heat recovery

5.28 Waste heat recovery is now a commercially available technology for some ships. Waste heat recovery systems use thermal heat losses from the exhaust gas for either electricity generation or additional propulsion with a shaft motor.

5.29 It may not be possible to retrofit such systems into existing ships. However, they may be a beneficial option for new ships. Shipbuilders should be encouraged to incorporate new technology into their designs.

Improved fleet management

5.30 Better utilization of fleet capacity can often be achieved by improvements in fleet planning. For example, it may be possible to avoid or reduce long ballast voyages through improved fleet planning. There is opportunity here for charterers to promote efficiency. This can be closely related to the concept of "just in time" arrivals.

5.31 Efficiency, reliability and maintenance-oriented data sharing within a company can be used to promote best practice among ships within a company and should be actively encouraged.

Improved cargo handling

5.32 Cargo handling is in most cases under the control of the port and optimum solutions matched to ship and port requirements should be explored.

Energy management

5.33 A review of electrical services on board can reveal the potential for unexpected efficiency gains. However care should be taken to avoid the creation of new safety hazards when turning off electrical services (e.g. lighting). Thermal insulation is an obvious means of saving energy. Also see comment below on shore power.

5.34 Optimization of reefer container stowage locations may be beneficial in reducing the effect of heat transfer from compressor units. This might be combined as appropriate with cargo tank heating, ventilation, etc. The use of water-cooled reefer plant with lower energy consumption might also be considered.

Fuel Type

5.35 Use of emerging alternative fuels may be considered as a CO₂ reduction method but availability will often determine the applicability.

Other measures

5.36 Development of computer software for the calculation of fuel consumption, for the establishment of an emissions "footprint", to optimize operations, and the establishment of goals for improvement and tracking of progress may be considered.

5.37 Renewable energy sources, such as wind, solar (or photovoltaic) cell technology, have improved enormously in the recent years and should be considered for onboard application.

5.38 In some ports shore power may be available for some ships but this is generally aimed at improving air quality in the port area. If the shore-based power source is carbon efficient, there may be a net efficiency benefit. Ships may consider using onshore power if available.

5.39 Even wind assisted propulsion may be worthy of consideration.

5.40 Efforts could be made to source fuel of improved quality in order to minimize the amount of fuel required to provide a given power output.

Compatibility of measures

5.41 This document indicates a wide variety of possibilities for energy efficiency improvements for the existing fleet. While there are many options available, they are not necessarily cumulative, are often area and trade dependent and likely to require the agreement and support of a number of different stakeholders if they are to be utilized most effectively.

Age and operational service life of a ship

5.42 All measures identified in this document are potentially cost-effective as a result of high oil prices. Measures previously considered unaffordable or commercially unattractive may now be feasible and worthy of fresh consideration. Clearly, this equation is heavily influenced by the remaining service life of a ship and the cost of fuel.

Trade and sailing area

5.43 The feasibility of many of the measures described in this guidance will be dependent on the trade and sailing area of the vessel. Sometimes ships will change their trade areas as a result of a change in chartering requirements but this cannot be taken as a general assumption. For example, wind-enhanced power sources might not be feasible for short sea shipping as these ships generally sail in areas with high traffic densities or in restricted waterways. Another aspect is that the world's oceans and seas each have characteristic conditions and so ships designed for specific routes and trades may not obtain the same benefit by adopting the same measures or combination of measures as other ships. It is also likely that some measures will have a greater or lesser effect in different sailing areas.

5.44 The trade a ship is engaged in may determine the feasibility of the efficiency measures under consideration. For example, ships that perform services at sea (pipe laying, seismic survey, OSVs, dredgers, etc.) may choose different methods of improving energy efficiency when compared to conventional cargo carriers. The length of voyage may also be an important parameter as may trade specific safety considerations. The pathway to the most efficient combination of measures will be unique to each vessel within each shipping company.

APPENDIX

A SAMPLE FORM OF A SHIP EFFICIENCY ENERGY MANAGEMENT PLAN

Name of Vessel:		GT:	
Vessel Type:		Capacity:	

Date of Development:		Developed by:	
Implementation Period:	From: Until:	Implemented by:	
Planned Date of Next Evaluation:			

1 MEASURES

Energy Efficiency Measures	Implementation (including the starting date)	Responsible Personnel
Weather Routeing	<Example> Contracted with [Service providers] to use their weather routeing system and start using on-trial basis as of 1 July 2012.	<Example> The master is responsible for selecting the optimum route based on the information provided by [Service providers].
Speed Optimization	While the design speed (85% MCR) is 19.0 kt, the maximum speed is set at 17.0 kt as of 1 July 2012.	The master is responsible for keeping the ship's speed. The log-book entry should be checked every day.

2 MONITORING

Description of monitoring tools

3 GOAL

Measurable goals

4 EVALUATION

Procedures of evaluation

(Annexes 10 to 34 to the report are contained in document MEPC 63/23/Add.1)

RESOLUTION MEPC.214(63)
Adopted on 2 March 2012

**2012 GUIDELINES ON SURVEY AND CERTIFICATION OF THE
ENERGY EFFICIENCY DESIGN INDEX (EEDI)**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution,

RECALLING ALSO that, at its sixty-second session, the Committee adopted, by resolution MEPC.203(62), amendments to the Annex of the Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (inclusion of regulations on energy efficiency for ships in MARPOL Annex VI),

NOTING the amendments to MARPOL Annex VI adopted at its sixty-second session by inclusion of a new chapter 4 for regulations on energy efficiency for ships, are expected to enter into force on 1 January 2013 upon their acceptance on 1 July 2012,

NOTING ALSO that regulation 5 (Surveys) of MARPOL Annex VI, as amended, requires ships to which chapter 4 applies shall also be subject to survey and certification taking into account guidelines developed by the Organization,

RECOGNIZING that the amendments to MARPOL Annex VI requires the adoption of relevant guidelines for smooth and uniform implementation of the regulations and to provide sufficient lead time for industry to prepare,

HAVING CONSIDERED, at its sixty-third session, the draft 2012 Guidelines on survey and certification of the Energy Efficiency Design Index (EEDI),

1. ADOPTS the 2012 Guidelines on survey and certification of the Energy Efficiency Design Index (EEDI), as set out in the annex to the present resolution;
2. INVITES Administrations to take the annexed Guidelines into account when developing and enacting national laws which give force to and implement provisions set forth in regulation 5 of MARPOL Annex VI, as amended;
3. REQUESTS the Parties to MARPOL Annex VI and other Member Governments to bring the annexed Guidelines on survey and certification of the Energy Efficiency Design Index (EEDI), to the attention of masters, seafarers, shipowners, ship operators and any other interested groups;
4. AGREES to keep these Guidelines under review in light of the experience gained; and
5. REVOKES Interim Guidelines circulated by MEPC.1/Circ.682, as from this date.

ANNEX

**2012 GUIDELINES ON SURVEY AND CERTIFICATION OF THE
ENERGY EFFICIENCY DESIGN INDEX (EEDI)**

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4.3	Final verification of the attained EEDI at sea trial
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Appendix 1	Sample of EEDI Technical File
Appendix 2	Guidelines for validation of electric power tables for EEDI (EPT-EEDI)
Appendix 3	Electric power table form for EEDI (EPT-EEDI Form) and statement of validation

1 GENERAL

The purpose of these Guidelines is to assist verifiers of Energy Efficiency Design Index (EEDI) of ships in conducting the survey and certification of the EEDI in accordance with regulations 5, 6, 7, 8 and 9 of MARPOL Annex VI, and assist shipowners, shipbuilders and manufacturers being related to the energy efficiency of a ship and other interested parties in understanding the procedures of the survey and certification of the EEDI.

2 DEFINITIONS¹

2.1 *Verifier* means an Administration or organization duly authorized by it, which conducts the survey and certification of the EEDI in accordance with regulations 5, 6, 7, 8 and 9 of MARPOL Annex VI and these Guidelines.

2.2 *Ship of the same type* means a ship of which hull form (expressed in the lines such as sheer plan and body plan) excluding additional hull features such as fins and of which principal particulars are identical to that of the base ship.

2.3 *Tank test* means model towing tests, model self-propulsion tests and model propeller open water tests. Numerical calculations may be accepted as equivalent to model propeller open water tests or used to complement the tank tests conducted (e.g. to evaluate the effect of additional hull features such as fins, etc., on ship's performance), with approval of the verifier.

3 APPLICATION

These Guidelines should be applied to new ships for which an application for an initial survey or an additional survey specified in regulation 5 of MARPOL Annex VI has been submitted to a verifier.

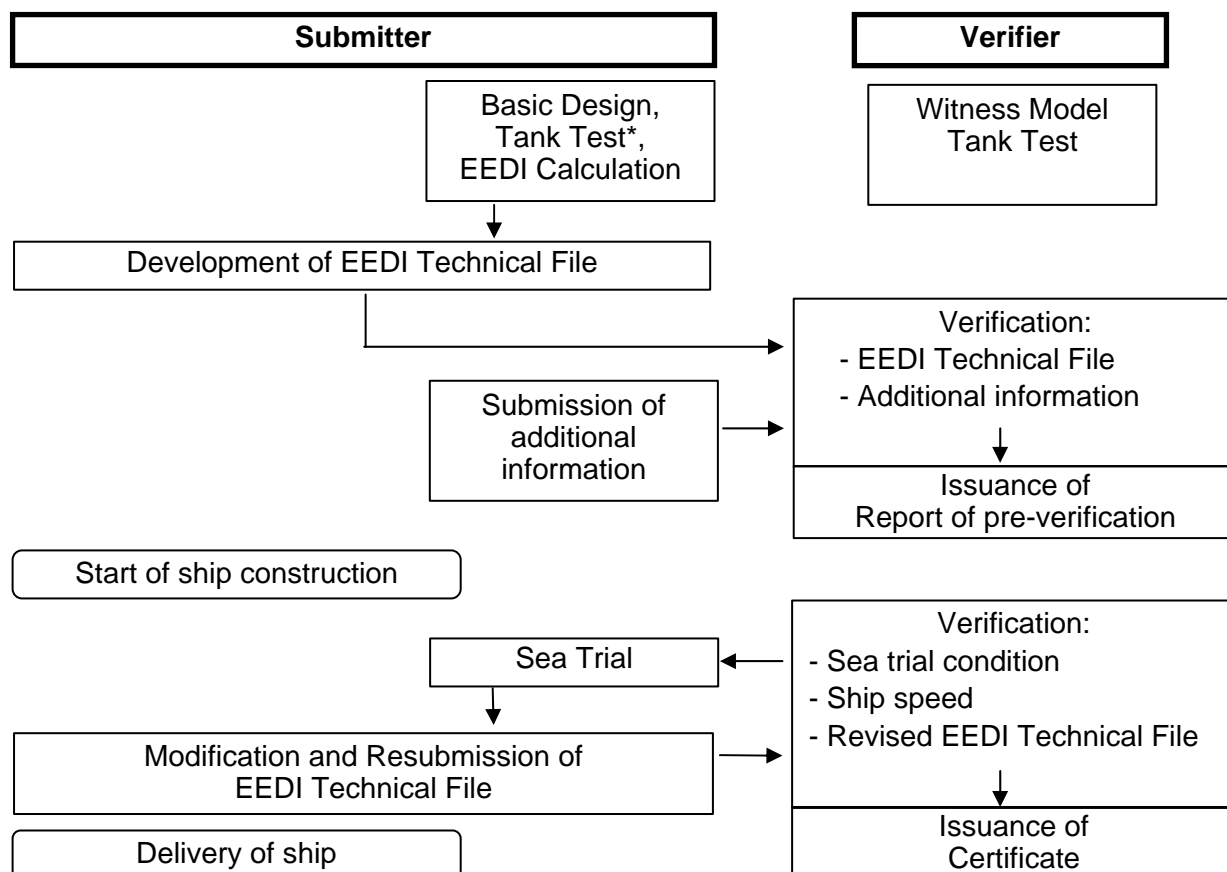
4 PROCEDURES FOR SURVEY AND CERTIFICATION

4.1 General

4.1.1 Attained EEDI should be calculated in accordance with regulation 20 of MARPOL Annex VI and the "Guidelines on the method of calculation of the attained EEDI for new ships" ("EEDI Calculation Guidelines", hereafter). Survey and certification of the EEDI should be conducted on two stages: preliminary verification at the design stage, and final verification at the sea trial. The basic flow of the survey and certification process is presented in figure 1.

4.1.2 The information used in the verification process may contain confidential information of submitters, which requires Intellectual Property Rights (IPR) protection. In the case where the submitter want a non-disclosure agreement with the verifier, the additional information should be provided to the verifier upon mutually agreed terms and conditions.

¹ Other terms used in these Guidelines have the same meaning as those defined in the EEDI Calculation Guidelines.



* To be conducted by a test organization or a submitter itself.

Figure 1: Basic Flow of Survey and Certification Process

4.2 Preliminary verification of the attained EEDI at the design stage

4.2.1 For the preliminary verification at the design stage, an application for an initial survey and an EEDI Technical File containing the necessary information for the verification and other relevant background documents should be submitted to a verifier.

4.2.2 EEDI Technical File should be written at least in English. The EEDI Technical File should include at least but not limited to:

- .1 deadweight (DWT) or gross tonnage (GT) for passenger and ro-ro passenger ships, the maximum continuous rating (MCR) of the main and auxiliary engines, the ship speed (V_{ref}), as specified in paragraph 2.2 of the EEDI Calculation Guidelines, type of fuel, the specific fuel consumption (SFC) of the main engine at the 75 per cent of MCR power, the SFC of the auxiliary engines at the 50 per cent MCR power, and the electric power table[†] for certain ship types, as necessary, as defined in the EEDI Calculation Guidelines;
- .2 power curve(s) (kW – knot) estimated at design stage under the condition as specified in paragraph 2.2 of the EEDI Calculation Guidelines, and in the event that the sea trial is carried out in a condition other than the above condition, then also a power curve estimated under the sea trial condition;

-
- .3 principal particulars, ship type and the relevant information to classify the ship into such a ship type, classification notations and the overview of propulsion system and electricity supply system on board;
 - .4 estimation process and methodology of the power curves at design stage;
 - .5 description of energy saving equipment;
 - .6 calculated value of the attained EEDI including the calculation summary, which should contain, at a minimum, each value of the calculation parameters and the calculation process used to determine the attained EEDI; and
 - .7 calculated values of the attained $EEDI_{weather}$ and f_w value (not equal to 1.0), if those values are calculated, based on the EEDI Calculation Guidelines.
-

[†] Electric power table should be validated separately, taking into account guidelines set out in appendix 2 to these Guidelines.

A sample of an EEDI Technical File is provided in the appendix 1 to these Guidelines.

4.2.3 If dual fuel engines are installed on the ship, the C_F factor and the Specific Fuel Consumption of gas fuel should be used if gas fuel will be used as the primary fuel on the ship. In order to verify this, the following information should be provided:

- .1 The use of boil-off gas or capacities of the gas fuel storage tanks, and the capacities of fuel oil storage tanks.
- .2 Arrangements of bunkering facilities for gas fuel in the intended operational area of the ship.

4.2.4 The *SFC* of the main and auxiliary engines should be quoted from the approved NO_x Technical File and should be corrected to the value corresponding to the ISO standard reference conditions using the standard lower calorific value of the fuel oil (42,700kJ/kg), referring to ISO 15550:2002 and ISO 3046-1:2002. For the confirmation of the *SFC*, a copy of the approved NO_x Technical File and documented summary of the correction calculations should be submitted to the verifier. In case NO_x Technical File has not been approved at the time of the application for initial survey, the test reports provided by manufacturers should be used. In this case, at the time of the sea trial verification, a copy of the approved NO_x Technical File and documented summary of the correction calculations should be submitted to the verifier.

Note: *SFC* in the NO_x Technical File are the values of a parent engine, and the use of such value of *SFC* for the EEDI calculation for member engines may have the following technical issues for further consideration:

- .1 The definition of "member engines" given in NO_x Technical File is broad and specification of engines belonging to the same group/family may vary; and
- .2 The rate of NO_x emission of the parent engine is the highest in the group/family – i.e. CO_2 emission, which is in the trade-off relationship with NO_x emission, can be lower than the other engines in the group/family.

4.2.5 For ships to which regulation 21 of MARPOL Annex VI applies, the power curves used for the preliminary verification at the design stage should be based on reliable results of tank test. A tank test for an individual ship may be omitted based on technical justifications

such as availability of the results of tank tests for ships of the same type. In addition, omission of tank tests is acceptable for a ship for which sea trials will be carried under the condition as specified in paragraph 2.2 of the EEDI Calculation Guidelines, upon agreement of the shipowner and shipbuilder and with approval of the verifier. For ensuring the quality of tank tests, ITTC quality system should be taken into account. Model tank test should be witnessed by the verifier.

Note: It would be desirable in the future that an organization conducting a tank test be authorized.

4.2.6 The verifier may request the submitter for additional information on top of those contained in Technical File, as necessary, to examine the calculation process of the attained EEDI. The estimation of the ship speed at the design stage much depends on each shipbuilder's experiences, and it may not be practicable for any person/organization other than the shipbuilder to fully examine the technical aspects of experience-based parameters such as the roughness coefficient and wake scaling coefficient. Therefore, the preliminary verification should focus on the calculation process of the attained EEDI to ensure that it is technically sound and reasonable and follows regulation 20 of MARPOL Annex VI and the EEDI Calculation Guidelines.

Note 1: A possible way forward for more robust verification is to establish a standard methodology of deriving the ship speed from the outcomes of tank test, by setting standard values for experience-based correction factors such as roughness coefficient and wake scaling coefficient. In this way, ship-by-ship performance comparison could be made more objectively by excluding the possibility of arbitrary setting of experience-based parameters. If such standardization is sought, this would have an implication on how the ship speed adjustment based on sea trial results should be conducted in accordance with paragraph 4.3.8 of these Guidelines.

Note 2: A joint industry standard to support the method and role of the verifier will be developed.

4.2.7 Additional information that the verifier may request the submitter to provide directly to it includes but not limited to:

- .1 descriptions of a tank test facility; this should include the name of the facility, the particulars of tanks and towing equipment, and the records of calibration of each monitoring equipment;
- .2 lines of a model ship and an actual ship for the verification of the appropriateness of the tank test; the lines (sheer plan, body plan and half-breadth plan) should be detailed enough to demonstrate the similarity between the model ship and the actual ship;
- .3 lightweight of the ship and displacement table for the verification of the deadweight;
- .4 detailed report on the method and results of the tank test; this should include at least the tank test results at sea trial condition and under the condition as specified in paragraph 2.2 of the EEDI Calculation Guidelines;
- .5 detailed calculation process of the ship speed, which should include the estimation basis of experience-based parameters such as roughness coefficient, wake scaling coefficient; and
- .6 reasons for exempting a tank test, if applicable; this should include lines and tank test results of the ships of same type, and the comparison of the

principal particulars of such ships and the ship in question. Appropriate technical justification should be provided explaining why the tank test is unnecessary.

4.2.8 The verifier should issue the report on the "Preliminary Verification of EEDI" after it has verified the attained EEDI at the design stage in accordance with paragraphs 4.1 and 4.2 of these Guidelines.

4.3 Final verification of the attained EEDI at sea trial

4.3.1 Sea trial conditions should be set as conditions specified in paragraph 2.2 of the EEDI Calculation Guidelines, if possible.

4.3.2 Prior to the sea trial, the following documents should be submitted to the verifier: a description of the test procedure to be used for the speed trial, the final displacement table and the measured lightweight, or a copy of the survey report of deadweight, as well as a copy of NO_x Technical File as necessary. The test procedure should include, at a minimum, descriptions of all necessary items to be measured and corresponding measurement methods to be used for developing power curves under the sea trial condition.

4.3.3 The verifier should attend the sea trial and confirm:

- .1 propulsion and power supply system, particulars of the engines, and other relevant items described in the EEDI Technical File;
- .2 draught and trim;
- .3 sea conditions;
- .4 ship speed; and
- .5 shaft power and RPM of the main engine.

4.3.4 Draught and trim should be confirmed by the draught measurements taken prior to the sea trial. The draught and trim should be as close as practical to those at the assumed conditions used for estimating the power curves.

4.3.5 Sea conditions should be measured in accordance with ISO 15016:2002 or the equivalent.

4.3.6 Ship speed should be measured in accordance with ISO 15016:2002 or the equivalent and at more than two points of which range includes the power of the main engine as specified in paragraph 2.5 of the EEDI Calculation Guidelines.

4.3.7 The main engine output should be measured by shaft power meter or a method which the engine manufacturer recommends and the verifier approves. Other methods may be acceptable upon agreement of the shipowner and shipbuilder and with approval of the verifier.

4.3.8 The submitter should develop power curves based on the measured ship speed and the measured output of the main engine at sea trial. For the development of the power curves, the submitter should calibrate the measured ship speed, if necessary, by taking into account the effects of wind, tide, waves, shallow water and displacement in accordance with

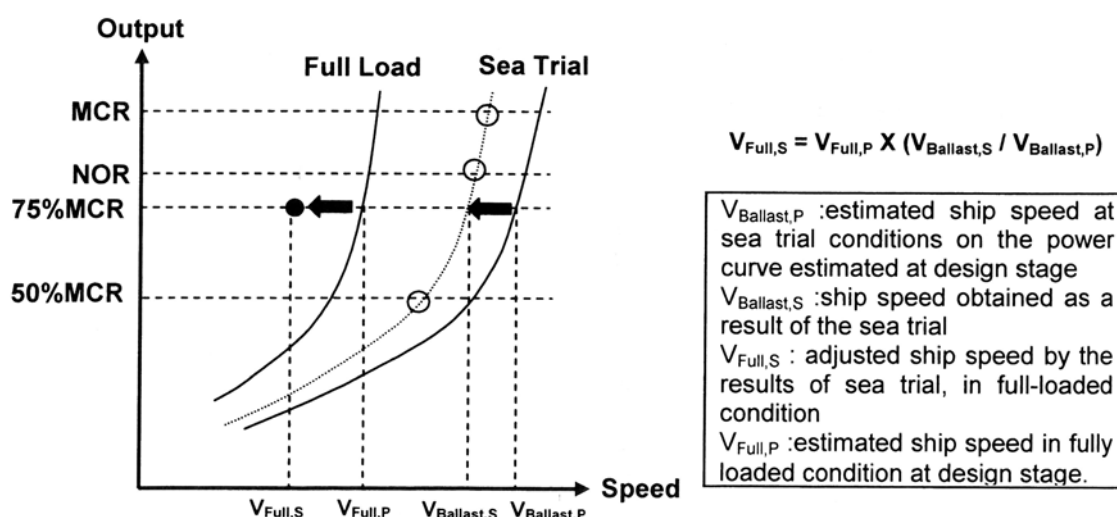
ISO 15016:2002² or the equivalent which may be acceptable provided that the concept of the method is transparent for the verifier and publicly available/accessible. Upon agreement with the shipowner, the submitter should submit a report on the speed trials including details of the power curve development to the verifier for verification.

4.3.9 The submitter should compare the power curves obtained as a result of the sea trial and the estimated power curves at the design stage. In case differences are observed, the attained EEDI should be recalculated, as necessary, in accordance with the following:

- .1 for ships for which sea trial is conducted under the condition as specified in paragraph 2.2 of the EEDI Calculation Guidelines: the attained EEDI should be recalculated using the measured ship speed at sea trial at the power of the main engine as specified in paragraph 2.5 of the EEDI Calculation Guidelines; and
- .2 for ships for which sea trial cannot be conducted under the condition as specified in paragraph 2.2 of the EEDI Calculation Guidelines: if the measured ship speed at the power of the main engine as specified in paragraph 2.5 of the EEDI Calculation Guidelines at the sea trial conditions is different from the expected ship speed on the power curve at the corresponding condition, the shipbuilder should recalculate the attained EEDI by adjusting ship speed under the condition as specified in paragraph 2.2 of the EEDI Calculation Guidelines by an appropriate correction method that is agreed by the verifier.

An example of possible methods of the speed adjustment is given in figure 2:

Note: Further consideration would be necessary for speed adjustment methodology in paragraph 4.3.9.2 of these Guidelines. One of the concerns relates to a possible situation where the power curve for sea trial condition is estimated in an excessively conservative manner (i.e. power curve is shifted in a leftward direction) with the intention to get an upward adjustment of the ship speed by making the measured ship speed at sea trial easily exceed the lower-estimated speed for sea trial condition at design stage.



² An ITTC standard for this purpose will be developed.

4.3.10 In cases where the finally determined deadweight/gross tonnage differs from the designed deadweight/gross tonnage used in the EEDI calculation during the preliminary verification, the submitter should recalculate the attained EEDI using the finally determined deadweight/gross tonnage. The finally determined gross tonnage should be confirmed in the Tonnage Certificate of the ship.

4.3.11 In case where the attained EEDI is calculated at the preliminary verification by using *SFC* based on the manufacturer's test report due to the non-availability at that time of the approved NO_x Technical File, the EEDI should be recalculated by using *SFC* in the approved NO_x Technical File.

4.3.12 The EEDI Technical File should be revised, as necessary, by taking into account the results of sea trial. Such revision should include, as applicable, the adjusted power curve based on the results of sea trial (namely, modified ship speed under the condition as specified in paragraph 2.2 of the EEDI Calculation Guidelines), the finally determined deadweight/gross tonnage and *SFC* described in the approved NO_x Technical File, and the recalculated attained EEDI based on these modifications.

4.3.13 The EEDI Technical File, if revised, should be submitted to the verifier for the confirmation that the (revised) attained EEDI is calculated in accordance with regulation 20 of MARPOL Annex VI and the EEDI Calculation Guidelines.

4.4 Verification of the attained EEDI in case of major conversion

4.4.1 In cases where a major conversion is made to a ship, the shipowner should submit to a verifier an application for an Additional Survey with the EEDI Technical File duly revised based on the conversion made and other relevant background documents.

4.4.2 The background documents should include at least but are not limited to:

- .1 documents explaining details of the conversion;
- .2 EEDI parameters changed after the conversion and the technical justifications for each respective parameter;
- .3 reasons for other changes made in the EEDI Technical File, if any; and
- .4 calculated value of the attained EEDI with the calculation summary, which should contain, at a minimum, each value of the calculation parameters and the calculation process used to determine the attained EEDI after the conversion.

4.4.3 The verifier should review the revised EEDI Technical File and other documents submitted and verify the calculation process of the attained EEDI to ensure that it is technically sound and reasonable and follows regulation 20 of MARPOL Annex VI and the EEDI Calculation Guidelines.

4.4.4 For verification of the attained EEDI after a conversion, speed trials of the ship are required, as necessary.

APPENDIX 1

SAMPLE OF EEDI TECHNICAL FILE

1 Data

1.1 General information

Shipbuilder	JAPAN Shipbuilding Company
Hull No.	12345
IMO No.	94111XX
Kind of ship	Bulk carrier

1.2 Principal particulars

Length overall	250.0 m
Length between perpendiculars	240.0 m
Breadth, moulded	40.0 m
Depth, moulded	20.0 m
Summer load line draught, moulded	14.0 m
Deadweight at summer load line draught	150,000 tons

1.3 Main engine

Manufacturer	JAPAN Heavy Industries Ltd.
Type	6J70A
Maximum continuous rating (MCR)	15,000 kW x 80 rpm
SFC at 75% MCR	165.0 g/kWh
Number of set	1
Fuel type	Diesel Oil

1.4 Auxiliary engine

Manufacturer	JAPAN Diesel Ltd.
Type	5J-200
Maximum continuous rating (MCR)	600 kW x 900 rpm
SFC at 50% MCR	220.0 g/kWh
Number of set	3
Fuel type	Diesel Oil

1.5 Ship speed

Ship speed in deep water at summer load line draught at 75% of MCR	14.25 knots
--------------------------------------------------------------------	-------------

2 Power Curves

The power curves estimated at the design stage and modified after the speed trials are shown in figure 2.1.

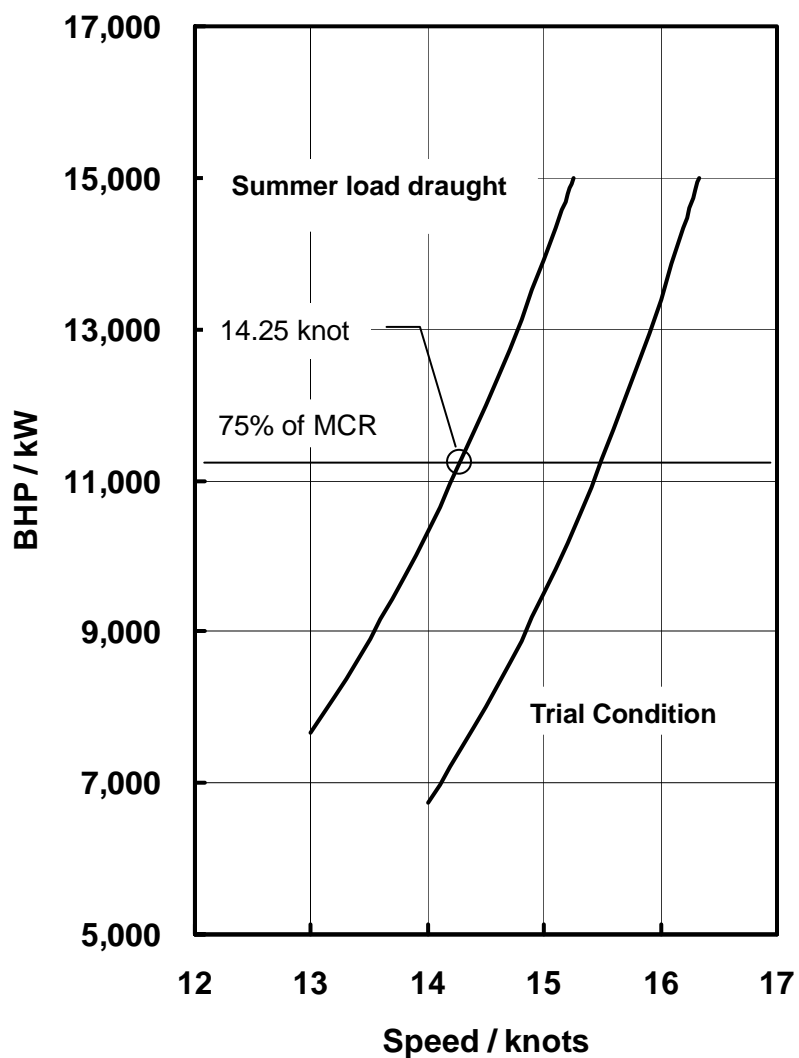


Figure 2.1: Power curves

3 Overview of Propulsion System and Electric Power Supply System

3.1 Propulsion system

3.1.1 Main engine Refer to subparagraph 1.3.

3.1.2 Propeller

Type	Fixed pitch propeller
Diameter	7.0 m
Number of blades	4
Number of set	1

3.2 Electric power supply system

3.2.1 Auxiliary engines Refer to subparagraph 1.4.

3.2.2 Main generators

Manufacturer	JAPAN Electric
Rated output	560 kW (700 kVA) x 900 rpm
Voltage	AC 450 V
Number of set	3

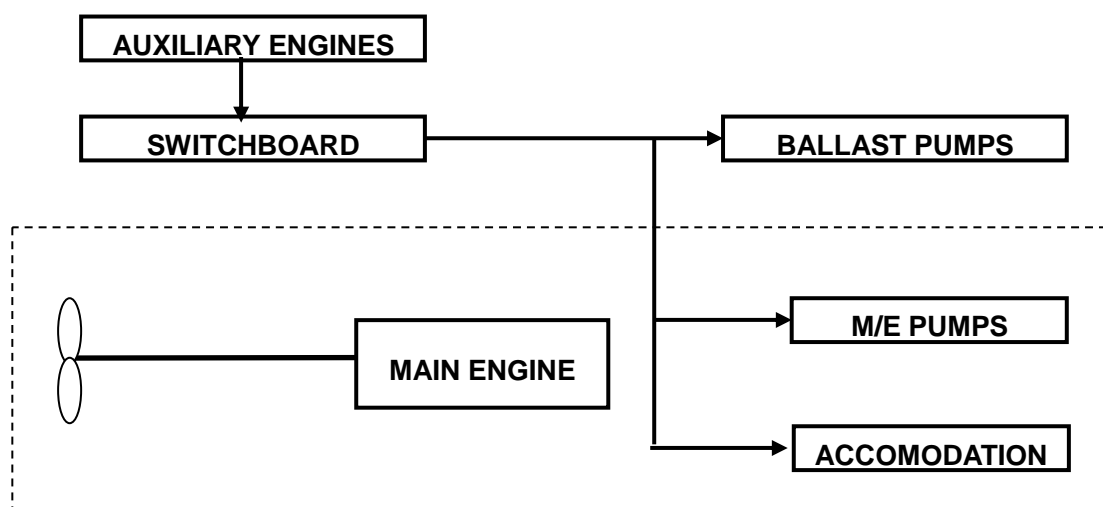


Figure 3.1: Schematic figure of propulsion and electric power supply system

4 Estimation Process of Power Curves at Design Stage

Power curves are estimated based on model test results. The flow of the estimation process is shown below.

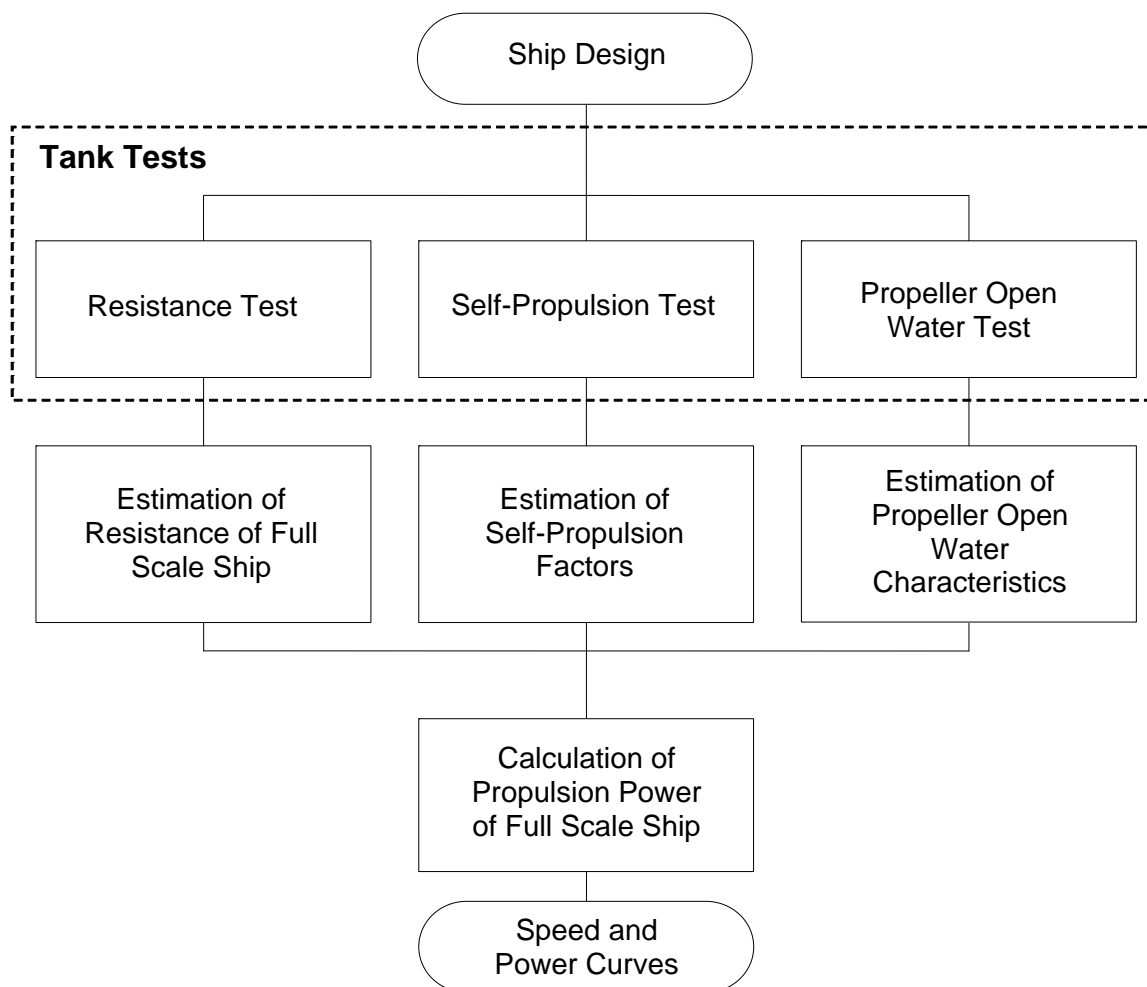


Figure 4.1: Flow-chart of process for estimating power curves

5 Description of Energy Saving Equipment

5.1 Energy saving equipment of which effects are expressed as $P_{AEff(i)}$ and/or $P_{eff(i)}$ in the EEDI calculation formula

N/A

5.2 Other energy saving equipment

(Example)

5.2.1 Rudder fins

5.2.2 Propeller boss cap fins

.....

(Specifications, schematic figures and/or photos, etc., for each piece of equipment or device should be indicated. Alternatively, attachment of the commercial catalogue may be acceptable.)

6 Calculated Value of attained EEDI

6.1 Basic data

Type of Ship	Capacity DWT	Speed V_{ref} (knots)
Bulk Carrier	150,000	14.25

6.2 Main engine

MCR_{ME} (kW)	Shaft Gen.	P_{ME} (kW)	Type of Fuel	C_{FME}	SFC_{ME} (g/kWh)
15,000	N/A	11,250	Diesel Oil	3.206	165.0

6.3 Auxiliary engines

P_{AE} (kW)	Type of Fuel	C_{FAE}	SFC_{AE} (g/kWh)
625	Diesel Oil	3.206	220.0

6.4 Ice class

N/A

6.5 Innovative electrical energy efficient technology

N/A

6.6 Innovative mechanical energy efficient technology

N/A

6.7 Cubic capacity correction factor

N/A

6.8 Calculated value of attained EEDI

$$\begin{aligned}
 EEDI &= \frac{\left(\prod_{j=1}^M f_j \right) \left(\sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)} \right) + (P_{AE} \cdot C_{FAE} \cdot SFC_{AE})}{f_i \cdot f_c \cdot Capacity \cdot f_w \cdot V_{ref}} \\
 &+ \frac{\left\{ \left(\prod_{j=1}^M f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} - \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{AEff(i)} \right) C_{FAE} \cdot SFC_{AE} \right\} - \left(\sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME} \right)}{f_i \cdot f_c \cdot Capacity \cdot f_w \cdot V_{ref}} \\
 &= \frac{1 \times (11250 \times 3.206 \times 165.0) + (625 \times 3.206 \times 220.0) + 0 - 0}{1 \cdot 1 \cdot 150000 \cdot 1 \cdot 14.25} \\
 &= 2.99 \quad (\text{g} - \text{CO}_2/\text{ton} \cdot \text{mile})
 \end{aligned}$$

attained EEDI: 2.99 g-CO₂/ton mile

7 Calculated value of attained $EEDI_{weather}$

7.1 Representative sea conditions

	Mean wind speed	Mean wind direction	Significant wave height	Mean wave period	Mean wave direction
BF6	12.6 (m/s)	0 (deg.)*	3.0 (m)	6.7 (s)	0 (deg.)*

* Heading direction of wind/wave in relation to the ship's heading, i.e. 0 (deg.) means the ship is heading directly into the wind.

7.2 Calculated weather factor, f_w

f_w	0.900
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7.3 Calculated value of attained $EEDI_{weather}$

attained $EEDI_{weather}$: 3.32 g-CO₂/ton mile

APPENDIX 2

GUIDELINES FOR VALIDATION OF ELECTRIC POWER TABLES FOR EEDI (EPT-EEDI)

1 INTRODUCTION

The purpose of these Guidelines is to assist Recognized Organizations in the validation of ship's Electric Power Tables (EPT) for calculation of Energy Efficiency Design Index (EEDI). As such, these Guidelines support the implementation of "GUIDELINES ON THE METHOD OF CALCULATION OF THE ATTAINED ENERGY EFFICIENCY DESIGN INDEX FOR NEW SHIPS" ("EEDI Calculation Guidelines", hereafter) and "GUIDELINES ON SURVEY AND CERTIFICATION OF THE ENERGY EFFICIENCY DESIGN INDEX". This document will also assist shipowners, shipbuilders, ship designers, and manufacturers in relation to aspects of developing more energy efficient ships and also in understanding the procedures for the EPT-EEDI validation.

2 OBJECTIVES

These Guidelines provide a framework for the uniform application of the EPT-EEDI validation process for those ships that come under paragraph 2.5.6.3 of the EEDI Calculation Guidelines.

3 DEFINITIONS

3.1 *Applicant* means an organization, primarily a shipbuilder or a ship designer, which requests the EPT-EEDI validation in accordance with these Guidelines.

3.2 *Validator* means a Recognized Organization which conducts the EPT-EEDI validation in accordance with these Guidelines.

3.3 *Validation* for the purpose of these Guidelines means review of submitted documents and survey during construction and sea trials.

3.4 *Standard EPT-EEDI-Form* refers to the layout given in appendix 3 that contains the EPT-EEDI results that will be the subject of validation. Other supporting documents submitted for this purpose will be used as reference only and will not be subject to validation.

3.5 P_{AE} herein is defined as per definition in paragraph 2.5.6 of the EEDI Calculation Guidelines.

3.6 *Ship Service and Engine-room Loads* refer to all the load groups which are needed for the hull, deck, navigation and safety services, propulsion and auxiliary engine services, engine-room ventilation and auxiliaries and ship's general services.

3.7 *Diversity Factor* is the ratio of the "total installed load power" and the "actual load power" for continuous loads and intermittent loads. This factor is equivalent to the product of service factors for load, duty and time.

4 APPLICATION

4.1 These Guidelines are applicable to ships as stipulated by paragraph 2.5.6.3 of the EEDI Calculation Guidelines.

4.2 These Guidelines should be applied for new ships for which an application for an EPT-EEDI validation has been submitted to a validator.

4.3 The steps of the validation process include:

- .1 Review of documents during the design stage
 - .1.1 Check if all relevant loads are listed in the EPT;
 - .1.2 Check if reasonable service factors are used; and
 - .1.3 Check the correctness of the P_{AE} calculation based on the data given in the EPT.
- .2 Survey of installed systems and components during construction stage
 - .2.1 Check if a randomly selected set of installed systems and components are correctly listed with their characteristics in the EPT.
- .3 Survey of sea trials
 - .3.1 Check if selected units/loads specified in EPT are observed.

5 SUPPORTING DOCUMENTS

5.1 The applicant should provide as a minimum the ship electric balance load analysis.

5.2 Such information may contain shipbuilders' confidential information. Therefore, after the validation, the validator should return all or part of such information to the applicant at the applicant's request.

5.3 A special EEDI condition during sea trials may be needed and defined for each vessel and included into the sea trial schedule. For this condition a special column should be inserted into the EPT.

6 PROCEDURES FOR VALIDATION

6.1 General

6.1.1 P_{AE} should be calculated in accordance with the EPT-EEDI Calculation Guidelines. EPT-EEDI validation should be conducted in two stages: preliminary validation at the design stage and final validation during sea trials. The validation process is presented in figure 1.

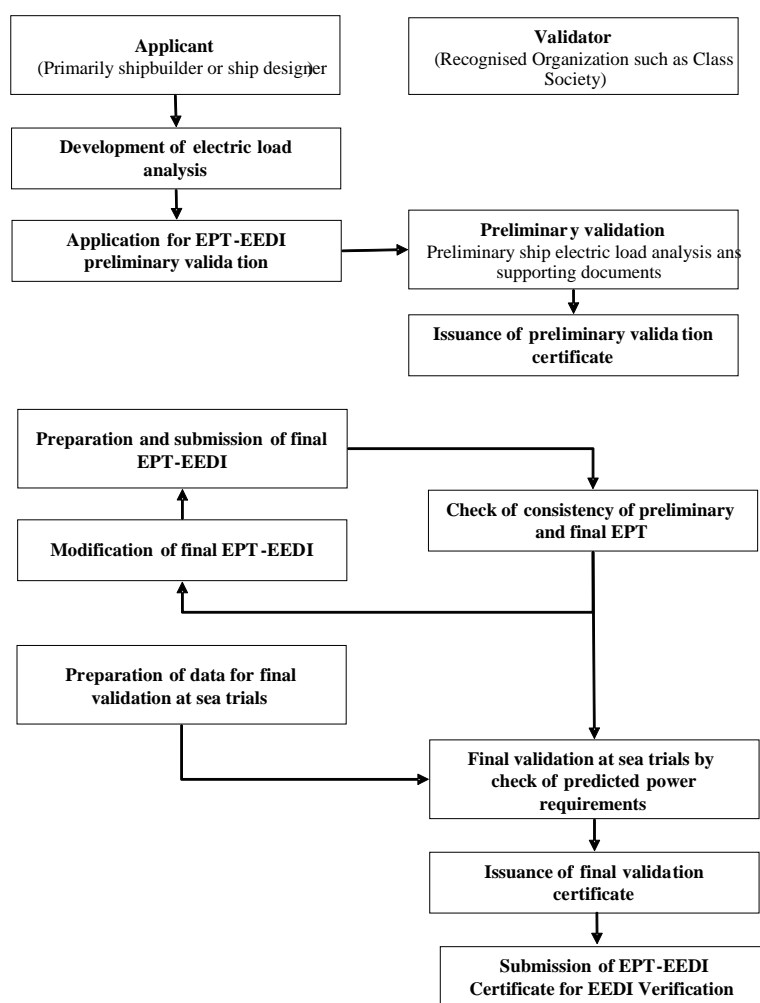


Figure 1: Basic Flow of EPT-EEDI Validation Process

6.2 Preliminary validation at the design stage

6.2.1 For the preliminary validation at the design stage, the applicant should submit to a validator an application for the validation of EPT-EEDI inclusive of EPT-EEDI Form and all the relevant and necessary information for the validation as supporting documents.

6.2.2 The applicant should supply as a minimum the supporting data and information, as specified in appendix A (to be developed).

6.2.3 The validator may request from the applicant additional information on top of those contained in these Guidelines, as necessary, to enable the validator to examine the calculation process of the EPT-EEDI. The estimation of the ship EPT-EEDI at the design stage depends on each applicant's experiences, and it may not be practicable to fully examine the technical aspects and details of each machinery component. Therefore, the preliminary validation should focus on the calculation process of the EPT-EEDI that should follow the best marine practices.

Note: A possible way forward for more robust validation is to establish a standard methodology of deriving the ship EPT by setting standard formats as agreed and used by industry.

6.3 Final validation

6.3.1 The final validation process as a minimum shall include the check of ship electric load analysis to ensure that all electric consumers are listed; their specific data and the calculations in the power table itself are correct and are supported by sea trial results. If necessary, additional information has to be requested.

6.3.2 For final validation the applicant shall revise the EPT-EEDI Form and supporting documents as necessary, by taking into account the characteristics of the machinery and other electrical loads actually installed on board the ship. The EEDI condition at sea trials shall be defined and the expected power requirements in these conditions documented in the EPT. Any changes within the EPT from design stage to construction stage should be highlighted by the shipyard.

6.3.3 The preparation for the final validation includes a desk top check comprising:

- .1 consistency of preliminary and final EPT;
- .2 changes of service factors (compared to the preliminary validation);
- .3 all electric consumers are listed;
- .4 their specific data and the calculations in the power table itself are correct; and
- .5 in case of doubt, component specification data is checked in addition.

6.3.4 A survey prior to sea trials is performed to ensure that machinery characteristics and data as well as other electric loads comply with those recorded in the supporting documents. This survey does not cover the complete installation but selects randomly a number [to be defined] of samples.

6.3.5 For the purpose of sea trial validation, the surveyor will check the data of selected systems and/or components given in the special column added to the EPT for this purpose or the predicted overall value of electric load by means of practicable measurements with the installed measurement devices.

7 ISSUANCE OF THE EPT-EEDI STATEMENT OF VALIDATION

7.1 The validator should stamp the EPT-EEDI Form "as Noted" after it validated the EPT-EEDI in the preliminary validation stage in accordance with these Guidelines.

7.2 The validator should stamp the EPT-EEDI Form "as Endorsed" after it validated the final EPT-EEDI in the final validation stage in accordance with these Guidelines.

APPENDIX 3

ELECTRIC POWER TABLE FORM FOR ENERGY EFFICIENCY DESIGN INDEX (EPT-EEDI FORM) AND STATEMENT OF VALIDATION

Ship ID:

IMO No.: _____

Ship's Name: _____

Shipyard: _____

Hull No.: 5 Miles _____

Applicant:Name: _____ ☐Address: _____ ☐**Validation Stage:**

Preliminary validation

Final validation

Summary Results of EPT-EEDI

Load Group	Seagoing Condition EEDI Calculation Guidelines		Remarks
	Continuous Load (kW)	Intermittent Load (kW)	
Ship Service and Engine-room Loads			
Accommodation and Cargo Loads			
Total installed load			
Diversity Factor			
Normal seagoing load			
Weighted average efficiency of generators			
PAE			

Supporting Documents

Title	ID or Remarks

Validator details:

Organization: _____

Address: _____

This is to certify that the above-mentioned electrical loads and supporting documents have been reviewed in accordance with EPT-EEDI Validation Guidelines and the review shows a reasonable confidence for use of the above PAE in EEDI calculations.

The date of review: _____ Statement of validation No. _____

This statement is valid on condition that the electric power characteristics of the ship do not change.

Signature of Validator

Printed Name:

RESOLUTION MEPC.215(63)
Adopted on 2 March 2012

**GUIDELINES FOR CALCULATION OF REFERENCE LINES FOR USE WITH THE
ENERGY EFFICIENCY DESIGN INDEX (EEDI)**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution,

RECALLING ALSO that, at its sixty-second session, the Committee adopted, by resolution MEPC.203(62), amendments to the Annex of the Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (inclusion of regulations on energy efficiency for ships in MARPOL Annex VI),

NOTING that regulation 21 (Required EEDI) of MARPOL Annex VI, as amended, requires reference lines to be established for each ship type to which regulation 21 is applicable,

HAVING CONSIDERED, at its sixty-third session, the draft Guidelines for calculation of reference lines for use with the Energy Efficiency Design Index (EEDI),

ADOPTS the Guidelines for calculation of reference lines for use with the Energy Efficiency Design Index (EEDI), as set out at annex to the present resolution.

ANNEX

GUIDELINES FOR CALCULATION OF REFERENCE LINES FOR USE WITH THE ENERGY EFFICIENCY DESIGN INDEX (EEDI)

1 The reference lines are established for each ship type to which regulation 21 (Required EEDI) of MARPOL Annex VI is applicable. The purpose of the EEDI is to provide a fair basis for comparison, to stimulate the development of more efficient ships in general and to establish the minimum efficiency of new ships depending on ship type and size. Hence, the reference lines for each ship type is calculated in a transparent and robust manner.

2 Ship types are defined in regulation 2 of MARPOL Annex VI. The reference line for each ship type is used for the determination of the required EEDI as defined in regulation 21 of MARPOL Annex VI.

3 These guidelines apply to the following ships types: bulk carrier, gas carrier, tanker, containership, general cargo ship, refrigerated cargo carrier and combination carrier. It is noted that a method of calculating reference lines has not been established for ro-ro cargo ships, ro-ro cargo ships (vehicle), ro-ro-passenger ships and passenger ships, as well as for ships with diesel-electric propulsion, turbine propulsion and hybrid propulsion.

Definition of a reference line

4 A reference line is defined as a curve representing an average index value fitted on a set of individual index values for a defined group of ships.

5 One reference line is developed for each ship type to which regulation 21 of MARPOL Annex VI is applicable, ensuring that only data from comparable ships are included in the calculation of each reference line.

6 The reference line value is formulated as *Reference line value* = $a (100\% \text{ deadweight})^{-c}$ where "a" and "c" are parameters determined from the regression curve fit.

7 Input data for the calculation of the reference lines is filtered through a process where data deviating more than two standard deviations from the regression line are discarded. The regression is then applied again to generate a corrected reference line. For the purpose of documentation, discarded data is listed with the ships IMO number.

Data sources

8 IHS Fairplay (IHSF) database is selected as the standard database delivering the primary input data for the reference line calculation. For the purpose of the EEDI reference line calculations, a defined version of the database is archived as agreed between the Secretariat and IHSF.

9 For the purpose of calculating the reference lines, data relating to existing ships of 400 GT and above from the IHSF database delivered in the period from 1 January 1999 to 1 January 2009 are used.

10 The following data from the IHSF database on ships with conventional propulsion systems is used when calculating the reference lines:

- .1 data on the ships' capacity is used as *Capacity* for each ship type as defined in MEPC.XXX(63);
- .2 data on the ships' service speed is used as reference speed V_{ref} ; and
- .3 data on the ships' total installed main power is used as $MCR_{ME(i)}$.

11 For some ships, some data entries may be blank or contain a zero (0) in the database. Datasets with blank power, capacity and/or speed data should be removed from the reference line calculations. For the purpose of later references, the omitted ships should be listed with their IMO number.

12 To ensure a uniform interpretation, the association of ship types defined in regulation 2 of MARPOL Annex VI, with the ship types given by the IHSF database and defined by the so-called Stat codes, is shown in the appendix to this guideline. Table 1 in the appendix lists the ship types from IHSF used for the calculation of reference lines. Table 2 lists the IHSF ship types not used when calculating the reference lines.

Calculation of reference lines

13 To calculate the reference line, an estimated index value for each ship contained in the set of ships per ship type is calculated using the following assumptions:

- .1 the carbon emission factor is constant for all engines, i.e. $C_{F,ME} = C_{F,AE} = CF = 3.1144 \text{ g CO}_2/\text{g fuel}$;
- .2 the specific fuel consumption for all ship types is constant for all main engines, i.e. $SFC_{ME} = 190 \text{ g/kWh}$;
- .3 $P_{ME(i)}$ is 75% of the total installed main power ($MCR_{ME(i)}$);
- .4 the specific fuel consumption for all ship types is constant for all auxiliary engines, i.e. $SFC_{AE} = 215 \text{ g/kWh}$;
- .5 P_{AE} is the auxiliary power and is calculated according to paragraphs 2.5.6.1 and 2.5.6.2 of the annex to MEPC.XXX(63);
- .6 no correction factors are used; and
- .7 innovative mechanical energy efficiency technology, shaft motors and other innovative energy efficient technologies are all excluded from the reference line calculation, i.e. $P_{AEff} = 0$, $P_{PTI} = 0$, $P_{eff} = 0$.

14 The equation for calculating the estimated index value for each ship (excluding container ships – see paragraph 15) is as follows:

$$\text{Estimated Index Value} = 3.1144 \cdot \frac{190 \cdot \sum_{i=1}^{NME} P_{MEi} + 215 \cdot P_{AE}}{\text{Capacity} \cdot V_{ref}}$$

15 For containerships, 70 per cent of the deadweight (70% DWT) is used as *capacity* for calculating the estimated index value for each containership as follows:

$$\text{Estimated Index Value} = 3.1144 \cdot \frac{190 \cdot \sum_{i=1}^{NME} P_{MEi} + 215 \cdot P_{AE}}{70\% \text{ DWT} \cdot V_{ref}}$$

Calculation of reference line parameters "a" and "c"

16 For all ship types to which these guidelines apply, parameters "a" and "c" are determined from a regression analysis undertaken by plotting the calculated estimated index values against 100 per cent deadweight (100% DWT).

Documentation

17 For purposes of transparency, the ships used in the calculation of the reference lines should be listed with their IMO numbers and the numerator and denominator of the index formula, as given in paragraphs 14 and 15. The documentation of the aggregated figures preserves the individual data from direct access but offers sufficient information for possible later scrutiny.

APPENDIX

1 To ensure a uniform interpretation, ship types defined in regulation 2 of MARPOL Annex VI are compared to the ship types given in the IHSF database.

2 The IHSF Stat code system provides several levels of definition as follows:

.1 Highest level:

A	Cargo carrying
B	Work vessel
W	Non-seagoing merchant ships
X	Non-merchant
Y	Non-propelled
Z	Non-ship structures

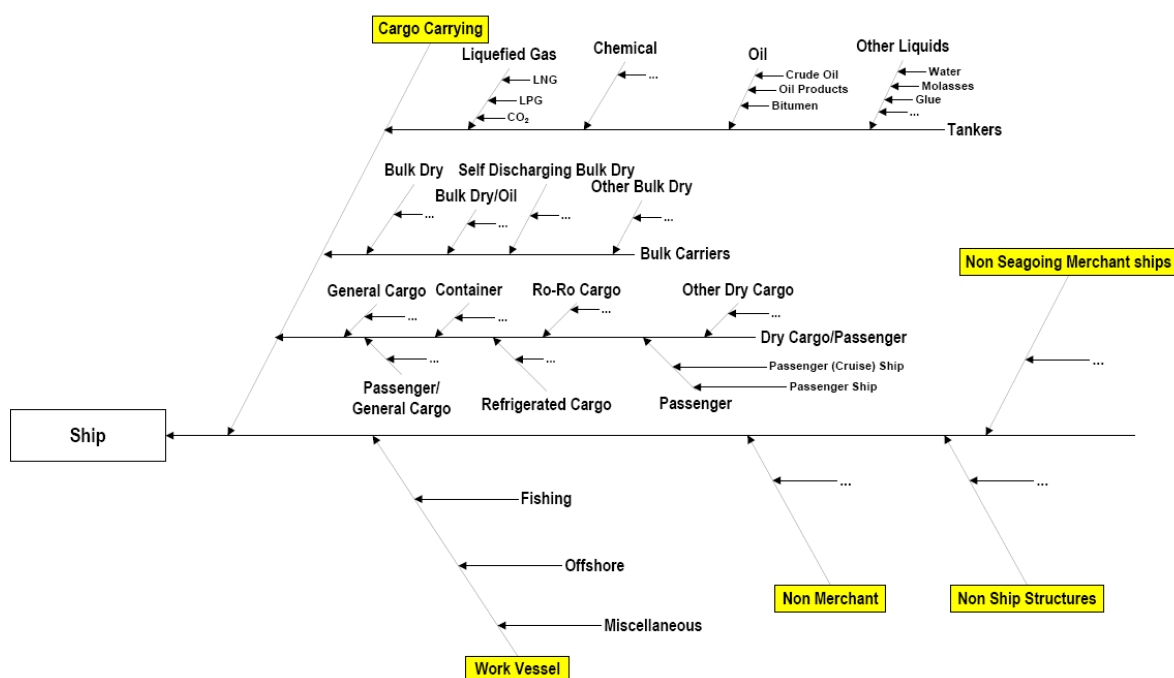
For the purpose of the EEDI, only group "A cargo carrying" needs to be considered. A graphical representation of this is given below.

.2 The next level comprises:

A1	Tankers
A2	Bulk carriers
A3	Dry cargo/passenger

There are further differentiations until level five, e.g. "A31A2GX General Cargo Ship", and each category is described.

The complete list is attached.



3 The ship types from the IHSF Stat code 5 (Statcode5v1075) used for the calculation of reference lines for the following ship types: bulk carrier, gas carrier, tanker, containership, general cargo ship, refrigerated cargo carrier and combination carrier, are set out in Table 1. The IHSF database ship types, not used in the calculation of reference lines for the specific ship types, are set out in Table 2, e.g. ships built for sailing on the Great Lakes and landing craft.

Table 1: Ship types from IHSF used for the calculation of reference lines for use with the EEDI

.1 Bulk carrier	Bulk dry	A21A2BC	Bulk carrier	A single deck cargo vessel with an arrangement of topside ballast tanks for the carriage of bulk dry cargo of a homogeneous nature.
	Bulk dry	A21B2BO	Ore carrier	A single deck cargo ship fitted with two longitudinal bulkheads. Ore is carried in the centreline holds only.
	Self-discharging bulk dry	A23A2BD	Bulk cargo carrier, self-discharging	A bulk carrier fitted with self-trimming holds, a conveyor belt (or similar system) and a boom which can discharge cargo alongside or to shore without the assistance of any external equipment.
	Other dry bulk	A24A2BT	Cement carrier	A single deck cargo vessel fitted with pumping arrangements for the carriage of cement in bulk. There are no weather deck hatches. May be self-discharging.
		A24B2BW	Wood chips carrier, self-unloading	A single deck cargo vessel with high freeboard for the carriage of wood chips. May be self-discharging.
		A24C2BU	Urea carrier	A single deck cargo vessel for the carriage of urea in bulk. May be self-discharging.
		A24D2BA	Aggregates carrier	A single deck cargo vessel for the carriage of aggregates in bulk. Also known as a sand carrier. May be self-discharging.
.2 Gas carrier	Liquefied gas	A24E2BL	Limestone carrier	A single deck cargo vessel for the carriage of limestone in bulk. There are no weather deck hatches. May be self-discharging.
		A11A2TN	LNG tanker	A tanker for the bulk carriage of liquefied natural gas (primarily methane) in independent insulated tanks. Liquefaction is achieved at temperatures down to -163 deg C.
		A11B2TG	LPG tanker	A tanker for the bulk carriage of liquefied petroleum gas in insulated tanks, which may be independent or integral. The cargo is pressurized (smaller vessels), refrigerated (larger vessels) or both ("semi-pressurized") to achieve liquefaction.
		A11C2LC	CO ₂ tanker	A tanker for the bulk carriage of liquefied carbon dioxide.
.3 Tanker	Chemical	A11A2TQ	CNG tanker	A tanker for the bulk carriage of compressed natural gas. Cargo remains in gaseous state but is highly compressed.
		A12A2LP	Molten sulphur tanker	A tanker for the bulk carriage of molten sulphur in insulated tanks at a high temperature.
		A12A2TC	Chemical tanker	A tanker for the bulk carriage of chemical cargoes, lube oils, vegetable/animal oils and other chemicals as defined in the International Bulk Chemical Code. Tanks are coated with suitable materials which are inert to the cargo.

		A12B2TR	Chemical/ products tanker	A chemical tanker additionally capable of the carriage of clean petroleum products.
		A12C2LW	Wine tanker	A cargo ship designed for the bulk transport of wine in tanks. Tanks will be stainless steel or lined. New vessels will be classified as chemical carriers.
		A12D2LV	Vegetable oil tanker	A cargo ship designed for the bulk transport of vegetable oils in tanks. Tanks will be stainless steel or lined. New vessels will be classified as chemical carriers.
		A12E2LE	Edible oil tanker	A cargo ship designed for the bulk transport of edible oils in tanks. Tanks will be stainless steel or lined. New vessels will be classified as chemical carriers.
		A12F2LB	Beer tanker	A tanker for the bulk carriage of beer.
		A12G2LT	Latex tanker	A tanker for the bulk carriage of latex.
		A12H2LJ	Fruit juice tanker	A tanker for the bulk carriage of fruit juice concentrate in insulated tanks.
	Oil	A13A2TV	Crude oil tanker	A tanker for the bulk carriage of crude oil.
		A13A2TW	Crude/oil products tanker	A tanker for the bulk carriage of crude oil but also for carriage of refined oil products.
		A13B2TP	Products tanker	A tanker for the bulk carriage of refined petroleum products, either clean or dirty.
		A13B2TU	Tanker (unspecified)	A tanker whose cargo is unspecified.
		A13C2LA	Asphalt/ Bitumen tanker	A tanker for the bulk carriage of asphalt/bitumen at temperatures between 150 and 200 deg C.
		A13E2LD	Coal/oil mixture tanker	A tanker for the bulk carriage of a cargo of coal and oil mixed as a liquid and maintained at high temperatures.
	Other liquids	A14A2LO	Water tanker	A tanker for the bulk carriage of water.
		A14F2LM	Molasses tanker	A tanker for the bulk carriage of molasses.
		A14G2LG	Glue tanker	A tanker for the bulk carriage of glue.
		A14H2LH	Alcohol tanker	A tanker for the bulk carriage of alcohol.
		A14N2LL	Caprolactam tanker	A tanker for the bulk carriage of caprolactam, a chemical used in the plastics industry for the production of polyamides.
	Chemical	A12A2TL	Parcels tanker	A chemical tanker with many segregated cargo tanks to carry multiple grades of chemicals as defined in the International Bulk Chemical Code. Typically these can have between 10 and 60 different tanks.

.4 Containership	Container	A33A2CC	Containership (fully cellular)	A single deck cargo vessel with boxed holds fitted with fixed cellular guides for the carriage of containers.
.5 General cargo ship	General cargo	A31A2GX	General cargo ship	A single or multi-deck cargo vessel for the carriage of various types of dry cargo. Single deck vessels will typically have box-shaped holds. Cargo is loaded and unloaded through weather deck hatches.
	Other dry cargo	A38H2GU	Pulp carrier	A vessel designed for carrying paper pulp.
.6 Refrigerated cargo carrier	Refrigerated cargo	A34A2GR	Refrigerated cargo ship	A multi-deck cargo ship for the carriage of refrigerated cargo at various temperatures.
.7 Combination carrier	Bulk dry/oil	A22A2BB	Bulk/oil carrier (OBO)	A bulk carrier arranged for the alternative (but not simultaneous) carriage of crude oil.
	Bulk dry/oil	A22B2BR	Ore/oil carrier	An ore carrier arranged for the alternative (but not simultaneous) carriage of crude oil.
	Bulk dry/oil	A22A2BP	Ore/bulk/products carrier	A bulk carrier arranged for the alternative (but not simultaneous) carriage of oil products.

Table 2: Ship types from IHSF not included in the calculation of reference lines for use with the EEDI

.1 Bulk carrier	Bulk dry	A21A2BG	Bulk carrier, laker only	A single deck cargo vessel with dimensions suited to the limitations of Great Lakes of North America trade, unsuitable for open sea navigation. Hatches are more numerous than standard bulk carriers, and much wider than they are long.
	Bulk dry	A21A2BV	Bulk carrier (with vehicle decks)	A bulk carrier with movable decks for the additional carriage of new vehicles.
	Bulk dry/oil	A22A2BB	Bulk/oil carrier (OBO)	A bulk carrier arranged for the alternative (but not simultaneous) carriage of crude oil.
	Bulk dry/oil	A22B2BR	Ore/oil carrier	An ore carrier arranged for the alternative (but not simultaneous) carriage of crude oil.
	Bulk dry/oil	A22A2BP	Ore/bulk/products carrier	A bulk carrier arranged for the alternative (but not simultaneous) carriage of oil products.
	Self-discharging bulk dry	A23A2BK	Bulk cargo carrier, self-discharging, laker	A Great Lakes bulk carrier fitted with a conveyor belt (or similar system) and a boom which can discharge cargo alongside or to shore without the assistance of any external equipment.
	Other bulk dry	A24H2BZ	Powder carrier	A single deck cargo vessel for the carriage of fine powders such as fly ash. There are no weather deck hatches.
	Other bulk dry	A24G2BS	Refined sugar carrier	A single deck cargo vessel for the carriage of refined sugar. Sugar is loaded in bulk and bagged in transit (BIBO – Bulk In – Bag Out).
.2 Gas carrier	Liquefied gas	A11B2TH	LPG/chemical tanker	An LPG tanker additionally capable of the carriage of chemical products as defined in the International Bulk Chemical Code.
.3 Tanker	Oil	A13A2TS	Shuttle tanker	A tanker for the bulk carriage of crude oil specifically for operation between offshore terminals and refineries. Is typically fitted with bow loading facilities.

.4 Containership	Container	A33B2CP	Passenger/ containership	A containership with accommodation for the carriage of more than 12 passengers.
.5 General cargo ship	General cargo	A31A2GO	Open hatch cargo ship	A large single deck cargo vessel with full width hatches and boxed holds for the carriage of unitized dry cargo such as forest products and containers. Many are fitted with a gantry crane.
	General cargo	A31A2GS	General cargo/tanker (container/oil/bulk – COB ship)	A general cargo ship with reversible hatch covers; one side is flush and the other is fitted with baffles for use with liquid cargoes. Containers can be carried on the hatch covers in dry cargo mode.
	General cargo	A31A2GT	General cargo/tanker	A general cargo ship fitted with tanks for the additional carriage of liquid cargo.
	General cargo	A31C2GD	Deck cargo ship	A vessel arranged for carrying unitized cargo on deck only. Access may be by use of a ro-ro ramp.
	Passenger/general cargo	A32A2GF	General cargo/passenger ship	A general cargo ship with accommodation for the carriage of more than 12 passengers.
	Other dry cargo	A38A2GL	Livestock carrier	A cargo vessel arranged for the carriage of livestock.
	Other dry cargo	A38B2GB	Barge carrier	A cargo vessel arranged for the carriage of purpose built barges (lighters) loaded with cargo. Typically loading is by way of a gantry crane. Also known as Lighter Aboard SHip vessels (LASH).
	Other dry cargo	A38C3GH	Heavy load carrier, semi-submersible	A heavy load carrier which is semi-submersible for the float on loading/unloading of the cargoes.
	Other dry cargo	A38C3GY	Yacht carrier, semi-submersible	A semi-submersible heavy load carrier specifically arranged for the carriage of yachts.
	Other dry cargo	A38D2GN	Nuclear fuel carrier	A cargo vessel arranged to carry nuclear fuel in flasks.
	Other dry cargo	A38D2GZ	Nuclear fuel carrier (with ro-ro facility)	A nuclear fuel carrier which is loaded and unloaded by way of a ro-ro ramp.
	Other dry cargo	A38B3GB	Barge carrier, semi-submersible	A barge carrier which is semi-submersible for the float on loading/unloading of the barges.

	Other dry cargo	A38C2GH	Heavy load carrier	A cargo vessel able to carry heavy and/or outsized individual cargoes. Cargo may be carried on deck or in holds and may be loaded by crane and/or ro-ro ramps.
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RESOLUTION MEPC.216(63)
Adopted on 2 March 2012

**AMENDMENTS TO THE ANNEX OF THE PROTOCOL OF 1978 RELATING TO
THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF
POLLUTION FROM SHIPS, 1973**

**(Regional arrangements for port reception facilities under
MARPOL Annexes I, II, IV and V)**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution,

NOTING article 16 of the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1973 Convention") and article VI of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1978 Protocol") which together specify the amendment procedure of the 1978 Protocol and confer upon the appropriate body of the Organization the function of considering and adopting amendments to the 1973 Convention, as modified by the 1978 Protocol (MARPOL 73/78),

HAVING CONSIDERED draft amendments to Annexes I, II, IV and V of MARPOL 73/78,

1. ADOPTS, in accordance with article 16(2)(d) of the 1973 Convention, the amendments to Annexes I, II, IV and V of MARPOL 73/78, the text of which is set out in the annex to the present resolution;
2. DETERMINES, in accordance with article 16(2)(f)(iii) of the 1973 Convention, that the amendments shall be deemed to have been accepted on 1 February 2013 unless, prior to that date, not less than one third of the Parties or Parties the combined merchant fleets of which constitute not less than 50 per cent of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;
3. INVITES the Parties to note that, in accordance with article 16(2)(g)(ii) of the 1973 Convention, the said amendments shall enter into force on 1 August 2013 upon their acceptance in accordance with paragraph 2 above;
4. REQUESTS the Secretary-General, in conformity with article 16(2)(e) of the 1973 Convention, to transmit to all Parties to MARPOL 73/78 certified copies of the present resolution and the text of the amendments contained in the annex;
5. REQUESTS FURTHER the Secretary-General to transmit to the Members of the Organization which are not Parties to MARPOL 73/78 copies of the present resolution and its annex.

ANNEX

AMENDMENTS TO MARPOL ANNEXES I, II, IV AND V

1 *New paragraphs 3bis and 4bis are added to regulation 38 of Annex I:*

3bis Small Island Developing States may satisfy the requirements in paragraphs 1 to 3 of this regulation through regional arrangements when, because of those States' unique circumstances, such arrangements are the only practical means to satisfy these requirements. Parties participating in a regional arrangement shall develop a Regional Reception Facilities Plan, taking into account the guidelines developed by the Organization.

The Government of each Party participating in the arrangement shall consult with the Organization, for circulation to the Parties of the present Convention:

- .1 how the Regional Reception Facilities Plan takes into account the Guidelines;
- .2 particulars of the identified Regional Ships Waste Reception Centres; and
- .3 particulars of those ports with only limited facilities.

4bis Small Island Developing States may satisfy the requirements in paragraph 4 of this regulation through regional arrangements when, because of those States' unique circumstances, such arrangements are the only practical means to satisfy these requirements. Parties participating in a regional arrangement shall develop a Regional Reception Facilities Plan, taking into account the guidelines developed by the Organization.

The Government of each Party participating in the arrangement shall consult with the Organization for circulation to the Parties of the present Convention:

- .1 how the Regional Reception Facilities Plan takes into account the Guidelines;
- .2 particulars of the identified Regional Ships Waste Reception Centres; and
- .3 particulars of those ports with only limited facilities.

2 *New paragraphs 2bis and 2ter are added to regulation 18 of Annex II:*

2bis Small Island Developing States may satisfy the requirements in paragraphs 1, 2 and 4 of this regulation through regional arrangements when, because of those States' unique circumstances, such arrangements are the only practical means to satisfy these requirements. Parties participating in a regional arrangement shall develop a Regional Reception Facilities Plan, taking into account the guidelines developed by the Organization.

The Government of each Party participating in the arrangement shall consult with the Organization for circulation to the Parties of the present Convention:

- .1 how the Regional Reception Facilities Plan takes into account the Guidelines;
- .2 particulars of the identified Regional Ships Waste Reception Centres; and
- .3 particulars of those ports with only limited facilities.

2ter Where regulation 13 of this annex requires a prewash and the Regional Reception Facility Plan is applicable to the port of unloading, the prewash and subsequent discharge to a reception facility shall be carried out as prescribed in regulation 13 of this annex or at a Regional Ship Waste Reception Centre specified in the applicable Regional Reception Facility Plan.

3 *New paragraph 1bis is added to regulation 12 of Annex IV:*

1bis Small Island Developing States may satisfy the requirements in paragraph 1 of this regulation through regional arrangements when, because of those States' unique circumstances, such arrangements are the only practical means to satisfy these requirements. Parties participating in a regional arrangement shall develop a Regional Reception Facilities Plan, taking into account the guidelines developed by the Organization.

The Government of each Party participating in the arrangement shall consult with the Organization for circulation to the Parties of the present Convention:

- .1 how the Regional Reception Facilities Plan takes into account the Guidelines;
- .2 particulars of the identified Regional Ships Waste Reception Centres; and
- .3 particulars of those ports with only limited facilities.

4 *New paragraph 2bis is added to regulation 8 of Annex V¹:*

2bis Small Island Developing States may satisfy the requirements in paragraphs 1 and 2.1 of this regulation through regional arrangements when, because of those States' unique circumstances, such arrangements are the only practical means to satisfy these requirements. Parties participating in a regional arrangement shall develop a Regional Reception Facilities Plan, taking into account the guidelines developed by the Organization.

The Government of each Party participating in the Arrangement shall consult with the Organization for circulation to the Parties of the present Convention:

- .1 how the Regional Reception Facilities Plan takes into account the Guidelines;
- .2 particulars of the identified Regional Ships Waste Reception Centres; and
- .3 particulars of those ports with only limited facilities.

¹ Text of revised Annex V, adopted by resolution MEPC.201(62).

RESOLUTION MEPC.217(63)
Adopted on 2 March 2012

**AMENDMENTS TO THE ANNEX OF THE PROTOCOL OF 1997 TO AMEND THE
INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM
SHIPS, 1973, AS MODIFIED BY THE PROTOCOL OF 1978 RELATING THERETO**

**(Regional arrangements for port reception facilities under MARPOL Annex VI and
Certification of marine diesel engines fitted with Selective Catalytic Reduction
systems under the NO_x Technical Code 2008)**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution,

NOTING article 16 of the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1973 Convention"), article VI of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter referred to as the "1978 Protocol") and article 4 of the Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (hereinafter referred to as the "1997 Protocol"), which together specify the amendment procedure of the 1997 Protocol and confer upon the appropriate body of the Organization the function of considering and adopting amendments to the 1973 Convention, as modified by the 1978 and 1997 Protocols,

NOTING that, by the 1997 Protocol, Annex VI entitled Regulations for the Prevention of Air Pollution from Ships was added to the 1973 Convention (hereinafter referred to as "Annex VI"),

NOTING FURTHER regulation 13 of MARPOL Annex VI which makes the Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines (NO_x Technical Code) mandatory under that Annex,

NOTING ALSO that both the revised Annex VI adopted by resolution MEPC.176(58) and the NO_x Technical Code 2008 adopted by resolution MEPC.177(58) entered into force on 1 July 2010,

HAVING CONSIDERED draft amendments to the revised Annex VI and the NO_x Technical Code 2008,

1. ADOPTS, in accordance with article 16(2)(d) of the 1973 Convention, the amendments to Annex VI and the NO_x Technical Code 2008, the text of which is set out in the annex to the present resolution;
2. DETERMINES, in accordance with article 16(2)(f)(iii) of the 1973 Convention, that the amendments shall be deemed to have been accepted on 1 February 2013, unless prior to that date, not less than one third of the Parties or Parties the combined merchant fleets of which constitute not less than 50 per cent of the gross tonnage of the world's merchant fleet, have communicated to the Organization their objection to the amendments;

3. INVITES the Parties to note that, in accordance with article 16(2)(g)(ii) of the 1973 Convention, the said amendments shall enter into force on 1 August 2013 upon their acceptance in accordance with paragraph 2 above;

4. REQUESTS the Secretary-General, in conformity with article 16(2)(e) of the 1973 Convention, to transmit to all Parties to the 1973 Convention, as modified by the 1978 and 1997 Protocols, certified copies of the present resolution and the text of the amendments contained in the annex;

5. REQUESTS FURTHER the Secretary-General to transmit to the Members of the Organization which are not Parties to the 1973 Convention, as modified by the 1978 and 1997 Protocols, copies of the present resolution and its annex.

ANNEX

AMENDMENTS TO MARPOL ANNEX VI AND THE NO_x TECHNICAL CODE 2008

Amendments to MARPOL Annex VI

- 1 *New paragraph 1bis is added to regulation 17:*

1bis Small Island Developing States may satisfy the requirements in paragraph 1 of this regulation through regional arrangements when, because of those States' unique circumstances, such arrangements are the only practical means to satisfy these requirements. Parties participating in a regional arrangement shall develop a Regional Reception Facilities Plan, taking into account the guidelines developed by the Organization.

The Government of each Party participating in the arrangement shall consult with the Organization for circulation to the Parties of the present Convention:

- .1 how the Regional Reception Facilities Plan takes into account the Guidelines;
- .2 particulars of the identified Regional Ships Waste Reception Centres; and
- .3 particulars of those ports with only limited facilities.

Amendments to the NO_x Technical Code 2008

- 2 *Existing paragraph 2.2.4 is replaced by the following:*

"2.2.4 *Engines not pre-certified on a test-bed*

- .1 There are engines which, due to their size, construction and delivery schedule, cannot be pre-certified on a test-bed. In such cases, the engine manufacturer, shipowner or shipbuilder shall make application to the Administration requesting an onboard test (see 2.1.2.2). The applicant must demonstrate to the Administration that the onboard test fully meets all of the requirements of a test-bed procedure as specified in chapter 5 of this Code. In no case shall an allowance be granted for possible deviations of measurements if an initial survey is carried out on board a ship without any valid pre-certification test. For engines undergoing an onboard certification test, in order to be issued with an EIAPP Certificate, the same procedures apply as if the engine had been pre-certified on a test-bed, subject to the limitations given in paragraph 2.2.4.2.
- .2 This pre-certification survey procedure may be accepted for an Individual Engine or for an Engine Group represented by the Parent Engine only, but it shall not be accepted for an Engine Family certification."

3 *Paragraph 2.2.5.1 is replaced by the following:*

- "1 Where a NO_x-reducing device is to be included within the EIAPP certification, it must be recognized as a component of the engine, and its presence shall be recorded in the engine's Technical File. The engine shall be tested with the NO_x-reducing device fitted unless, due to technical and practical reasons, the combined testing is not appropriate and the procedures specified in paragraph 2.2.4.1 cannot be applied, subject to approval by the Administration. In the latter case, the applicable test procedure shall be performed and the combined engine/NO_x-reducing device shall be approved and pre-certified by the Administration taking into account guidelines developed by the Organization*. However, this pre-certification is subject to the limitations given in paragraph 2.2.4.2."

* Refer to the 2011 Guidelines addressing additional aspects to the NO_x Technical Code 2008 with regard to particular requirements related to marine diesel engines fitted with selective catalytic reduction (SCR) systems adopted by resolution MEPC.198(62).

RESOLUTION MEPC.218(63)
Adopted on 2 March 2012

**DEVELOPMENT OF TECHNICAL ONBOARD EQUIPMENT IN RELATION
TO THE DESIGNATION OF THE BALTIC SEA AS A SPECIAL AREA
UNDER MARPOL ANNEX IV**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by the international conventions for the prevention and control of marine pollution,

RECALLING ALSO the amendments to MARPOL Annex IV adopted by resolution MEPC.200(62), which are expected to enter into force on 1 January 2013, prohibiting the discharge of sewage from passenger ships within a special area unless, in accordance with regulation 11.3 of MARPOL Annex IV, the passenger ship has in operation an approved sewage treatment plant which shall be type approved by the Administration, taking into account the standards and test methods developed by the Organization,

RECALLING FURTHER the work of the Sub-Committee on Ship Design and Equipment at its fifty-sixth session on the development of the revised guidelines on implementation of effluent standards and performance tests for sewage treatment plants,

BEING CONSCIOUS of the importance of the development and availability of adequate and cost-effective technical means so as to make it possible for the shipping industry to comply with the discharge standards under MARPOL Annex IV,

HAVING CONSIDERED the amendments to MARPOL Annex IV,

1. CALLS for the development, without delay, of proven, adequate and cost-effective technical onboard equipment to make it possible to meet the discharge standards under regulation 11.3 of MARPOL Annex IV; and
2. UNDERTAKES to keep under review the development of the revised guidelines on implementation of effluent standards and performance tests for sewage treatment plants.

RESOLUTION MEPC.219(63)
Adopted on 2 March 2012

2012 GUIDELINES FOR THE IMPLEMENTATION OF MARPOL ANNEX V

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by the international conventions for the prevention and control of marine pollution,

RECALLING ALSO that Annex V of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78) relating thereto provides regulations for the prevention of pollution by garbage from ships,

NOTING that the Committee, at its twenty-sixth session, approved the Guidelines for the Implementation of Annex V of MARPOL 73/78,

NOTING ALSO that the Committee, at its thirty-third session, adopted the Revised Guidelines for the Implementation of Annex V of MARPOL 73/78 (the Revised Guidelines) by resolution MEPC.59(33), which were further amended by resolution MEPC.92(45), adopted at its forty-fifth session,

NOTING FURTHER that the Committee, at its sixty-second session, adopted the revised MARPOL Annex V by resolution MEPC.201(62), which is expected to enter into force on 1 January 2013,

RECOGNIZING the need to review the Revised Guidelines in light of the revised MARPOL Annex V,

HAVING CONSIDERED, at its sixty-third session, the draft 2012 Guidelines for the Implementation of MARPOL Annex V,

1. ADOPTS the 2012 Guidelines for the Implementation of MARPOL Annex V, the text of which is set out in the annex to this resolution;
2. INVITES Governments, in implementation of the provisions of the revised MARPOL Annex V, to take into account the 2012 Guidelines for the Implementation of MARPOL Annex V, upon the entry into force of the revised MARPOL Annex V; and
3. REVOKES the Revised Guidelines for the Implementation of Annex V of MARPOL 73/78 (resolution MEPC.59(33), as amended by resolution MEPC.92(45)), upon the entry into force of the revised MARPOL Annex V.

ANNEX

2012 GUIDELINES FOR THE IMPLEMENTATION OF MARPOL ANNEX V

PREFACE

The main objectives of these guidelines are to assist:

- .1 governments in developing and enacting domestic laws which implement Annex V;
- .2 shipowners, ship operators, ships' crews, cargo owners and equipment manufacturers in complying with requirements set forth in Annex V and relevant domestic laws; and
- .3 port and terminal operators in assessing the need for, and providing, adequate reception facilities for garbage generated on all types of ships. In the interest of uniformity, governments are requested to refer to these guidelines and related International Maritime Organization guidance¹ when developing and enforcing appropriate national regulations.

1 INTRODUCTION

1.1 The revised MARPOL Annex V with an entry into force date of 1 January 2013, prohibits the discharge of all types of garbage into the sea unless explicitly permitted under the Annex. These guidelines have been developed taking into account the regulations set forth in Annex V, as amended, of the International Convention for the Prevention of Pollution from Ships, (MARPOL) (hereinafter referred to as the "Convention"). The purpose of these guidelines is to provide guidance to governments, shipowners, ship operators, ships' crews, cargo owners, port reception facility operators and equipment manufacturers. The guidelines are divided into the following six sections that provide a general framework upon which governments can formulate programmes:

- Introduction;
- Garbage management;
- Management of cargo residues of solid bulk cargoes;
- Training, education and information;
- Port reception facilities for garbage; and
- Enhancement of compliance with MARPOL Annex V.

¹ Comprehensive Manual on Port Reception Facilities, 1999 Edition; MEPC.83(44), Guidelines for ensuring the Adequacy of Port Waste Reception Facilities; and MEPC.1/Circ.671, 20 July 2009, Guide to Good Practice for Port Reception Facility Providers and Users Guidelines.

1.2 Under the revised MARPOL Annex V, discharge of all garbage is now prohibited, except as specifically permitted in regulations 3, 4, 5 and 6 of MARPOL Annex V. MARPOL Annex V reverses the historical presumption that garbage may be discharged into the sea based on the nature of the garbage and defined distances from shore. Regulation 7 provides limited exceptions to these regulations in emergency and non-routine situations. Generally, discharge is restricted to food wastes, identified cargo residues, animal carcasses, and identified cleaning agents and additives and cargo residues entrained in washwater which are not harmful to the marine environment. It is recommended that ships use port reception facilities as the primary means of discharge for all garbage.

1.3 Recognizing that the Annex V regulations continue to restrict the discharge of garbage into the sea, require garbage management for ships, and that garbage management technology continues to evolve, it is recommended that governments and the Organization continue to gather information and review these guidelines periodically.

1.4 Regulation 8 of MARPOL Annex V provides that Governments must ensure the provision of adequate port reception facilities for garbage from ships and should facilitate and promote their use. Section 5 provides guidelines for these facilities.

1.5 The Convention provides definitions for terms used throughout these guidelines. Section 1.6 includes relevant aspects of these definitions, followed by other definitions which are useful for these guidelines.

1.6 Definitions

1.6.1 **Dishwater** means the residue from the manual or automatic washing of dishes and cooking utensils which have been pre-cleaned to the extent that any food particles adhering to them would not normally interfere with the operation of automatic dishwashers.

1.6.2 **Grey water** means drainage from dishwater, shower, laundry, bath and washbasin drains. It does not include drainage from toilets, urinals, hospitals, and animal spaces, as defined in regulation 1.3 of MARPOL Annex IV (sewage), and it does not include drainage from cargo spaces. Grey water is not considered garbage in the context of Annex V.

1.6.3 **Recycling** means the activity of segregating and recovering components and materials for reprocessing.

1.6.4 **Reuse** means the activity of recovering components and materials for further use without reprocessing.

1.7 Application

1.7.1 This section provides clarification as to what should and should not be considered garbage under MARPOL Annex V.

1.7.2 Ash and clinkers from shipboard incinerators and coal-burning boilers should be considered as operational wastes within the meaning of regulation 1.12 of MARPOL Annex V, and therefore are included in the term garbage, within the meaning of regulation 1.9 of MARPOL Annex V.

1.7.3 The definition of "operational wastes" (regulation 1.12 of MARPOL Annex V) excludes grey water, bilge water, or other similar discharges essential to the operation of a ship. "Other similar discharges" essential to the operation of a ship include, but are not limited to the following:

- boiler/economizer blowdown;
- boat engine wet exhaust;
- chain locker effluent;
- controllable pitch propeller and thruster hydraulic fluid and other oil to sea interfaces (e.g. thruster bearings, stabilizers, rudder bearings, etc.);
- distillation/reverse osmosis brine;
- elevator pit effluent;
- firemain systems water;
- freshwater lay-up;
- gas turbine washwater;
- motor gasoline and compensating discharge;
- machinery wastewater;
- pool, spa water and recreational waters;
- sonar dome discharge; and
- welldeck discharges.

1.7.4 While cleaning agents and additives contained in hold washwater, and deck and external surface washwater are considered "operational wastes" and thus "garbage" under Annex V, these cleaning agents and additives may be discharged into the sea so long as they are not harmful to the marine environment.

1.7.5 A cleaning agent or additive is considered not harmful to the marine environment if it:

- .1 is not a "harmful substance" in accordance with the criteria in MARPOL Annex III; and
- .2 does not contain any components which are known to be carcinogenic, mutagenic or reprotoxic (CMR).

1.7.6 The ship's record should contain evidence provided by the producer of the cleaning agent or additive that the product meets the criteria for not being harmful to the marine environment. To provide an assurance of compliance, a dated and signed statement to this effect from the product supplier would be adequate for the purposes of a ship's record. This might form part of a Safety Data Sheet or be a stand-alone document but this should be left to the discretion of the producer concerned.

1.7.7 Releasing small quantities of food into the sea for the specific purpose of fish feeding in connection with fishing or tourist operations should not be considered a discharge of garbage in the context of Annex V.

1.7.8 Fishing gear that is released into the water with the intention for later retrieval, such as fish aggregating devices (FADs), traps and static nets, should not be considered garbage or accidental loss in the context of Annex V.

2 GARBAGE MANAGEMENT

2.1 Waste Minimization

2.1.1 All shipowners and operators should minimize taking onboard material that could become garbage. Ship-specific garbage minimization procedures should be included in the Garbage Management Plan. It is recommended that manufacturers, cargo owners, ports and terminals, shipowners and operators and governments consider the management of garbage associated with ships' supplies, provisions, and cargoes as needed to minimize the generation of garbage in all forms.

2.1.2 When making supply and provisioning arrangements, shipowners and operators, where possible, with the ships suppliers should consider the products being procured in terms of the garbage they will generate. Options that should be considered to decrease the amount of such garbage include the following:

- .1 using supplies that come in bulk packaging, taking into account factors such as adequate shelf-life (once a container is open) to avoid increasing garbage associated with such products;
- .2 using supplies that come in reusable or recyclable packaging and containers; avoiding the use of disposable cups, utensils, dishes, towels and rags and other convenience items whenever possible; and
- .3 avoiding supplies that are packaged in plastic, unless a reusable or recyclable plastic is used.

2.1.3 When considering selection of materials for stowage and securing of cargo or protection of cargo from the weather, shipowners and operators should consider how much garbage such materials will generate. Options that should be considered to decrease the amount of such garbage include the following:

- .1 using permanent reusable coverings for cargo protection instead of disposable or recyclable plastic sheeting;
- .2 using stowage systems and methods that reuse dunnage, shoring, lining and packing materials; and

- .3 discharging to port reception facilities the dunnage, lining and packaging materials generated in port during cargo activities as its discharge into the sea is not permitted.

2.1.4 Governments are encouraged to undertake research and technology development to minimize potential garbage and its impacts on the marine environment. Suggested areas for such study are listed below:

- .1 development of recycling technology and systems for all types of materials that may be returned to shore as garbage; and
- .2 development of technology for use of biodegradable materials to replace current plastic products as appropriate. In connection with this, governments should also study the impacts on the environment of the products from degradation of such new materials.

2.2 Fishing gear

2.2.1 Lost fishing gear may harm the marine environment or create a navigation hazard. Fishing vessel operators are required to record the discharge or loss of fishing gear in the Garbage Record Book or Ship's log as specified within regulations 7.1 and 10.3.4 of MARPOL Annex V.

2.2.2 Fishing vessel operators are further required to report the accidental loss or discharge of fishing gear which poses a significant threat to the marine environment and navigation. Reports should be made to the flag State, and where appropriate, the coastal State in whose jurisdiction the loss of the fishing gear occurred, as specified in regulation 10.6 of MARPOL Annex V:

- .1 the accidental loss or discharge of fishing gear which is required to be reported by regulation 10.6 of MARPOL Annex V should be determined specifically by the government. For such determination, the government is encouraged to consider various factors including: (1) the amount of the gear lost or discharged and (2) the conditions of the marine environment where it was lost or discharged. Comprehensive consideration is needed on the characteristics of the gear that was lost, including types, size (weight and/or length), quantity, material (especially, synthetic/plastic or not), buoyancy. In addition, governments should consider the impact of the fishing gear in different locations in order to assess whether the lost gear represents a significant threat to the marine environment or navigation, taking into account the vulnerability of habitat and protected species to gear interactions. Governments are encouraged to report to IMO their measures taken for this issue with a view to promoting information sharing and opinion exchange among governments and relevant International Organizations. Further, governments are encouraged to report to IMO, progress made in implementing these measures, including summaries of where gear was lost and, if applicable, actions taken to address the gear loss;
- .2 examples of lost or abandoned fishing gear which could be considered to pose a significant threat to the marine environment include whole or nearly whole large fishing gear or other large portions of gear. In determining the threat to the marine environment, governments should give careful consideration to the impact of gear in sensitive areas, such as coral reefs, and in areas where interactions would have higher risks of detrimental impacts, such as foraging or breeding areas for protected species;

- .3 governments are encouraged to develop communication frameworks to enable the recording and sharing of information on fishing gear loss where necessary in order to reduce loss and facilitate recovery of fishing gear. Governments are further encouraged to develop frameworks to assist fishing vessels in reporting the loss of gear to the flag State and to a coastal State. Such frameworks should take into consideration implementation challenges in small scale and artisanal fisheries and recreational operations;
- .4 fishing industry, relevant international organizations and governments are encouraged to undertake such research, technology development, information sharing and management measures as may be needed to minimize the probability of loss, and maximize the probability of retrieval of fishing gear from the sea; and
- .5 governments should encourage vessel operators to implement appropriate onboard storage and handling of fishing gear, and should also consider relevant guidance from FAO and IMO.

2.3 Shipboard garbage handling (collection, processing, storage, discharge)

2.3.1 Regulation 3 of MARPOL Annex V provides that the discharge of garbage into the sea is prohibited, with limited exceptions, as summarized in table 1. Under certain conditions discharge into the sea of food wastes, animal carcasses, cleaning agents and additives contained in hold washwater, deck and external surface washwater and cargo residues which are not considered to be harmful to the marine environment is permitted.

TABLE 1 – SUMMARY OF RESTRICTIONS TO THE DISCHARGE OF GARBAGE INTO THE SEA UNDER REGULATIONS 4, 5 AND 6 OF MARPOL ANNEX V

(Note: Table 1 is intended as a summary reference. The provisions in MARPOL Annex V, not table 1, prevail.)

Garbage type ¹	All ships except platforms ⁴		Offshore platforms located more than 12 nm from nearest land and ships when alongside or within 500 metres of such platforms ⁴ Regulation 5
	Outside special areas Regulation 4 (Distances are from the nearest land)	Within special areas Regulation 6 (Distances are from nearest land or nearest ice-shelf)	
Food waste comminuted or ground ²	≥3 nm, en route and as far as practicable	≥12 nm, en route and as far as practicable ³	Discharge permitted
Food waste not comminuted or ground	≥12 nm, en route and as far as practicable	Discharge prohibited	Discharge prohibited
Cargo residues ^{5, 6} not contained in washwater	≥ 12 nm, en route and as far as practicable	Discharge prohibited	Discharge prohibited
Cargo residues ^{5, 6} contained in washwater		≥ 12 nm, en route and as far as practicable (subject to conditions in regulation 6.1.2)	
Cleaning agents and additives ⁶ contained in cargo hold washwater	Discharge permitted	≥ 12 nm, en route and as far as practicable (subject to conditions in regulation 6.1.2)	Discharge prohibited

Garbage type ¹	All ships except platforms ⁴		Offshore platforms located more than 12 nm from nearest land and ships when alongside or within 500 metres of such platforms ⁴ Regulation 5
	Outside special areas Regulation 4 (Distances are from the nearest land)	Within special areas Regulation 6 (Distances are from nearest land or nearest ice-shelf)	
Cleaning agents and additives ⁵ in deck and external surfaces washwater		Discharge permitted	
Animal Carcasses (should be split or otherwise treated to ensure the carcasses will sink immediately)	Must be en route and as far from the nearest land as possible. Should be >100 nm and maximum water depth	Discharge prohibited	Discharge prohibited
All other garbage including plastics, synthetic ropes, fishing gear, plastic garbage bags, incinerator ashes, clinkers, cooking oil, floating dunnage, lining and packing materials, paper, rags, glass, metal, bottles, crockery and similar refuse	Discharge prohibited	Discharge prohibited	Discharge prohibited

- ¹ When garbage is mixed with or contaminated by other harmful substances prohibited from discharge or having different discharge requirements, the more stringent requirements shall apply.
- ² Comminuted or ground food wastes must be able to pass through a screen with mesh no larger than 25 mm.
- ³ The discharge of introduced avian products in the Antarctic area is not permitted unless incinerated, autoclaved or otherwise treated to be made sterile.
- ⁴ Offshore platforms located 12 nm from nearest land and associated ships include all fixed or floating platforms engaged in exploration or exploitation or associated processing of seabed mineral resources, and all ships alongside or within 500 m of such platforms.
- ⁵ Cargo residues means only those cargo residues that cannot be recovered using commonly available methods for unloading.
- ⁶ These substances must not be harmful to the marine environment.

2.3.2 Compliance with Annex V involves personnel, equipment and procedures for collecting, sorting, processing, storing, recycling, reusing and discharging garbage. Economic and procedural considerations associated with these activities include storage space requirements, sanitation, equipment and personnel costs and in port garbage service charges.

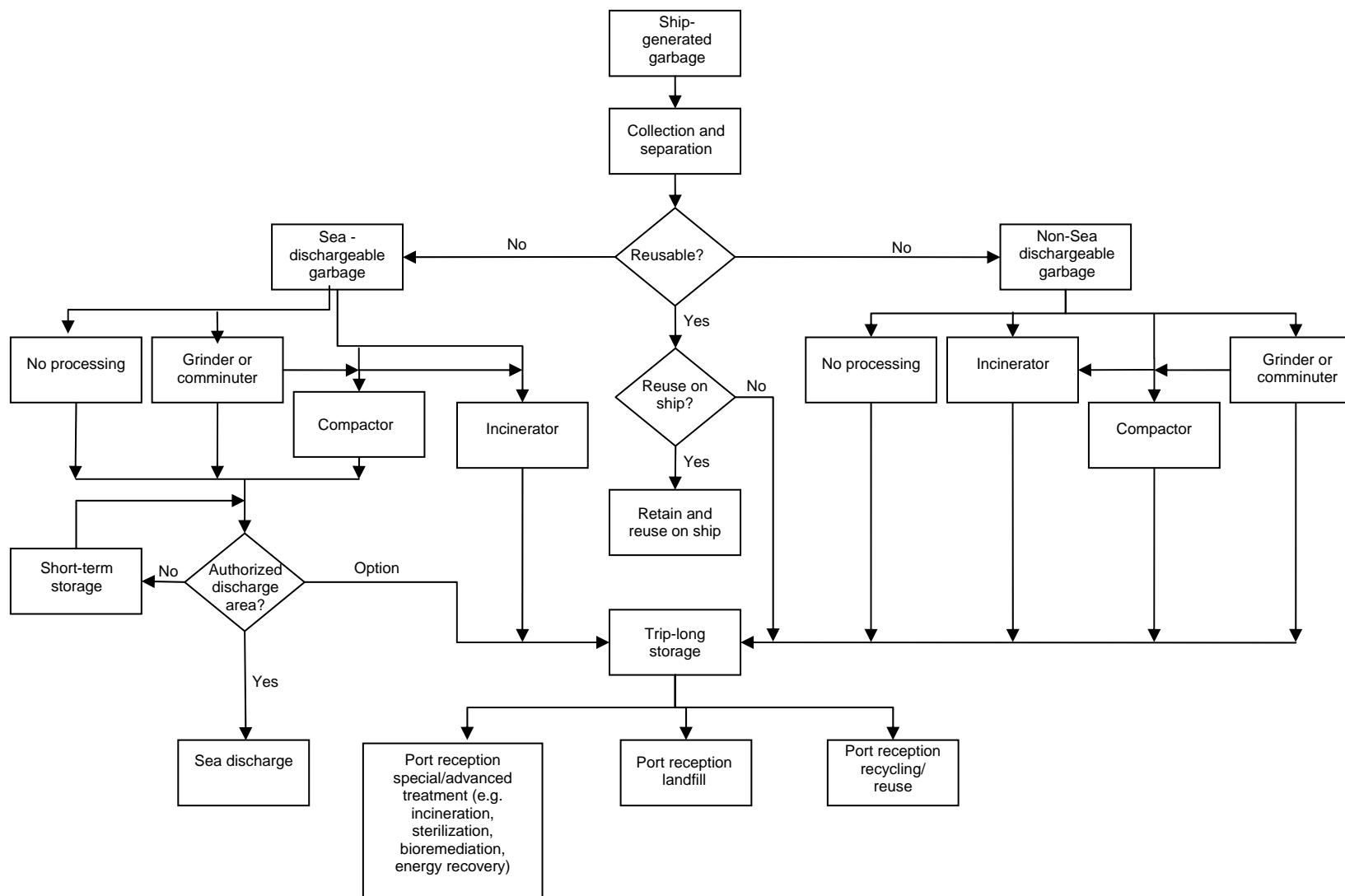
2.3.3 Compliance with the provisions of Annex V involves careful planning by the ship's owner and operator and proper execution by crew members as well as other seafarers. The most appropriate procedures for handling and storing garbage on board ships may vary depending on factors such as the type and size of the ship, the area of operation (e.g. special area, distance from nearest land or ice-shelf), shipboard garbage processing equipment and storage space, number of crew or passengers, duration of voyage, and regulations and reception facilities at ports of call. However, in view of the cost involved with the different garbage handling options, it is economically advantageous to first, limit the

amount of material that may become garbage from being brought on board the ship and second, separate garbage eligible for discharge into the sea from other garbage that may not be discharged into the sea. Proper management of containers and packaging coming on board and proper handling and storage can minimize shipboard storage space requirements and enable efficient transfer of retained garbage to port reception facilities for proper handling (i.e. recycling, reuse) or land-based disposal.

2.3.4 Every ship of 100 gross tonnage and above, and every ship certified to carry 15 or more persons, and fixed and floating platforms are required to carry and implement a garbage management plan that specifies procedures to be followed to ensure proper and efficient handling and storage of garbage. A garbage management plan² should be developed that can be incorporated into crew and ship operating manuals. Such manuals should identify crew responsibilities (including an Environmental Control Officer) and procedures for all aspects of handling and storing garbage on board the ship. Procedures for handling ship-generated garbage are divided into four phases: collection, processing, storage, and discharge. A generalized garbage management plan for handling and storing ship-generated garbage is presented in table 2. Specific procedures for each phase are discussed below.

² Garbage management plans are mandatory on certain ships in accordance with regulation 10 of Annex V of MARPOL 73/78.

Table 2: Options for shipboard handling and discharge of garbage



2.4 Collection

2.4.1 Procedures for collecting garbage generated on board should be based on the consideration of what is permitted and what is not permitted to be discharged into the sea while en route, and whether a particular garbage type can be discharged to port facilities for recycling or reuse. The details of these procedures should be written in the garbage management plan.

2.4.2 To reduce or avoid the need for sorting after collection and to facilitate recycling, it is recommended that distinctively marked garbage receptacles be provided on board the ship to receive garbage as it is generated. Receptacles on board can be in the form of drums, metal bins, cans, container bags, or wheelie bins. Any receptacles on deck areas, poop decks or areas exposed to the weather should be secured on the ship and have lids that are tight and securely fixed. All garbage receptacles should be secured to prevent loss, spillage, or loss of any garbage that is deposited in the receptacles. Receptacles should be clearly marked and distinguishable by graphics shape, size, or location. Receptacles should be placed in appropriate spaces throughout the ship (e.g. the engine-room, mess deck, wardroom, galley, and other living or working spaces) and all crew members and passengers should be advised of what garbage should and should not be placed in them.

2.4.3 The recommended garbage types that should be separated are:

- non-recyclable plastics and plastics mixed with non-plastic garbage;
- rags;
- recyclable material:
 - cooking oil;
 - glass;
 - aluminium cans;
 - paper, cardboard, corrugated board;
 - wood;
 - metal;
 - plastics; (including styrofoam or other similar plastic material); and
- garbage that might present a hazard to the ship or crew (e.g. oily rags, light bulbs, acids, chemical, batteries, etc.).

2.4.4 Crew responsibilities should be assigned for collecting or emptying these receptacles and taking the garbage to the appropriate processing or storage location. Use of such a system facilitates subsequent shipboard processing and minimizes the amount of garbage which must be stored on board ship for return to port.

Plastics and plastics mixed with non-plastic garbage

2.4.5 Plastics are used for a variety of marine purposes including, but not limited to, packaging (vapour-proof barriers, bottles, containers, liners, bags, cargo wrapping material, foam cushioning material, etc.); ship construction (fibreglass and laminated structures, siding, piping, insulation, flooring, carpets, fabrics, paints and finishes, adhesives, electrical and electronic components, etc.); disposable eating utensils (styrofoam plates, bowls, food containers, cups, etc.); bags; sheeting; floats; fishing nets; fishing lines; strapping bands; wire rope with synthetic fibre sheaths; combination wire rope; rope; line; sails; and many other manufactured plastic items.

2.4.6 Regulation 3.2 of Annex V prohibits the discharge of all plastics into the sea. When plastic is mixed with other garbage, the mixture must be treated as if it were all plastic. The most stringent procedures for the handling and discharge should be followed taking into account the applicable provisions of the garbage management plan.

Food wastes

2.4.7 Some governments have regulations for controlling human, plant, and animal diseases that may be carried by foreign food wastes and materials that have been associated with them (e.g. food packing and disposable eating utensils, etc.). These regulations may require incinerating, sterilizing, double bagging or other special treatment of garbage to destroy possible pest and disease organisms. This type of garbage should be kept separate from other garbage and preferably retained for discharge at port reception facilities in accordance with the laws of the receiving country. Governments are reminded of their obligation to ensure the provision of adequate reception facilities. Precautions must be taken to ensure that plastics contaminated by food wastes (e.g. plastic food wrappers) are not discharged into the sea with other food wastes.

Synthetic fishing net and line scraps

2.4.8 As regulation 3.2 of MARPOL Annex V prohibits the discharge into the sea of synthetic fishing net and line scraps generated by the repair or operation of fishing gear, these items should be collected in a manner that avoids their loss overboard. Such material may be incinerated, compacted, or stored along with other plastics or it may be preferable to keep it separate from other types of garbage if it has strong odour or is present in great volume. Unless such garbage is appropriately incinerated, the atmospheric incineration products could be toxic. Onboard incineration should follow regulation 16 of MARPOL Annex VI.

Recovery of garbage at sea

2.4.9 Seafarers are encouraged to recover persistent garbage from the sea during routine operations as opportunities arise and prudent practice permits, and they are encouraged to retain the material for discharge to port reception facilities.

2.5 Processing

2.5.1 Depending on factors such as the type of ship, area of operation, number of crew or passengers, etc., ships may be equipped with incinerators³, compactors, comminuters, or other devices for shipboard garbage processing (see sections 2.8 to 2.11). Appropriate members of the crew should be trained and assigned responsibility for operating this equipment on a schedule commensurate with ship needs. In selecting appropriate processing procedures, the following should be considered.

2.5.2 Use of compactors, incinerators, comminuters, and other such devices has a number of advantages, such as, reducing shipboard space requirements for storing garbage, and making it easier to discharge garbage at port reception facilities.

2.5.3 It should be noted that special rules on incineration under domestic law may apply in some ports and may exist in some special areas. Incineration of hazardous materials (e.g. scraped paint, impregnated wood) and certain types of plastics (e.g. PVC-based plastics or other plastics containing hazardous chemicals) calls for special precaution due to

³ Refer to resolution MEPC.76(40), "Standard specification for shipboard incinerators". Amended by resolution MEPC.93(45).

the potential environmental and health effects from combustion of by-products. The problems of combustion of by-products are discussed in 2.11.3.

2.5.4 Ships operating primarily in special areas or within three nautical miles from the nearest land or ice-shelf are greatly restricted in what they can discharge. These ships should choose between storage of either compacted or uncompacted material for discharging at port reception facilities or incineration with retention of ash and clinkers. The type of ship and the expected volume and type of garbage generated determine the suitability of compaction, incineration or storage options.

2.6 Storage

2.6.1 Garbage collected from throughout the ship should be delivered to designated processing or storage locations. Garbage that must be returned to port for discharge at port reception facilities may require storage until arrangements can be made to discharge it ashore for appropriate processing. In all cases, garbage should be stored in a manner which avoids health and safety hazards. The following points should be considered when selecting procedures for storing garbage:

- .1 sufficient storage space and equipment (e.g. cans, drums, bags or other containers) should be provided. Where storage space is limited, ship operators are encouraged to consider the installation of compactors or incinerators. To the extent possible, all processed and unprocessed garbage stored for any length of time should be in tight, securely covered containers in order to prevent the unintentional discharge of stored garbage;
- .2 food wastes and other garbage to be returned to port and which may carry diseases or pests should be stored in tightly covered containers and be kept separate from garbage which does not contain such food wastes. Quarantine arrangements in some countries may require double bagging of this type of waste. Both types of garbage should be stored in separate clearly marked containers to avoid incorrect discharge and facilitate proper handling and treatment on land; and
- .3 cleaning and disinfecting are both preventative and remedial pest control methods that should be applied regularly in garbage storage areas.

2.7 Discharge

2.7.1 Although discharge into the sea of limited types of garbage is permitted under Annex V, discharge of garbage to port reception facilities should be given primary consideration. When discharging garbage, the following points should be considered:

- .1 regulations 4, 5, and 6 of MARPOL Annex V, summarized in table 1, set forth the requirements for garbage permitted to be discharged into the sea. In general the discharge shall take place when the ship is en route and as far as practicable from the nearest land. Attempts should be made to spread the discharge over as wide an area as possible and in deep water (50 metres or more). Prevailing currents and tidal movements should be taken into consideration when discharging into the sea is permitted; and

- .2 to ensure timely transfer of large quantities of ship-generated garbage to port reception facilities, it is essential for shipowners, operators or their agents to make arrangements well in advance for garbage reception. At the same time, discharge needs should be identified in order to make arrangements for garbage requiring special handling or other necessary arrangements. Advice should be provided to the port of the type of garbage to be discharged and whether it is separated and the estimated amounts. The port may have special discharge requirements for food wastes and related garbage which may carry certain disease or pest organisms, dunnage, batteries, medicines, outdated pyrotechnics or unusually large, heavy, or odorous derelict fishing gear, etc.

2.8 Shipboard equipment for processing garbage

2.8.1 The choice of options⁴ for garbage processing depends largely upon personnel limitations, generation rate, capacity, vessel configuration, voyage route and availability of port reception facilities. The type of equipment available for shipboard garbage handling includes incinerators, compactors, comminuters and their associated hardware.

2.9 Grinding or comminution

2.9.1 The discharge of comminuted food wastes may be permitted under regulations 4.1.1 and 6.1.1 of MARPOL Annex V whilst the ship is en route. Such comminuted or ground food waste must be capable of passing through a screen with openings no greater than 25 mm.

2.9.2 A wide variety of food waste grinders is available on the market and most modern ships' galleys have the equipment needed to produce a slurry of food particles and water that washes easily through the required 25 mm screen. Output ranges from 10 to 250 litres per minute. The discharge from shipboard comminuters should be directed into an appropriately constructed holding tank when the vessel is operating within an area where discharge is prohibited.

2.9.3 Size reduction of certain other garbage items can be achieved by shredding or crushing and machines for carrying out this process are available for use on board ships.

2.9.4 Information on the development, advantages and use of comminuters for processing food waste aboard ships should be forwarded to the Organization for sharing between interested parties.

2.9.5 Outside special areas, ships operating primarily beyond three nautical miles from the nearest land are encouraged to install and use comminuters to grind food wastes to a particle size capable of passing through a screen with openings no larger than 25 mm. Regulation 4 requires comminuting or grinding food wastes if the food wastes are to be discharged between three and 12 nautical miles from the nearest land. Although unprocessed food wastes may be discharged beyond 12 nautical miles, it is recommended that comminuters be used as they hasten assimilation into the marine environment. Because food wastes comminuted with plastics cannot be discharged into the sea, all plastic materials need to be removed before food wastes are placed into a comminuter or grinder.

⁴ Reference may also be made to other technical guidance such as, ISO/CD21070 Ships and marine technology – Marine environment protection – Management and handling of shipboard garbage.

2.9.6 When operating *inside* a special area, regulation 6 of MARPOL Annex V requires all food wastes to be comminuted or ground prior to discharge in to the sea. All discharges are to be as far as practicable and not less than 12 nautical miles from the nearest land or ice-shelf.

2.10 Compaction

Table 3 shows compaction options for various types of garbage.

Table 3 – Compaction options for shipboard-generated garbage

Examples of garbage	Special handling by vessel personnel before compaction	Compaction characteristics			Onboard storage space
		Rate of alteration	Retainment of compacted form	Density of compacted form	
Metal, food and beverage containers, glass, small wood pieces	None	Very rapid	Almost 100%	High	Minimum
Comminuted plastics, fibre and paper board	Minor – reduce material to size for feed, minimal manual labour	Rapid	Approximately 80%	Medium	Minimum
Small metal drums ⁵ , uncomminuted cargo packing, large pieces of wood	Moderate – longer manual labour time required to size material for feed	Slow	Approximately 50%	Relatively low	Moderate
Uncomminuted plastics	Major – very long manual labour time to size material for feed; usually impractical	Very slow	Less than 10%	Very low	Maximum
Bulky metal cargo containers, thick metal items	Impractical for shipboard compaction; not feasible	Not applicable	Not applicable	Not applicable	Maximum

⁵ Small and large drums can be compacted very easily with the proper device – a large number of these devices have been designed for remote locations, and therefore they are small and easy to operate with excellent results. It should be noted, that the compaction of drums is probably restricted to larger vessels, due to lack of space on smaller (fishing) vessels.

2.10.1 Most garbage can be compacted to some degree; the exceptions include unground plastics, fibre and paper board, bulky cargo containers and thick metal items. Pressurized containers should not be compacted or shredded without the use of specialized equipment designed for this purpose because they present an explosion hazard in standard compactors.

2.10.2 Compaction reduces the volume of garbage. In most cases, the output from a compactor is a block of material which facilitates the shipboard storage of garbage and its discharging of the material in a port facility. It should be taken into account that the output from a compactor might be subject to quarantine, sanitary or health requirements or other requirements from the port reception facilities and advice from local authorities should be sought on any standards or requirements which are additional to those set by the Organization.

2.10.3 Compactors have options including sanitizing, deodorizing, adjustable compaction ratios, bagging in plastic or paper, boxing in cardboard (with or without plastic or wax paper lining), baling, etc. Compacted materials should be stored appropriately. While metal and plastic bales can get wet, paper and cardboard bales should be kept dry.

2.10.4 If grinding machines are used prior to compaction, the compaction ratio can be increased and the storage space decreased. Careful investigation of the appropriate compaction machine should be undertaken, based on the type and volume of material that will be compacted, as not all compactors require grinding. Compaction is just one step in the solid waste management scheme and the shipowner/operator should ensure all phases of garbage management are described in their Garbage Management Plan. Proper care should be taken when handling and storing binder wrap to prevent it from accidentally entering the marine environment.

2.10.5 A compactor should be installed in a compartment with adequate room for operating and maintaining the unit and storing garbage to be processed. The compartment should be located adjacent to the areas of food processing and commissary store-rooms. If not already required by regulation, it is recommended that the space should have freshwater wash down service, coamings, deck drains, adequate ventilation and hand or automatic fixed fire-fighting equipment.

2.10.6 Information on the development and use of shipboard compactors should be forwarded to the Organization for sharing between interested parties.

2.11 Incineration

2.11.1 Ash and clinkers from shipboard incinerators should be considered as operational waste and, therefore, as garbage that is not eligible for discharge into the sea.

2.11.2 Incineration conducted in a shipboard incinerator can significantly reduce the need to store garbage on board the ship. Shipboard incinerators should be designed, constructed, operated and maintained in accordance with the IMO Standard Specification for Shipboard Incinerators (footnote 3). MARPOL Annex VI requires shipboard incinerators installed after 1 January 2000 to be type approved and meet specific air pollution criteria. Incinerators should only be used to incinerate materials that are specified by the incinerator manufacturer.

2.11.3 In general, shipboard incineration should not be undertaken when the ship is in port or at offshore terminal. Some ports may have domestic laws that specify additional air emission restrictions, particularly those near high population areas. The use of a shipboard incinerator may require permission from the port authority concerned.

2.11.4 Table 4 presents options for incineration of garbage, and includes considerations for special handling by vessel personnel, combustibility, reduction in volume, residual materials, exhaust, and onboard storage space. Most garbage is amenable to incineration with the exception of metal and glass.

Table 4 – Incineration options for shipboard-generated garbage

Examples of garbage	Special handling by vessel personnel ⁶ before incineration	Incineration characteristics				Onboard storage space
		Combustibility	Reduction of volume	Residual	Exhaust	
Paper Packing, food and beverage containers	Minor – easy to feed into hopper	High	Over 95%	Powder ash	Possibly smoky and not hazardous	Minimum
Fibre and paper board	Minor – reduce material to size for feed, minimum manual labour	High	Over 95%	Powder ash	Possibly smoky and not hazardous	Minimum
Plastics packaging, food and beverage containers, etc.	Minor – easy to feed into hopper	High	Over 95%	Powder ash	Possibly smoky and not hazardous based on incinerator design	Minimum
Plastics sheeting, netting, rope and bulk material.	Moderate – manual labour time to size reduction	High	Over 95%	Powder ash	Possibly smoky and not hazardous based on incinerator design	Minimum
Rubber hoses and bulk pieces	Major – manual labour time to size reduction	High	Over 95%	Powder ash	Possibly smoky and not hazardous based on incinerator design	Minimum
Metal food and beverage containers, etc.	Minor – easy to feed into hopper	Low	Less 10%	Slag	Possibly smoky and not hazardous	Moderate

⁶ Each operator of the onboard garbage incinerator should be trained and familiar in the use of the equipment and the types of garbage that can be destroyed in the incinerator.

Examples of garbage	Special handling by vessel personnel ⁶ before incineration	Incineration characteristics				Onboard storage space
		Combustibility	Reduction of volume	Residual	Exhaust	
Metal cargo, bulky containers, thick metal items	Major – manual labour time to size reduction(not easily incinerated)	Very low	Less 5%	Large metal Fragments and slag	Possibly smoky and not hazardous	Maximum
Glass food and beverage containers, etc.	Minor – easy to feed into hopper	Low	Less 10%	Slag	Possibly smoky and not hazardous	Moderate
Wood, cargo containers and large wood scrapes	Moderate – manual labour time to size reduction	High	Over 95%	Powder ash	Possibly smoky and not hazardous	Minimum

2.11.5 Some of the disadvantages of incinerators may include the possible hazardous nature of the ash or vapour, dirty operation, excessive labour required for charging, stoking and ash removal. Some incinerators may not be able to meet air pollution regulations imposed in some ports and harbours or by flag and coastal States when such matters are subject to their jurisdiction. Some of these disadvantages can be remedied by automatic equipment for charging and stoking, however, the additional equipment to perform automatic functions will require more installation space.

2.11.6 The incineration of garbage that contains a large amount of plastic involves very specific incinerator settings such as higher oxygen injection and higher temperatures (850 to 1,200°C). If these special conditions are not met, depending on the type of plastic and conditions of combustion, some toxic gases can be generated in the exhaust stream, including vaporized hydrochloric (HCl) and hydrocyanic (HCN) acids. These and other intermediary products of combustion of waste containing plastics are toxic to humans and marine life.

2.11.7 Onboard incineration of garbage may reduce the volume of garbage subject to quarantine requirements in some countries. However, incinerator ash may still be subject to local quarantine, sanitary or health requirements. Advice should be sought from local authorities regarding requirements that are in addition to MARPOL. For example, higher temperatures and more complete combustion may be required to effectively destroy organisms that present a risk.

2.11.8 Information on the development and advantages on the use of shipboard incinerator systems should be forwarded to the Organization for sharing between interested parties.

2.12 Treatment of animal carcasses

2.12.1 Only fit and healthy animals should be presented for loading as cargo and managed in accordance with international standards for the transport of animals at sea⁷. The master of the ship is expected to have responsibility for shipboard livestock operational issues, animal health and welfare, and conditions for the control and reporting of animal mortality on board.

2.12.2 Ships carrying live animal cargo consignments are expected to have animals that die during a voyage. These mortalities accrue gradually over the voyage and are dependent on various factors including age and type of animal species, facilities on board the ship and local climatic conditions. The most common mortality causes stem from enteritis, refusal to feed, injury, exhaustion, or illness not evident prior to loading. The mortality numbers are generally low and are operational issues to be controlled as part of cargo management practice. These mortalities are considered to be generated during the normal operation of the ship and liable to be discharged of continually or periodically and therefore subject to Annex V regulations.

2.12.3 As part of normal livestock ship management procedures, regular inspections (day and night) are recommended to ensure the health and welfare of the animals. It is recommended that these inspections include shipboard recording, on a daily basis, of the number of animals that have died or have been euthanized.

2.12.4 When mortalities occur on board, the carcasses should be removed from the pen areas and assessed for appropriate disposition. The options for appropriate discharge of the carcasses under Annex V will typically be discharge into the sea or discharge to a reception facility. Where the ship has an appropriate storage area on board, limited quantities of treated carcasses may be stored for short periods for subsequent discharge into the sea or to reception facilities. Any storage on board should take into account occupational health and safety requirements.

2.12.5 Regulation 4.1.4 of MARPOL Annex V permits the discharge into the sea of animal carcasses generated during the normal operation of a ship, but only if the ship is en route, outside a special area, as far as possible from the nearest land and taking into account the guidelines developed by the Organization. To comply with regulation 4.1.4 of MARPOL Annex V, it is recommended that the discharge into the sea should take place greater than 100 nautical miles (nm) from the nearest land and in the maximum water depth possible.

2.12.6 When a ship is on a voyage that is not often greater than 100 nm from nearest land, the retention of carcasses on board during conditions of high temperatures and high humidity may constitute a threat to human health and safety or to the remaining live animals. In these circumstances it may not be possible to discharge animal carcasses in accordance with these guidelines. In such circumstances where the master of the ship determines that such health and safety threats exist, it is recommended the discharge into the sea should take place greater than 12 nm from the nearest land. Where the discharge of animal carcasses at sea occurs under these circumstances, the entry in the Garbage Record Book of the position of the ship should also include a remark about these circumstances.

⁷ The World Organisation for Animal Health (OIE) formulated "Guidelines for the Transport of Animals by Sea" as part of the Terrestrial Animal Health Code (2010).

2.12.7 Animal carcasses should be split or otherwise treated prior to their discharge at sea. Procedures for the treatment of carcasses should take into account the health and safety of the crew and other livestock cargo. Treatment should facilitate the sinking or dispersal of the carcass when it is discharged into the sea.

2.12.8 Treatment of a carcass involves:

- manually slitting or cutting the carcass to the extent that the thoracic and abdominal cavities are opened; or
- passing the carcass through equipment such as a comminuter, grinder, hogger, or mincer.

2.12.9 For each animal carcass incinerated, discharged into the sea or discharged to a reception facility, an entry in the Garbage Record Book shall be made. The entry should include the date/time, position of the ship and remarks to specify the animal species (e.g. sheep, cattle, goats), the category "H" and the number of carcasses discharged. Where the discharge is to a reception facility, the receipt obtained from the facility should be attached to the Garbage Record Book.

2.12.10 Following the completion of a voyage, the master of the ship is encouraged to provide a copy of the pages of the Garbage Record Book that contain the entries for the discharges of animal carcasses at sea to the flag State and the State from whose port the voyage originated, and other information requested.

2.12.11 Governments are encouraged to analyse the garbage records of discharges of animal carcasses and other relevant information to inform and assist future reviews of the Annex V guidelines and regulations.

Mortalities in excess of those generated during the normal operation of a ship

2.12.12 Carcasses of animals resulting from mortalities in excess of those generated during the normal operation of a ship are not "garbage" under Annex V and are not covered under these guidelines. To assist in managing these situations, masters should contact the flag State of the ship and where appropriate, port and/or coastal State(s) to seek guidance on the appropriate legal regimes and requirements, as well as consult relevant IMO guidelines and circulars. In particular, masters should refer to the joint London Convention-London Protocol/MEPC "Guidance on Managing Spoilt Cargoes".

2.12.13 "Mortalities in excess of those generated during the normal operation of a ship" refers to animal mortalities in excess of those described in paragraph 2.12.2. While this could be a number of animals dying at the same time or within a short period of time, the number of mortalities that exceed those generated during the normal operation of a ship will depend upon the animal species and the total number and/or species carried in the consignment.

2.12.14 Circumstances that may result in mortalities that exceed those generated during the normal operation of the ship, include:

- malfunctioning of ventilation or watering systems;
- weather events such as heat waves or storm systems;
- infectious disease outbreaks; and
- refusal of cargo offloading by authorities at destination, leading to the need to euthanize some or all of the live animal cargo.

2.12.15 The guidance provided above and in the LC-LP/MEPC Circular on guidance on managing spoilt cargoes is not a substitute for any stricter requirements imposed upon a ship by a port State, a flag State or the exporting country, for the management of livestock cargoes.

2.13 Discharge of fish carried as a cargo

2.13.1 Fish, including shellfish, carried on board as cargo that have died or been euthanized on board during the voyage are considered to be animal carcasses and should, to the extent practicable, be treated in the manner set out in section 2.12 of these guidelines. Governments may want to consider additional actions to reduce the risk of spreading parasitic or pathogenic organisms.

3 MANAGEMENT OF CARGO RESIDUES OF SOLID BULK CARGOES

3.1 Cargo residues are included in the definition of garbage within the meaning of Annex V, regulation 1.9 and may be discharged in accordance with regulations 4.1.3 and 6.1.2. However, cargo material contained in the cargo hold bilge water should not be treated as cargo residues if the cargo material is not harmful to the marine environment and the bilge water is discharged from a loaded hold through the ship's fixed piping bilge drainage system.

3.2 Cargo residues are considered harmful to the marine environment and subject to regulations 4.1.3 and 6.1.2.1 of the revised MARPOL Annex V if they are residues of solid bulk substances which are classified according to the criteria of the United Nations Globally Harmonized System for Classification and Labelling of Chemicals (UN GHS) meeting the following parameters¹⁾:

- .1 Acute Aquatic Toxicity Category 1; and/or
- .2 Chronic Aquatic Toxicity Category 1 or 2; and/or
- .3 Carcinogenicity²⁾ Category 1A or 1B combined with not being rapidly degradable and having high bioaccumulation; and/or
- .4 Mutagenicity²⁾ Category 1A or 1B combined with not being rapidly degradable and having high bioaccumulation; and/or
- .5 Reproductive Toxicity²⁾ Category 1A or 1B combined with not being rapidly degradable and having high bioaccumulation; and/or
- .6 Specific Target Organ Toxicity Repeated Exposure²⁾ Category 1 combined with not being rapidly degradable and having high bioaccumulation; and/or
- .7 Solid bulk cargoes containing or consisting of synthetic polymers, rubber, plastics, or plastic feedstock pellets (this includes materials that are shredded, milled, chopped or macerated or similar materials).

Notes:

- 1) The criteria are based on UN GHS, fourth revised edition (2011). For specific products (e.g. metals and inorganic metal compounds) guidance available in UN GHS, annexes 9 and 10 are essential for proper interpretation of the criteria and classification and should be followed.
- 2) Products that are classified for Carcinogenicity, Mutagenicity, Reproductive toxicity or Specific Target Organ Toxicity Repeated Exposure for oral and dermal hazards or without specification of the exposure route in the hazard statement.

3.3 Cargo residues that are harmful to the marine environment may require special handling not normally provided by reception facilities. Ports and terminals receiving such cargoes should have adequate reception facilities for all relevant residues, including when contained in washwater.

3.4 Solid bulk cargoes should be classified and declared by the shipper as to whether or not they are harmful to the marine environment. Such declaration should be included in the information required in section 4.2 of the IMSBC Code.

3.5 Ports, terminals and ship operators should consider cargo loading, unloading and onboard handling practices⁸ in order to minimize production of cargo residues. Cargo residues are created through inefficiencies in loading, unloading, onboard handling. Options that should be considered to decrease the amount of such garbage include the following:

- .1 ensuring ships are suitable to carry the intended cargo and also suitable for unloading the same cargo using conventional unloading methods;
- .2 unloading cargo as efficiently as possible, utilizing all appropriate safety precautions to prevent injury or ship and equipment damage and to avoid or minimize cargo residues; and
- .3 minimizing spillage of the cargo during transfer operations by carefully controlling cargo transfer operations, both on board and from dockside. This should include effective measures to enable immediate communications between relevant ship and shore-based personnel during the transfer operations and when feasible, enclosure of conveyance devices such as conveyor belts. Since this spillage typically occurs in port, it should be completely cleaned up immediately following the loading and unloading event and handled as cargo; delivering it into the intended cargo space or into the appropriate unloading holding area.

3.6 When the master, based on the information received from the relevant port authorities, determines that there are no adequate reception facilities⁹ at either the port of departure or the port of destination in the case where both ports are situated within the same special area, the condition under regulation 6.1.2.3 should be considered satisfied.

3.7 MARPOL Annex V, regulation 6.1.2 also applies when the "port of departure" and the "next port of destination" is the same port. To discharge cargo hold washwater in this situation, the ship must be en route and the discharge must take place not less than 12 miles from the nearest land.

4 TRAINING, EDUCATION AND INFORMATION

4.1 These guidelines are intended to address governments, shipowners, ship operators, ships' crews, cargo owners, port reception facility operators and equipment manufacturers as sources of pollution of the sea by garbage. Accordingly, governments should develop and undertake training, education and public information programmes suited for all seafaring communities under their jurisdiction, prepared and presented in such a way that they communicate with that segment of the community.

⁸ Refer to the International Maritime Solid Bulk Cargoes Code and supplement 2009 Edition (IMSBC Code).

⁹ IMO Circular MEPC.1/Circ.469/Rev.1, Revised Consolidated Format for Reporting Alleged Inadequacy of Port Reception Facilities.

4.2 Governments may exchange and maintain information relevant to compliance, non-compliance and information on legal proceedings for violations with Annex V regulations through the Organization. Governments are encouraged to provide the Organization with the following:

- .1 technical information on shipboard garbage management methods such as minimization, recovery, recycling, reuse, incineration, compaction, separation, sorting and sanitation system, packaging and provisioning methods;
- .2 educational materials developed to raise the level of compliance with Annex V. This includes printed materials (e.g. placards, posters, brochures, etc.), photographs, DVDs, audio and video tapes, and films as well as synopses of training programmes, seminars and formal curricula; and
- .3 information and reports on the nature and extent of garbage from shipping found along beaches and in coastal waters under their respective jurisdictions. In order to assess the effectiveness of Annex V, these studies should provide details on amounts, distribution, sources and impacts of garbage from shipping.

4.3 Governments are encouraged to amend their maritime certification examinations and requirements, as appropriate, to include a knowledge of duties imposed by national and international law regarding the control of pollution of the sea by garbage.

4.4 Placards required by regulation 10.1 should contain a summary declaration stating the prohibition and restrictions for discharging garbage from ships under MARPOL Annex V and the possible penalties for failure to comply. Governments are encouraged to develop appropriate placards for use by every ship of their registry of more than 12 metres in length overall and fixed and floating platforms. (Sample placards targeting crew and shipboard operations; fixed or floating platforms and ships operating within 500 metres of such platforms; and passengers are shown in figures 1, 2 and 3.)

4.4.1 The declaration should be placed on a placard at least 12.5 cm by 20 cm, made of durable material and fixed in conspicuous and prominent places on board the ship. Placards should also be replaced when damage or wear compromises the readability of the declaration.

4.4.2 The placards should also be placed in prominent places where crew will be working and living, and in areas where bins are placed for collection of garbage. These places include galley spaces, mess room(s), wardroom, bridge, main deck and other areas of the ship, as appropriate. The placards should be displayed at line of sight height and be printed in the working language of the crew. Ships which operate internationally will also have placards printed in English, French or Spanish, in accordance with regulation 10.1.2 of MARPOL Annex V.

4.4.3 Where the ship carries passengers, placards also should be placed in prominent places where passengers are accommodated and congregate. These include cabins, all deck areas for recreational purposes open to passengers.

4.5 Governments should ensure that appropriate education and training in respect of MARPOL is included in the training programmes leading to STCW and STCW-F certification.

4.6 Governments are encouraged to have maritime colleges and technical institutes under their jurisdiction develop or augment curricula to include both the legal duties as well as the technical options available to professional seafarers for handling ship-generated garbage. These curricula should also include information on environmental and ecological impacts of garbage. A list of suggested topics to be included in the curriculum is provided below:

- .1 garbage in the marine environment, sources, methods for prevention of release of garbage to the environment and impacts on the environment;
- .2 national and international laws relating to, or impinging upon shipboard waste management;
- .3 health and sanitation considerations related to the storage, handling and transfer of ship-generated garbage;
- .4 current technology for onboard and shoreside¹⁰ processing of ship generated garbage; and
- .5 provisioning options, materials and procedures to minimize the generation of garbage aboard ships.

4.7 Professional associations and societies of ship officers, engineers, naval architects, shipowners and managers, and seafarers are encouraged to ensure their members' competency regarding the handling of ship-generated garbage.

4.8 Ship and reception facility operators should establish detailed training programmes for personnel operating and maintaining ships garbage reception or processing equipment. It is suggested that the programme include instruction on what constitutes garbage and the applicable regulation for handling and disposing of it. Such training should be reviewed annually and updated as appropriate.

4.9 Generalized public information programmes are needed to provide information to non-professional seafarers, and others concerned with the health and stability of the marine environment, regarding the impacts of garbage at sea. Governments and involved commercial organizations are encouraged to utilize the Organization's library and to exchange resources and materials, as appropriate, to initiate internal and external public awareness programmes.

4.9.1 Methods for delivering this information include radio and television, articles in periodicals and trade journals, voluntary public projects such as beach clean-up days and adopt-a-beach programmes, public statements by high government officials, posters, brochures, social media, conferences and symposia, cooperative research and development, voluntary product labelling and teaching materials for public schools.

4.9.2 Audiences include recreational sailors and fishermen, port and terminal operators, coastal communities, ship supply industries, shipbuilders, garbage management industries, plastic manufacturers and fabricators, trade associations, educators and governments.

¹⁰ Reference may also be made to other technical guidance such as, ISO/CD16304 Ships and marine technology – Marine environment protection – Arrangement and management of port waste reception facilities.

4.9.3 The subjects addressed in these programmes are recommended to include the relevant domestic and international law; options for handling garbage at sea and upon return to shore; known sources and types of garbage; impacts of plastics on marine life and ship operations; the accumulation of garbage in the world's oceans and seas impacts on coastal tourist trade; current actions by governments, intergovernmental organizations, non-governmental organizations and sources of further information.

5 PORT RECEPTION FACILITIES FOR GARBAGE

5.1 The methodology for determining the adequacy of a reception facility should be based on the number and types of ships that will call at the port, the waste management requirements of each type of ship as well as the size and location of a port. Emphasis should also be placed on calculating the quantities of garbage, including recyclable material from ships which are not discharged into the sea in accordance with the provisions of Annex V.

5.2 It should be noted that, due to differences in port reception procedures and additional treatment among ports, port reception facilities may require the separation on board of:

- .1 food wastes (e.g. animal derived products and by-products because of risk of animal diseases);
- .2 cooking oil (animal derived products and by-products because of risk of animal diseases);
- .3 plastics;
- .4 domestic waste, operational waste and recyclable or reusable material;
- .5 special items like medical waste, outdated pyrotechnics and fumigation remnants;
- .6 animal wastes, including used bedding from the transport of live animals (due to risk of disease) but excluding drainage from spaces containing living animals; and
- .7 cargo residues.

5.3 Ship, port and terminal operators should consider the following when determining quantities and types of garbage on a per ship basis:

- .1 types of garbage normally generated;
- .2 ship type and design;
- .3 ship operating route;
- .4 number of persons on board;
- .5 duration of voyage;
- .6 time spent in areas where discharge into the sea is prohibited or restricted; and
- .7 time spent in port.

5.4 Governments, in assessing the adequacy of reception facilities, should also consider the technological challenges associated with the recycling, treatment and discharge of garbage received from ships. Governments should take responsible actions within their national programmes to consider garbage management standards. In doing so, relevant international standards should be taken into account.

5.4.1 The type and capacity of equipment for treatment and final disposal of garbage is a significant factor in determining the adequacy of a reception facility. It not only provides a measure of the time required to complete the process, but it also is the primary means for ensuring that ultimate disposal of the garbage is environmentally sound.

5.4.2 Governments should continue to carry out studies into the provision of reception facilities at ports in their respective countries. Governments should carry out the studies in close cooperation with port authorities and other local authorities responsible for garbage handling. Such studies should include information such as a port-by-port listing of available garbage reception facilities, the types of garbage they are equipped to handle their capacities and any special procedures required to use them. Governments should submit data on the availability of port reception facilities to GISIS.

5.4.3 While selecting the most appropriate type of reception facility for a particular port, consideration should be given to several alternative methods available. In this regard, floating plants for collection of garbage, such as barges or self-propelled ships, might be considered more effective in a particular location than land-based facilities.

5.5 These guidelines aim to stimulate governments to develop modern waste reception facilities and continue to improve their garbage management processes. Information on developments in this area should be forwarded to the Organization.

5.6 Governments are encouraged to develop policies and practices that facilitate the reduction, use and recycling of ship-generated garbage. The development of port reception facilities and associated guidance that aids the handling of separated garbage from ships should encourage ships to separate garbage on board.

6 ENHANCEMENT OF COMPLIANCE WITH MARPOL ANNEX V

6.1 Recognizing that direct enforcement of Annex V regulations, particularly at sea, is difficult to accomplish, governments are encouraged to consider not only restrictive and punitive measures consistent with international law, but also the removal of any disincentives, the creation of positive incentives and initiatives to facilitate more effective compliance, and the development of voluntary measures within the regulated community when developing programmes and domestic legislation to ensure compliance with Annex V.

6.2 Compliance Facilitation and Enforcement

6.2.1 Ships should inform their flag State of ports in foreign countries Party to Annex V which do not have adequate port reception facilities for garbage. This can provide a basis for advising responsible governments of possible problems and calling the Organization's attention to possible issues of compliance. An acceptable reporting format is reproduced in MEPC.1/Circ.671, along with the procedure for submitting and handling such reports.

6.2.2 Governments should develop a strategy to assess or audit port reception facilities under their jurisdiction. Detailed guidance in this regard is provided by the Organization. At a minimum, periodic inspection of the reception facilities is recommended and consideration should be given to establishing a documentation system (e.g. letters or certificates) stating that adequate facilities are available for receiving ship-generated garbage.

6.2.2.1 Governments are encouraged to improve the adequacy and efficiency of existing port reception facilities for fishing gear.

6.2.3 Governments should identify appropriate agencies for enforcement and facilitating compliance and provide legal authority, adequate training, funding and equipment to incorporate the goals and objectives under Annex V regulations into their responsibilities. In those cases where customs or agricultural officials are responsible for receiving and inspecting garbage, governments should ensure that the inspections are facilitated.

6.2.4 Governments should consider the use of garbage management reporting systems. Such reporting systems may provide valuable data for measuring and monitoring the impacts of garbage regulations and management and identifying trends over time. A reporting system could be based on the information in garbage record books (where applicable) or ship's log. In addition advance notification forms and garbage reception receipts could provide input into the garbage reporting system.

6.2.5 A garbage management reporting system may also include reporting of discharges of garbage. Particular attention should be given to the reporting of any discharge in special areas; discharge at port reception facilities; and discharge of garbage into the sea. Reports should include the date, time, location by latitude and longitude, or name of port, type of garbage and estimated amount of garbage discharged. Particular attention should be given to the reporting of:

- .1 the loss of fishing gear;
- .2 the discharge of cargo residues;
- .3 any discharge in special areas;
- .4 discharge at port reception facilities; and
- .5 discharge of garbage into the sea, in those limited situations, where permitted.

6.2.6 The issuance of documents or receipts (i.e. IMO standard forms) by port reception facilities might also be used in maintaining a garbage management reporting system.

6.3 Compliance incentive systems

6.3.1 The augmentation of port reception facilities to serve ship traffic without undue delay or inconvenience may call for capital investment from port and terminal operators as well as the garbage management companies serving those ports. Governments are encouraged to evaluate means within their authority to lessen this impact, thereby helping to ensure that garbage delivered to port is actually received and disposed of properly at reasonable cost or without charging special fees to individual ships. Such means could include, but are not limited to:

- .1 tax incentives;
- .2 loan guarantees;
- .3 public vessel business preference;
- .4 special funds to assist in problem situations such as remote ports with no land-based garbage management system in which to deliver ships' garbage;
- .5 government subsidies; and
- .6 special funds to help defray the cost of a bounty programme for lost, abandoned or discarded fishing gear or other persistent garbage. The programme would make appropriate payments to persons who retrieve such fishing gear, or other persistent garbage other than their own, from marine waters under the jurisdiction of government.

6.3.2 The minimization of taking packaging on board and the installation of shipboard garbage management handling and processing equipment would facilitate compliance with Annex V and lessen the burden on port reception facilities to process garbage for discharge. Therefore, governments might consider actions to encourage the reduction of packaging and the installation of certain types of garbage processing equipment on ships operating under its flag. For example, programmes to lessen costs to shipowners for purchasing and installing such equipment, or requirements for installing compactors, incinerators and comminuters during construction of new ships could be very helpful.

6.3.3 Governments are encouraged to consider the economic impacts of domestic regulations intended to ensure compliance with Annex V. Due to the highly variable nature of ship operations and configurations, consideration should be given in domestic regulations to permitting ships the greatest range of options for complying with Annex V. However, any range of options needs to be consistent with Annex V and should facilitate the implementation of and compliance with Annex V.

6.3.4 Governments are encouraged to support research and development of technology that facilitates compliance with Annex V regulations for ships and ports. This research should concentrate on:

- .1 minimization of packaging;
- .2 shipboard garbage handling systems;
- .3 ship provision innovations to minimize garbage generation;
- .4 loading, unloading and cleaning technologies to minimize dunnage, spillage and cargo residues;
- .5 new ship construction design to facilitate garbage management and transfer and to minimize retention of cargo in ship holds; and
- .6 wharf and berth design to facilitate garbage management and transfer.

6.3.5 Governments are encouraged to work within the Organization to develop port reception systems that simplify the transfer of garbage for international vessels.

6.4 Voluntary measures

6.4.1 Governments are encouraged to assist ship operators and seafarers' organizations in developing resolutions, by-laws and other internal mechanisms that encourage compliance with Annex V regulations. Some of these groups include:

- .1 seamen and officer unions;
- .2 associations of shipowners, insurers, classification societies;
- .3 pilot associations; and
- .4 fishermen's organizations.

6.4.2 Governments are encouraged to assist and support, where possible, the development of mechanisms to promote compliance with Annex V among port authorities, terminal operators, stevedores, longshoremen, and land-based garbage management authorities.

Sample placard targeting crew and shipboard operations

Discharge of all garbage into the sea is prohibited except provided otherwise

The MARPOL Convention and domestic law prohibit the discharge of most garbage from ships. Only the following garbage types are allowed to be discharged and under the specified conditions.

Outside Special Areas designated under MARPOL Annex V:

- Comminuted or ground food wastes (capable of passing through a screen with openings no larger than 25 millimetres) may be discharged not less than 3 nautical miles from the nearest land.
- Other food wastes may be discharged not less than 12 nautical miles from the nearest land.
- Cargo residues classified as not harmful to the marine environment may be discharged not less than 12 nautical miles from the nearest land.
- Cleaning agents or additives in cargo hold, deck and external surfaces washing water may be discharged only if they are not harmful to the marine environment.
- With the exception of discharging cleaning agents in washing water, the ship must be en route and as far as practicable from the nearest land.

Inside Special Areas designated under MARPOL Annex V

- More stringent discharge requirements apply for the discharges of food wastes and cargo residues; AND
- Consult Annex V and the shipboard garbage management plan for details.

For all areas of the sea, ships carrying specialized cargoes such as live animals or solid bulk cargoes should consult Annex V and the associated Guidelines for the implementation of Annex V.

Discharge of any type of garbage must be entered in the Garbage Record Book
Violation of these requirements may result in penalties.

Sample placard targeting fixed or floating platforms and ships operating within 500 metres of such platforms

Discharge of all garbage into the sea is prohibited except provided otherwise

The MARPOL Convention and domestic law prohibit the discharge of all garbage into the sea from fixed or floating platforms and from all other ships when alongside or within 500 metres of such platforms.

Exception: Comminuted or ground food wastes may be discharge from fixed or floating platforms located more than 12 miles from the nearest land and from all other ships when alongside or within 500 metres of such platforms. Comminuted or ground food wastes must be capable of passing through a screen no larger than 25 millimetres.

Discharge of any type of garbage must be entered in the Garbage Record Book

Violation of these requirements may result in penalties.

Sample placard targeting passengers

Discharge of all garbage into the sea is prohibited except provided otherwise

The MARPOL Convention and domestic law generally prohibit the discharge of most forms of garbage from ships into the sea.

Violation of these requirements may result in penalties.

All garbage is to be retained on board and placed in the bins provided.

RESOLUTION MEPC.220(63)
Adopted on 2 March 2012

**2012 GUIDELINES FOR THE DEVELOPMENT OF
GARBAGE MANAGEMENT PLANS**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by the international conventions for the prevention and control of marine pollution,

RECALLING ALSO that Annex V of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto provides regulations for the prevention of pollution by garbage from ships,

NOTING that the Committee, at its thirty-eighth session, adopted the Guidelines for the Development of Garbage Management Plans by resolution MEPC.71(38),

NOTING ALSO that the Committee, at its sixty-second session, adopted the revised MARPOL Annex V by resolution MEPC.201(62), which is expected to enter into force on 1 January 2013,

NOTING FURTHER that regulation 10.2 of the revised MARPOL Annex V provides that every ship of 100 gross tonnage and above, and every ship which is certified to carry 15 or more persons and fixed or floating platforms shall carry a Garbage Management Plan based on the guidelines developed by the Organization,

RECOGNIZING the need to review the Guidelines for the Development of Garbage Management Plans, in light of the revised MARPOL Annex V,

HAVING CONSIDERED, at its sixty-third session, the draft 2012 Guidelines for the Development of Garbage Management Plans,

1. ADOPTS the 2012 Guidelines for the Development of Garbage Management Plans, the text of which is set out in the annex to this resolution;
2. INVITES Governments to apply the 2012 Guidelines for the Development of Garbage Management Plans, upon the entry into force of the revised MARPOL Annex V; and
3. REVOKES the Guidelines for the Development of Garbage Management Plans (resolution MEPC.71(38)), upon the entry into force of the revised MARPOL Annex V.

ANNEX

2012 GUIDELINES FOR THE DEVELOPMENT OF GARBAGE MANAGEMENT PLANS

For compliance with regulation 10 of the revised MARPOL Annex V

1 INTRODUCTION

1.1 In 2011, IMO adopted amendments to MARPOL Annex V which require that:

- .1 every ship of 100 gross tonnage and above, and every ship certified to carry 15 or more persons, and fixed or floating platforms shall carry a garbage management plan;
- .2 every ship of 400 gross tonnage and above, and every ship certified to carry 15 or more persons engaged in voyages to ports or offshore terminals of another Party, and every fixed or floating platform shall be provided with a Garbage Record Book; and
- .3 every ship of 12 metres or more in length overall, and fixed or floating platforms shall display placards which notify the crew and passengers of the ship's disposal requirements of regulations 3, 4, 5 and 6 of the Annex as applicable.

These provisions are included in regulation 10 to the revised MARPOL Annex V with an entry into force date of 1 January 2013.

1.2 These Guidelines provide direction on complying with the requirements for a ship's garbage management plan, and are intended to assist the shipowner/operator in the implementation of regulation 10.2 of the revised MARPOL Annex V. It is assumed that the author of the garbage management plan is familiar with the requirements of the revised MARPOL Annex V and the IMO Guidelines for the Implementation of MARPOL Annex V.

1.3 Shipowners and operators should also consult other available technical guidance on shipboard garbage handling such as, ISO 21070 "Standard for the Management and handling of shipboard garbage" which outlines best management practices for shipboard garbage management and, to the extent it is consistent with the revised MARPOL Annex V, should be incorporated in any garbage management plan.

1.4 A ship's garbage management plan should detail the specific ship's equipment, arrangements and procedures for the handling of garbage. The plan may contain extracts and/or references to existing company instructions.

2 REGULATORY REQUIREMENTS

2.1 Regulation 10.2 of MARPOL Annex V reads as follows:

"Every ship of 100 gross tonnage and above, and every ship which is certified to carry 15 or more persons, and fixed or floating platforms, shall carry a garbage management plan which the crew shall follow. This plan shall provide written procedures for minimizing, collecting, storing, processing and disposing of garbage, including the use of the equipment on board. It shall also designate the person or

persons in charge of carrying out the plan. Such a plan shall be based on the guidelines developed by the Organization and written in the working language of the crew."

3 PREVENTION OF POLLUTION FROM GARBAGE

3.1 To achieve cost-effective and environmentally sound results, many garbage management planners use a combination of complementary techniques to manage garbage, such as the following:

- .1 reduction at source;
- .2 reusing or recycling;
- .3 onboard processing (treatment);
- .4 discharge into the sea in those limited situations where it is permitted; and
- .5 discharge to a port reception facility.

3.2 When requisitioning stores and provisions, shipping companies should encourage their suppliers to remove, reduce, all packaging, at an early stage, to limit the generation of garbage on board ships.

3.3 When garbage is generated aboard a ship, procedures should be defined to enable the crew to sort the material that can be reused onboard the ship or recycled at an appropriate port reception facility.

3.4 Ship's garbage is made up of distinct components, some of which are regulated in MARPOL Annex V, while others may be regulated locally, nationally or regionally. Each component of the garbage should be evaluated separately to determine the best management practice for that type of garbage.

4 MATTERS WHICH SHOULD BE ADDRESSED IN THE GARBAGE MANAGEMENT PLAN

4.1 Designated person in charge of carrying out the plan

4.1.1 In accordance with regulation 10.2 of the revised MARPOL Annex V, the plan shall designate a person in charge of carrying out the plan. The person should ensure the garbage management plan is followed.

4.1.2 This person should be assisted by ship's crew to ensure that the minimization, collection, separation and processing of garbage is appropriate and efficient in all areas of the ship.

4.2 Procedures for collecting garbage

4.2.1 Identify suitable receptacles for collection and separation¹.

¹

Separation of garbage for the purposes of these Guidelines is considered part of the collection process. Separation may take place at the source or at a separate designated station.

4.2.2 Identify the locations of receptacles and collection and separation stations.

4.2.3 Describe the process of how garbage is transported from the source of generation to the collection and separation stations.

4.2.4 Describe how garbage is to be handled between primary collection and separation stations and other handling methods relating to the following:

- .1 needs of reception facilities, taking into account possible local recycling arrangements;
- .2 onboard processing and potential reuse of garbage aboard the ship;
- .3 storage; and
- .4 discharge into the sea in those limited situations where it is permitted.

4.2.5 Describe the training or education programmes to facilitate collection of garbage and sorting of reusable or recyclable material.

4.3 Procedures for processing garbage

4.3.1 Identify personnel responsible for the operation of the processing equipment.

4.3.2 Identify available processing devices and their capacities.

4.3.3 Identify the locations of processing devices and processing stations.

4.3.4 Identify the categories of garbage that are to be processed by each of the available processing devices.

4.3.5 Describe how material that can be reused or recycled is to be handled between primary processing stations and the storage or transfer stations.

4.3.6 Describe processing procedures used for the following:

- .1 needs of reception facilities, taking into account available recycling arrangements;
- .2 storage; and
- .3 discharge into the sea in those limited situations where it is permitted.

4.3.7 Describe the training or education programmes to facilitate the processing of garbage and reuse or recycling of material.

4.3.8 Identify standard operating procedures for the operation and maintenance of the equipment used to manage garbage. This may be done by reference to documents available on board.

4.4 Procedures for storing garbage or reusable or recyclable material

4.4.1 Identify the locations, the intended use, and the capacities of available storage stations for each category of garbage or reusable or recyclable material.

4.4.2 Describe the condition of how the garbage will be stored (for example, "food – frozen"; "cans – compacted and stacked"; "paper – compacted and should remain dry", etc.).

4.4.3 Describe how garbage, including reusable and recyclable material, is to be handled between storage stations and discharge with regard to the following:

- .1 discharge to reception facilities, taking into account available recycling arrangements; and
- .2 discharge into the sea in those limited situations where it is allowed.

4.4.4 Describe the training or education programmes to facilitate the storing of garbage and options for reusing and recycling components of the waste stream.

4.5 Procedures for discharging of garbage

4.5.1 Describe the ship's procedures to ensure and demonstrate compliance with the requirements of the revised MARPOL Annex V for the discharge of garbage.

RESOLUTION MEPC.221(63)
Adopted on 2 March 2012

**2012 GUIDELINES FOR THE DEVELOPMENT OF A
REGIONAL RECEPTION FACILITIES PLAN**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution,

REAFFIRMING the importance of providing adequate facilities for the reception of ship generated wastes and cargo residues in compliance with the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the 1978 and 1997 Protocols,

RECOGNIZING that the burden of providing port reception facilities in all ports has been a barrier to some States' ratification of MARPOL,

RECOGNIZING FURTHER that the unique circumstances of Small Island Developing States pose unique challenges for these States in meeting international shipping's needs for discharging ship generated wastes and cargo residues,

RECALLING the recognition by the Committee at its forty-ninth session that in certain areas regional arrangements are an acceptable way to satisfy MARPOL obligations to provide port reception facilities,

RECALLING ALSO the adoption of amendments to MARPOL Annexes I, II, IV, V and VI by resolutions MEPC.216(63) and MEPC.217(63), respectively, to provide for regional arrangements for Small Island Developing States where a Regional Reception Facilities Plan has been developed in accordance with the Guidelines to be developed by the Organization,

HAVING CONSIDERED the draft 2012 Guidelines for the Development of a Regional Reception Facilities Plan,

1. ADOPTS the 2012 Guidelines for the Development of a Regional Reception Facilities Plan, as set out in the annex to this resolution; and
2. INVITES Governments to apply the Guidelines, when considering the development of a Regional Reception Facilities Plan, upon the entry into force of the amendments to MARPOL Annexes I, II, IV, V and VI on regional arrangements for port reception facilities.

ANNEX

2012 GUIDELINES FOR THE DEVELOPMENT OF A REGIONAL RECEPTION FACILITIES PLAN

Objectives of the Guidelines

1 The Guidelines provide guidance for the development of a Regional Reception Facilities Plan (RRFP) to assist Member States in specific geographic regions of the world in the appropriate and effective implementation of regulation 38 of Annex I, regulation 18 of Annex II, regulation 12 of Annex IV, regulation 8 of Annex V and regulation 17 of Annex VI of MARPOL.

Application of the Guidelines

2 The Guidelines are provided to assist Governments to develop appropriate and effective regional port reception facilities' arrangements that meet the needs of international ships calling at ports and terminals within an identified geographical region. Detailed proposals for regional arrangements (RA) for port reception facilities should be submitted to the Marine Environment Protection Committee (MEPC) for consultation, in accordance with the Guidelines on the organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies (MSC-MEPC.1/Circ.4, as amended) . Submissions should be co-sponsored by all Member States whose ports and terminals will participate in the proposed RRFP. Before finalizing and implementing the RRFP, the proposing Parties should take into account the comments received as a result of the Committee's review.

Definitions

3.1 *Regional Reception Facilities Plan (RRFP)* – a document developed in accordance with Part 1 of these Guidelines.

3.2 *Regional Ships Waste Reception Centre (RSWRC)* – a port identified in the RRFP where adequate port reception facilities for ship generated wastes and cargo residues regulated under MARPOL are available.

3.3 *Period of review* – time in years after which an RRFP is to be reviewed, with a view to ensuring that the RA for port reception facilities in place under the RRFP continue to meet the needs of stakeholders and the objectives of MARPOL.

Part 1 – Development of a Regional Reception Facilities Plan (RRFP)

4 *Identification of the region to be covered by a RRFP* – For the purposes of an RRFP, a region should include the participating States and the ports that will be covered by the plan. A map should be provided, clearly showing the participating States and all ports within the region. The majority of States participating in an RRFP should be Small Island Developing States (SIDS). Although non-SIDS may participate, they should do so only so far as their ports may be Regional Waste Reception Centres. The obligations of non-SIDS to provide adequate reception facilities in all ports and terminals will not be satisfied by RA.

5 *Identification of the nature of the unique circumstances that impact on the ability to provide adequate port reception facilities* – A clear understanding of such unique circumstances will lead to a logical approach to designing RA that most efficiently address those circumstances. Generally, such circumstances will include practical difficulties on the part of a State to manage its own domestic waste, or a disproportionate additional burden from ships to the domestic waste stream. Distances between ports and suitable waste processing facilities may result in unacceptable costs for transport which may increase the risk of inappropriate treatment. A State's small geographical size may limit the space available to process or dispose of ship generated wastes and cargo residues, as may geomorphology (for example high water table or unstable land areas on low lying islands). A small population may limit the ability to provide staff to receive and process ship generated wastes and cargo residues at times convenient to ships. In addition to these examples, other unique circumstances may be present and should be fully described in the RRFP.

6 In demonstrating a compelling need for RA, alternatives should be explored, costed and assessed in terms of their environmental risk. For example, it may be relatively efficient to receive ship generated wastes and cargo residues in every port, temporarily store it and transport it to a central treatment plant for processing, while being sure to comply with applicable international law on the transboundary movement of hazardous wastes. The cost of such storage, transport and central processing may be less than providing comprehensive processing of ship generated wastes and cargo residues in the vicinity of every port, and may be more easily funded and/or recovered from port users. However, in some regions, the cost of transport may still be prohibitive and the environmental risk associated with the transport of the ship generated wastes and cargo residues may be unacceptable.

7 Note that RA are not intended as a quick solution for short-term problems (e.g. where an individual port has a temporary inability to provide adequate port reception facilities due to equipment breakdown, industrial action, severe weather etc.). RA is intended for ports where the practicality of providing port reception facilities is likely to be challenging for the foreseeable future. A clear understanding of the unique circumstances will also help to identify the areas or issues that may be able to be tackled in the long term to enhance the provision of port reception facilities throughout the region.

8 *Context for RA within a broader approach to waste management and implementation of MARPOL* – RA should be designed to complement other strategies to improving management of ship generated wastes and cargo residues within a region. It should be clearly understood and documented how RA will contribute to efforts to improve the ability of a State to effectively fulfil its obligations under MARPOL, or to accede to MARPOL where a State is not already a Party. Parties proposing RA should ensure that such arrangements would be suited to the vessels calling at ports within the region and would not encourage any illegal discharge into the sea.

9 *International and domestic shipping and the needs of ships operating in the region to discharge ship generated wastes and cargo residues* – Understanding shipping patterns is important to assessing the demand for port reception facilities in a region and in individual ports. The ships calling at each port within a region should be quantified, as well as the existing number of requests for reception of various types of ship generated wastes and cargo residues. Advice on how to approach this task is given in several IMO documents and publications.¹

¹ Refer to resolution MEPC.83(44) on Guidelines for Ensuring the Adequacy of Port Reception Facilities; the Comprehensive Manual on Port Reception Facilities (IMO, 1999); and Circular MEPC.1/Circ.671, Guide to Good Practice for Port Reception Facility Providers and Users.

10 The types of ships operating in a region should be carefully identified as certain ship types generate particular waste streams and/or are subject to specific ship generated wastes and cargo residues management requirements. For example:

- oil and chemical tankers – cargo slops from tankers can reach large volumes with high water content compared to other types of ships' generated wastes which is generally more concentrated;
- oil tankers of less than 150 gross tonnage – in most cases these ships are required to retain all oil on board;
- fishing vessels – damaged or otherwise decommissioned fishing gear can be bulky and contaminated with target and non-target species, including invasive aquatic species and fouling organisms;
- passenger vessels – these generally have larger volumes of garbage and sewage compared to the general merchant fleet; and
- recreational vessels – may lack or have limited pollution prevention equipment, for example smaller holding tanks and garbage storage areas, basic or no sewage treatment, no bilge water treatment.

11 For a successful regional approach, it is also important to understand the overall voyage pattern of ships calling at ports in the region. Therefore, an RRFP should take account of routes and ports of call, including origin and destination outside the region. A ship should not need to deviate from its route for the sole purpose of accessing port reception facilities. Aspects of routing and voyage planning that might affect the amount of ship generated wastes and cargo residues on board ships arriving in a particular region or port, and/or the need to clear ship generated wastes and cargo residues storage spaces prior to the onward journey, include:

- voyage through a Special Area where certain ship generated wastes and cargo residues may not be allowed to be discharged into the sea;
- voyage through a Particularly Sensitive Sea Area where associated protective measures include additional discharge restrictions;
- periods of anchorage prior to entering a port, during which ship generated wastes and cargo residues may accumulate on board; and
- average times spent in each port, which may provide greater or lesser opportunities to discharge ship generated wastes and cargo residues.

12 *Additional considerations* – There may be other factors that influence the demand for port reception facilities in a region or a particular port. For example, quarantine requirements within a region, in a particular port, or at the onward destination, may necessitate particular means of waste handling on board and/or in port (e.g. compulsory discharge to shore, incineration requirements, cleaning or disinfection, fumigation). Increased shipboard collection and segregation of recyclable and reusable materials may also influence demand for port reception facilities.

13 *All ports in the region, including type and available facilities* – The RRFP should contain a thorough assessment of the port reception facilities at all ports and terminals within the region. Several IMO documents and publications provide detailed information on what constitutes adequate facilities and how adequacy can be assessed. An assessment should also be made of any opportunities to provide adequate port reception facilities where such facilities are not already available.

14 *Identification of the selected Regional Ships Waste Reception Centres (RSWRC)* – Based on the foregoing assessments and considerations, an RRFP should identify which ports would be Regional Ships Waste Reception Centres (RSWRC). In general, these should be the ports where facilities are adequate to receive all types of ship generated wastes and cargo residues, including any ship generated wastes and cargo residues remaining on board a ship that has visited a port within the region where ship generated wastes and cargo residues cannot be delivered. RSWRCs should be located so as to be convenient according to the prevailing shipping patterns. This means that ships should not be forced to deviate from their voyage for the sole purpose of delivering ship generated wastes and cargo residues to shore. RSWRCs should be located so that ships can deliver ship generated wastes and cargo residues during normal port visits – that is, where the ship would otherwise have visited for the purposes of unloading, loading, provisioning or lay-up.

15 *Identification of ports with limited facilities (PLF)* – Based on the foregoing assessments, an RRFP should identify which ports have limited facilities (PLF).

16 *Identification of a central point of contact* – A central point of contact should be identified in an RRFP whose role should include:

- maintaining a current version of the RRFP;
- receiving and, where appropriate responding to or redirecting, inquiries about an RRFP;
- facilitating discussions between government, shipping and waste industry stakeholders regarding an RRFP;
- providing consistent information to government, shipping and waste industry stakeholders regarding an RRFP; and
- instigating periodic reviews of an RRFP.

17 Other functions could also be assigned to the central point of contact, depending on the size and complexity of an RRFP.

18 It is suggested that a government agency or authority, rather than an individual person, is nominated as the central point of contact to encourage continuity through any staff changes. The central point of contact should also be able to respond to enquiries in a timely manner. Hours of contact should be at least the business hours of the agency or authority.

19 *Identification of stakeholder roles and responsibilities* – this should list stakeholders and describe their roles and responsibilities in implementing or operating in a region covered by an RRFP. A generic example is provided below, but should be modified and/or expanded upon to address specific arrangements within a region.

Stakeholder	Examples of roles/responsibilities
Regulators (e.g. environment protection agencies, quarantine authorities, maritime authorities)	<ul style="list-style-type: none"> - Enforcing legislation related to the prevention of pollution from ships, management of ship generated wastes and cargo residues. - Licensing waste service providers. - Providing current information to the Organization, including updating GISIS, with respect to port reception facilities.
Port users (e.g. ships agents, masters)	<ul style="list-style-type: none"> - Maintaining an awareness of how to access information on RSWRCs, PLFs and individual port reception facilities in ports. - Providing timely advance notification of the need to access port reception facilities. - Submitting formal reports of alleged inadequacies of port reception facilities where appropriate.
Waste service providers	<ul style="list-style-type: none"> - Operating in accordance with relevant legislation. - Collecting ship generated wastes and cargo residues from vessels and transporting it to storage or disposal point. - Treating, reusing, recycling, destroying or otherwise managing ship generated wastes and cargo residues collected by waste transporters. - Providing current contact details to RRFP point of contact and other stakeholders as necessary.

20 *Period of review* – an RRFP should include a schedule for regular review by the participating States to take into account changing shipping patterns, types of ship generated wastes and cargo residues, local waste infrastructure and capacity improvements and other relevant circumstances. The aim of such a review process is to ensure that the objectives of the Convention and the needs of ships using ports covered by a RRFP continue to be met.

21 *Description of consultations undertaken with stakeholders in developing an RRFP* – this will assist in demonstrating to MEPC and stakeholders that the full range of stakeholder needs, roles and points of view have been thoroughly considered in developing an RRFP.

Part 2 – Consultation with MEPC on a Regional Reception Facilities Plan

22 *Submission to MEPC* – A proposal for a RRFP should be submitted to MEPC, at least twelve months before it is expected to come into effect, for review and comment by the Committee at its next regular session. The proposal should clearly state the date the RA comes into effect. Each submission should be coordinated by the central point of contact and sponsored by all States whose ports are included in the region.

- 23 MEPC should consider the submission according to the following criteria:
- .1 the region of application is clearly defined:
 - all States and ports participating in the RA are identified; and
 - a map of the region is provided;
 - .2 a compelling need for RA has been demonstrated through explanation of the unique circumstances that impact on the Parties' abilities to provide port reception facilities in every port within the region. It has also been clearly demonstrated that RA are the only practical means to meet the requirements of MARPOL. The submission should address the following considerations with respect to compelling need:
 - demonstrated difficulty in managing ship generated wastes and cargo residues in PLFs caused by physical, geographical or logistical circumstances; and
 - satisfactory explanation of alternative options that have been considered and why they are impractical or less efficient than RA;
 - .3 the RRFP contributes positively to the ability of the States involved to effectively implement their obligations under MARPOL, or to accede to if not already Party to MARPOL;
 - .4 the identified RSWRCs meet the needs of shipping within the region:
 - ships generally call at one or more RSWRCs during a voyage within a region;
 - ships generally have sufficient holding tanks and storage space for ship generated wastes and cargo residues, to retain for discharge to an RSWRC, discharge to sea in accordance with MARPOL, or discharge at a port outside the region;
 - there has been demonstrated consultation with current and expected port users to identify their needs for port reception facilities; and
 - all PLFs are serviced by one or more RSWRCs;
 - .5 the stakeholder roles are clear and evidence is presented showing that they have been defined in consultation with the stakeholders;
 - .6 a suitable central point of contact has been nominated:
 - appropriate administrative arrangements exist for the central point of contact to effectively carry out the role;
 - consultation with stakeholders on suitability of central point of contact has been demonstrated; and
 - telephone, fax and e-mail contact details are provided; and
 - .7 the specified period of review, as outlined in the proposal, is appropriate given anticipated changes in shipping patterns during the period.

24 All substantive comments on the proposed RRFP should be reflected in the report of the Committee.

25 When finalizing the RRFP, the Parties proposing the RRFP should take the MEPC comments into account to enhance the ability of the RA to meet the needs of shipping. In addressing the comments, the Parties proposing the RRFP may consider actions including, but not limited to, providing additional details in the RRFP, coordinating further with stakeholders, reconfiguring RSWRCs and/or administrative arrangements, and identifying future upgrades to existing facilities. The final RRFP should describe how the MEPC comments have been taken into account.

Part 3 – Communication of information

26 Article 11(1)(d) of MARPOL requires Parties to communicate to the Organization a list of port reception facilities including their location, capacity and available waste management services and other characteristics. In addition, there are requirements to notify the Organization how a RRFP takes into account these Guidelines and the particulars of the RSWRCs. Accordingly, a copy of the finalized RRFP should be forwarded to the Organization so that the Organization can notify Parties of the receipt of such information and circulate it to all Parties as required by Article 11(2).

27 In addition, all port reception facility contact details for each port should be kept up to date in GISIS, and a link to a website where the RRFP may be accessed should be provided in GISIS. Contact details for the central point of contact for the RRFP should be included. The primary responsibility for updating port reception facility details in GISIS remains with the port State, however, it may be prudent to assign a role to the central point of contact to monitor currency and encourage regular updates.

Part 4 – Alleged inadequate port reception facilities and regional arrangements

28 A regional system based on MEPC/Circ.470 "Waste reception facility reporting requirements" should be established among port States within a region for handling formal reports of alleged inadequate port reception facilities received in the format set out in MEPC/Circ.469/Rev.1 – "Revised consolidated format for reporting alleged inadequacies of port reception facilities". The primary responsibility for responding to formal reports of alleged inadequate port reception facilities remains with the port State, however, a regional system may include providing a copy of all relevant correspondence to the RRFP central point of contact, or may include more proactive involvement of the RRFP central point of contact in monitoring the progress of any reports to ensure that reports of inadequacy are addressed by both the port State and the flag State where notifications and responses are required.

4 ALBERT EMBANKMENT
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Circular letter No.3261
20 March 2012

To: All IMO Members
Parties to the MARPOL Convention which are not members of IMO

Subject: **Amendments to the IBC Code**

1 MEPC 63 (27 February to 2 March 2012) considered and approved, subject to MSC 90's concurrent decision, draft amendments to chapters 17, 18 and 19 of the IBC Code for circulation, with a view to adoption at MEPC 64 (1 to 5 October 2012).

2 The Secretary-General has the honour to transmit herewith, in accordance with article 16(2)(a) of the MARPOL Convention, the text of the draft amendments referred to above, given in the annex, with a view to their consideration for adoption at MEPC 64 in accordance with article 16(2)(b), (c) and (d) of the said Convention.

ANNEX

The existing text of chapters 17, 18 and 19 of the IBC Code is replaced by the following:

Chapter 17**Summary of minimum requirements**

Mixtures of noxious liquid substances presenting pollution hazards only, and which are assessed or provisionally assessed under regulation 6.3 of MARPOL Annex II, may be carried under the requirements of the Code applicable to the appropriate position of the entry in this chapter for Noxious Liquid Substances, not otherwise specified (n.o.s.).

EXPLANATORY NOTES

Product name (column a)	The product name shall be used in the shipping document for any cargo offered for bulk shipments. Any additional name may be included in brackets after the product name. In some cases, the product names are not identical with the names given in previous issues of the Code
UN Number (column b)	Deleted
Pollution Category (column c)	The letter X, Y, Z means the Pollution Category assigned to each product under MARPOL Annex II
Hazards (column d)	"S" means that the product is included in the Code because of its safety hazards; "P" means that the product is included in the Code because of its pollution hazards; and "S/P" means that the product is included in the Code because of both its safety and pollution hazards
Ship type (column e)	1: ship type 1 (2.1.2.1) 2: ship type 2 (2.1.2.2) 3: ship type 3 (2.1.2.3)
Tank type (column f)	1: independent tank (4.1.1) 2: integral tank (4.1.2) G: gravity tank (4.1.3) P: pressure tank (4.1.4)
Tank vents (column g)	Cont.: controlled venting Open: open venting
Tank environmental control (column h)	Inert: inerting (9.1.2.1) Pad: liquid or gas padding (9.1.2.2) Dry: drying (9.1.2.3) Vent: natural or forced ventilation (9.1.2.4) No: no special requirements under this Code
Electrical equipment (column i)	Temperature classes (i') T1 to T6 - indicates no requirements blank no information Apparatus group (i'') IIA, IIB or IIC: - indicates no requirements blank no information Flashpoint (i''') Yes: flashpoint exceeding 60°C (10.1.6) No: flashpoint not exceeding 60°C (10.1.6) NF: non-flammable product (10.1.6)

Gauging (column j)	O: open gauging (13.1.1.1) R: restricted gauging (13.1.1.2) C: closed gauging (13.1.1.3)
Vapour detection (column k)	F: flammable vapours T: toxic vapours No: indicates no special requirements under this Code
Fire protection (column l)	A: alcohol-resistant foam or multi-purpose foam B: regular foam; encompasses all foams that are not of an alcohol-resistant type, including fluoro-protein and aqueous-film-forming foam (AFFF) C: water-spray D: dry chemical No: no special requirements under this Code
Materials of construction (column m)	Deleted
Emergency equipment (column n)	Yes: see 14.3.1 No: no special requirements under this Code
Specific and operational requirements (column o)	When specific reference is made to chapters 15 and/or 16, these requirements shall be additional to the requirements in any other column

Note: The following pages are numbered according to the database generation.

Chapter 17 of the IBC Code

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Acetic acid	Z	S/P	3	2G	Cont	No	T1	IIA	No	R	F	A	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.19.6, 16.2.9
Acetic anhydride	Z	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	A	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.19.6
Acetochlor	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Acetone cyanohydrin	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	A	Yes	15.12, 15.13, 15.17, 15.18, 15.19, 16.6.1, 16.6.2, 16.6.3
Acetonitrile	Z	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	A	No	15.12, 15.19.6
Acetonitrile (Low purity grade)	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.19.6
Acid oil mixture from soyabean, corn (maize) and sunflower oil refining	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Acrylamide solution (50% or less)	Y	S/P	2	2G	Open	No			NF	C	No	No	No	15.12.3, 15.13, 15.19.6, 16.2.9, 16.6.1
Acrylic acid	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	A	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.13, 15.17, 15.19, 16.2.9, 16.6.1
Acrylonitrile	Y	S/P	2	2G	Cont	No	T1	IIB	No	C	FT	A	Yes	15.12, 15.13, 15.17, 15.19
Acrylonitrile-Styrene copolymer dispersion in polyether polyol	Y	P	3	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6
Adiponitrile	Z	S/P	3	2G	Cont	No		IIB	Yes	R	T	A	No	16.2.9
Alachlor technical (90% or more)	X	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.19.6, 16.2.9
Alcohol (C9-C11) poly (2.5-9) ethoxylate	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Alcohol (C6-C17) (secondary) poly(3-6)ethoxylates	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Alcohol (C6-C17) (secondary) poly(7-12)ethoxylates	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Alcohol (C12-C16) poly(1-6)ethoxylates	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Alcohol (C12-C16) poly(20+)ethoxylates	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Alcohol (C12-C16) poly(7-19)ethoxylates	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Alcohols (C13+)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.9
Alcohols (C12+), primary, linear	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Alcohols (C8-C11), primary, linear and essentially linear	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Alcohols (C12-C13), primary, linear and essentially linear	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Alcohols (C14-C18), primary, linear and essentially linear	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Alkanes (C6-C9)	X	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
Iso- and cyclo-alkanes (C10-C11)	Y	P	3	2G	Cont	No	-	-	No	R	F	A	No	15.19.6
Iso- and cyclo-alkanes (C12+)	Y	P	3	2G	Cont	No	-	-	No	R	F	A	No	
Alkanes(C10-C26), linear and branched, (flashpoint >60°C)	Y	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6

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n-Alkanes (C10+)	Y	P	3	2G	Cont	No	-	-	No	R	F	A	No	15.19.6
Alkaryl polyethers (C9-C20)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6
Alkenoic acid, polyhydroxy ester borated	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6
Alkenyl (C11+) amide	X	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Alkenyl (C16-C20) succinic anhydride	Z	S/P	3	2G	Cont	No			Yes	C	T	No	Yes	15.12, 15.17, 15.19
Alkyl acrylate-vinylpyridine copolymer in toluene	Y	P	2	2G	Cont	No	T4	IIB	No	R	F	A	No	15.19.6, 16.2.9
Alkylaryl phosphate mixtures (more than 40% Diphenyl tolyl phosphate, less than 0.02% ortho-isomers)	X	S/P	1	2G	Cont	No	T1	IIA	Yes	C	T	ABC	No	15.12, 15.17, 15.19
Alkylated (C4-C9) hindered phenols	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	BD	No	15.19.6, 16.2.6, 16.2.9
Alkylbenzene, alkylindane, alkylindene mixture (each C12-C17)	Z	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
Alkyl benzene distillation bottoms	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Alkylbenzene mixtures (containing at least 50% of toluene)	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 15.17, 15.19.6
Alkyl (C3-C4) benzenes	Y	P	2	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6
Alkyl (C5-C8) benzenes	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Alkyl(C9+)benzenes	Y	P	3	2G	Open	No	-	-	Yes	O	No	AB	No	
Alkyl (C11-C17) benzene sulphonic acid	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6
Alkylbenzene sulphonic acid, sodium salt solution	Y	S/P	2	2G	Open	No	-	-	NF	O	No	No	No	15.19.6, 16.2.6, 16.2.9
Alkyl (C12+) dimethylamine	X	S/P	1	2G	Cont	No	-	-	Yes	C	T	BCD	Yes	15.12, 15.17, 15.19
Alkyl dithiocarbamate (C19-C35)	Y	P	3	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Alkyldithiothiadiazole (C6-C24)	Y	P	3	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6
Alkyl ester copolymer (C4-C20)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Alkyl (C8-C10)/(C12-C14):(40% or less/60% or more) polyglucoside solution (55% or less)	Y	P	3	2G	Open	No			Yes	O	No	No	No	15.19.6, 16.2.6, 16.2.9
Alkyl (C8-C10)/(C12-C14):(60% or more/40% or less) polyglucoside solution(55% or less)	Y	P	3	2G	Open	No			Yes	O	No	No	No	16.2.6, 16.2.9
Alkyl (C7-C9) nitrates	Y	S/P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 15.20, 16.6.1, 16.6.2, 16.6.3
Alkyl(C7-C11)phenol poly(4-12) ethoxylate	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Alkyl (C8-C40) phenol sulphide	Z	P	3	2G	Open	No			Yes	O	No	AB	No	
Alkyl (C8-C9) phenylamine in aromatic solvents	Y	P	2	2G	Cont	No	T4	IIB	No	R	F	A	No	15.19.6
Alkyl (C9-C15) phenyl propoxylate	Z	P	3	2G	Open	No			Yes	O	No	AB	No	
Alkyl (C8-C10) polyglucoside solution (65% or less)	Y	P	3	2G	Open	No			Yes	O	No	No	No	16.2.6
Alkyl (C8-C10)/(C12-C14):(50%/50%) polyglucoside solution (55% or less)	Y	P	3	2G	Open	No			Yes	O	No	No	No	16.2.6, 16.2.9

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Alkyl (C12-C14) polyglucoside solution (55% or less)	Y	P	3	2G	Open	No			Yes	O	No	No	No	15.19.6, 16.2.9
Alkyl(C12-C16) propoxyamine ethoxylate	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.19, 16.2.6
Alkyl(C10-C20, saturated and unsaturated) phosphite	Y	P	2	2G	Open	No			Yes	O	No	A	No	16.2.9
Alkyl sulphonic acid ester of phenol	Y	P	3	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6
Alkyl (C18+) toluenes	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.9
Alkyl(C18-C28)toluenesulfonic acid	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.17, 15.19, 16.2.6, 16.2.9
Alkyl(C18-C28)toluenesulfonic acid, calcium salts, borated	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6
Alkyl (C18-C28) toluenesulfonic acid, calcium salts, low overbase	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6
Alkyl (C18-C28) toluenesulphonic acid, calcium salts, high overbase	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6
Allyl alcohol	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	A	Yes	15.12, 15.17, 15.19
Allyl chloride	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	A	Yes	15.12, 15.17, 15.19
Aluminium chloride/Hydrogen chloride solution	Y	S/P	2	2G	Cont	No	-	-	NF	C	T	No	Yes	15.11, 15.12, 15.17, 15.19
Aluminium sulphate solution	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
2-(2-Aminoethoxy) ethanol	Z	S/P	3	2G	Open	No			Yes	O	No	AD	No	15.19.6
Aminoethyldiethanolamine/Aminoethylethanolamine solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	16.2.9
Aminoethyl ethanolamine	Z	S/P	3	2G	Open	No	T2	IIA	Yes	O	No	A	No	
N-Aminoethylpiperazine	Z	S/P	3	2G	Cont	No			Yes	R	T	A	No	15.19.6, 16.2.9
2-Amino-2-methyl-1-propanol	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Ammonia aqueous (28% or less)	Y	S/P	2	2G	Cont	No			NF	R	T	ABC	Yes	15.19.6
Ammonium chloride solution (less than 25%) (*)	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	
Ammonium hydrogen phosphate solution	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Ammonium lignosulphonate solutions	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	16.2.9
Ammonium nitrate solution (93% or less)	Z	S/P	2	1G	Open	No			NF	O	No	No	No	15.2, 15.11.4, 15.11.6, 15.18, 15.19.6, 16.2.9
Ammonium polyphosphate solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	
Ammonium sulphate solution	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Ammonium sulphide solution (45% or less)	Y	S/P	2	2G	Cont	No	T4	IIB	No	C	FT	A	Yes	15.12, 15.17, 15.19, 16.6.1, 16.6.2, 16.6.3
Ammonium thiosulphate solution (60% or less)	Z	P	3	2G	Open	No			NF	O	No	No	No	16.2.9
Amyl acetate (all isomers)	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
n-Amyl alcohol	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	AB	No	
Amyl alcohol, primary	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	AB	No	

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sec-Amyl alcohol	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	AB	No	
tert-Amyl alcohol	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	
tert-Amyl methyl ether	X	P	2	2G	Cont	No	T2	IIB	No	R	F	A	No	15.19.6
Aniline	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	A	No	15.12, 15.17, 15.19
Aryl polyolefins (C11-C50)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Aviation alkylates (C8 paraffins and iso-paraffins BPT 95 - 120°C)	X	P	2	2G	Cont	No	T4	IIA	No	R	F	B	No	15.19.6
Barium long chain (C11-C50) alkaryl sulphonate	Y	S/P	2	2G	Open	No			Yes	O	No	AD	No	15.12.3, 15.19, 16.2.6, 16.2.9
Benzene and mixtures having 10% benzene or more (i)	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	AB	No	15.12.1, 15.17, 15.19.6, 16.2.9
Benzene sulphonyl chloride	Z	S/P	3	2G	Cont	No			Yes	R	T	AD	No	15.19.6, 16.2.9
Benzenetricarboxylic acid, trioctyl ester	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6
Benzyl acetate	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Benzyl alcohol	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
Benzyl chloride	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	AB	Yes	15.12, 15.13, 15.17, 15.19
Bio-fuel blends of Diesel/gas oil and Alkanes (C10-C26), linear and branched with a flashpoint >60°C (>25% but <99% by volume)	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 15.17, 15.19.6
Bio-fuel blends of Diesel/gas oil and FAME (>25% but <99% by volume)	X	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	ABC	No	15.12, 15.17, 15.19.6
Bio-fuel blends of Diesel/gas oil and vegetable oil (>25% but <99% by volume)	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 15.17, 15.19.6
Bio-fuel blends of Gasoline and Ethyl alcohol (>25% but <99% by volume)	X	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	A	No	15.12, 15.17, 15.19.6
Brake fluid base mix: Poly(2-8)alkylene (C2-C3) glycols/Polyalkylene (C2-C10) glycols monoalkyl (C1-C4) ethers and their borate esters	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	
Bromochloromethane	Z	S/P	3	2G	Cont	No			NF	R	T	No	No	
Butene oligomer	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Butyl acetate (all isomers)	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Butyl acrylate (all isomers)	Y	S/P	2	2G	Cont	No	T2	IIB	No	R	FT	A	No	15.13, 15.19.6, 16.6.1, 16.6.2
tert-Butyl alcohol	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	A	No	
Butylamine (all isomers)	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	A	Yes	15.12, 15.17, 15.19.6
Butylbenzene (all isomers)	X	P	2	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6
Butyl benzyl phthalate	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Butyl butyrate (all isomers)	Y	P	3	2G	Cont	No	T1	IIA	No	R	F	A	No	15.19.6
Butyl/Decyl/Cetyl/Eicosyl methacrylate mixture	Y	S/P	2	2G	Cont	No			Yes	R	No	AD	No	15.13, 15.19.6, 16.6.1, 16.6.2

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Butylene glycol	Z	P	3	2G	Open	No			Yes	O	No	A	No	
1,2-Butylene oxide	Y	S/P	3	2G	Cont	Inert	T2	IIB	No	R	F	AC	No	15.8.1 to 15.8.7, 15.8.12, 15.8.13, 15.8.16, 15.8.17, 15.8.18, 15.8.19, 15.8.21, 15.8.25, 15.8.27, 15.8.29, 15.19.6
n-Butyl ether	Y	S/P	3	2G	Cont	Inert	T4	IIB	No	R	FT	A	No	15.4.6, 15.12, 15.19.6
Butyl methacrylate	Z	S/P	3	2G	Cont	No		IIA	No	R	FT	AD	No	15.13, 15.19.6, 16.6.1, 16.6.2
n-Butyl propionate	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Butyraldehyde (all isomers)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	FT	A	No	15.19.6
Butyric acid	Y	S/P	3	2G	Cont	No			Yes	R	No	A	No	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.19.6
gamma-Butyrolactone	Y	P	3	2G	Open	No			Yes	O	No	AB	No	15.19.6
Calcium alkaryl sulphonate (C11-C50)	Z	S/P	3	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19
Calcium alkyl (C10-C28) salicylate	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Calcium hydroxide slurry	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	16.2.9
Calcium hypochlorite solution (15% or less)	Y	S/P	2	2G	Cont	No			NF	R	No	No	No	15.19.6
Calcium hypochlorite solution (more than 15%)	X	S/P	1	2G	Cont	No			NF	R	No	No	No	15.19, 16.2.9
Calcium lignosulphonate solutions	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	16.2.9
Calcium long-chain alkyl(C5-C10) phenate	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
Calcium long-chain alkyl(C11-C40) phenate	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6
Calcium long-chain alkyl phenate sulphide (C8-C40)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6
Calcium long-chain alkyl salicylate (C13+)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6
Calcium long-chain alkyl (C18-C28) salicylate	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Calcium nitrate/Magnesium nitrate/Potassium chloride solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	16.2.9
epsilon-Caprolactam (molten or aqueous solutions)	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Carbolic oil	Y	S/P	2	2G	Cont	No			Yes	C	FT	A	No	15.12, 15.19.6, 16.2.9
Carbon disulphide	Y	S/P	2	1G	Cont	Pad+ine rt	T6	IIC	No	C	FT	C	Yes	15.3, 15.12, 15.19
Carbon tetrachloride	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.17, 15.19.6
Cashew nut shell oil (untreated)	Y	S/P	2	2G	Cont	No			Yes	R	T	AB	No	15.19.6, 16.2.6, 16.2.9
Castor oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Cesium formate solution (*)	Y	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	15.19.6
Cetyl/Eicosyl methacrylate mixture	Y	S/P	2	2G	Open	No			Yes	O	No	AD	No	15.13, 15.19.6, 16.2.9, 16.6.1, 16.6.2
Chlorinated paraffins (C10-C13)	X	P	1	2G	Open	No			Yes	O	No	A	No	15.19, 16.2.6

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Chlorinated paraffins (C14-C17) (with 50% chlorine or more, and less than 1% C13 or shorter chains)	X	P	1	2G	Open	No	-	-	Yes	O	No	A	No	15.19
Chloroacetic acid (80% or less)	Y	S/P	2	2G	Cont	No			NF	C	No	No	No	15.11.2, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.19, 16.2.9
Chlorobenzene	Y	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	AB	No	15.19.6
Chloroform	Y	S/P	3	2G	Cont	No			NF	R	T	No	Yes	15.12, 15.19.6
Chlorohydrins (crude)	Y	S/P	2	2G	Cont	No		IIA	No	C	FT	A	No	15.12, 15.19
4-Chloro-2-methylphenoxyacetic acid, dimethylamine salt solution	Y	P	2	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.9
o-Chloronitrobenzene	Y	S/P	2	2G	Cont	No			Yes	C	T	ABD	No	15.12, 15.17, 15.18, 15.19, 16.2.6, 16.2.9
1-(4-Chlorophenyl)-4,4- dimethyl-pentan-3-one	Y	P	2	2G	Open	No			Yes	O	No	ABD	No	15.19.6, 16.2.6, 16.2.9
2- or 3-Chloropropionic acid	Z	S/P	3	2G	Open	No			Yes	O	No	A	No	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 16.2.9
Chlorosulphonic acid	Y	S/P	1	2G	Cont	No			NF	C	T	No	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.5, 15.11.6, 15.11.7, 15.11.8, 15.12, 15.16.2, 15.19
m-Chlorotoluene	Y	S/P	2	2G	Cont	No	T4	IIA	No	R	FT	AB	No	15.19.6
o-Chlorotoluene	Y	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	AB	No	15.19.6
p-Chlorotoluene	Y	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	AB	No	15.19.6, 16.2.9
Chlorotoluenes (mixed isomers)	Y	S/P	2	2G	Cont	No	T4	IIA	No	R	FT	AB	No	15.19.6
Choline chloride solutions	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Citric acid (70% or less)	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Coal tar	X	S/P	2	2G	Cont	No	T2	IIA	Yes	R	No	BD	No	15.19.6, 16.2.6, 16.2.9
Coal tar naphtha solvent	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	AD	No	15.19.6, 16.2.9
Coal tar pitch (molten)	X	S/P	2	1G	Cont	No	T2	IIA	Yes	R	No	BD	No	15.19.6, 16.2.6, 16.2.9
Cocoa butter	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Coconut oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Coconut oil fatty acid	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Coconut oil fatty acid methyl ester	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6
Copper salt of long chain (C17+) alkanolic acid	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Corn Oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Cotton seed oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Creosote (coal tar)	X	S/P	2	2G	Cont	No	T2	IIA	Yes	R	T	AD	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Cresols (all isomers)	Y	S/P	2	2G	Open	No	T1	IIA	Yes	O	No	AB	No	15.19.6, 16.2.9
Cresylic acid, dephenolized	Y	S/P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6

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Cresylic acid, sodium salt solution	Y	S/P	2	2G	Open	No			Yes	O	No	No	No	15.19.6, 16.2.9
Crotonaldehyde	Y	S/P	2	2G	Cont	No	T3	IIB	No	R	FT	A	Yes	15.12, 15.17, 15.19.6
1,5,9-Cyclododecatriene	X	S/P	1	2G	Cont	No			Yes	R	T	A	No	15.13, 15.19, 16.6.1, 16.6.2
Cycloheptane	X	P	2	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6
Cyclohexane	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6, 16.2.9
Cyclohexanol	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.9
Cyclohexanone	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	A	No	15.19.6
Cyclohexanone, Cyclohexanol mixture	Y	S/P	3	2G	Cont	No			Yes	R	FT	A	No	15.19.6
Cyclohexyl acetate	Y	P	3	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6
Cyclohexylamine	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	FT	AC	No	15.19.6
1,3-Cyclopentadiene dimer (molten)	Y	P	2	2G	Cont	No	T1	IIB	No	R	F	A	No	15.19.6, 16.2.6, 16.2.9
Cyclopentane	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Cyclopentene	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
p-Cymene	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Decahydronaphthalene	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	AB	No	15.19.6
Decanoic acid	X	P	2	2G	Open	No			Yes	O	No	A	No	16.2.9
Decene	X	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
Decyl acrylate	X	S/P	1	2G	Open	No	T3	IIA	Yes	O	No	ACD	No	15.13, 15.19, 16.6.1, 16.6.2
Decyl alcohol (all isomers)	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9(e)
Decyl/Dodecyl/Tetradecyl alcohol mixture	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Decyloxytetrahydrothiophene dioxide	X	S/P	2	2G	Cont	No			Yes	R	T	A	No	15.19.6, 16.2.9
Diacetone alcohol	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	A	No	
Dialkyl (C8-C9) diphenylamines	Z	P	3	2G	Open	No			Yes	O	No	AB	No	
Dialkyl (C7-C13) phthalates	X	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6
Dialkyl (C9 - C10) phthalates	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Dialkyl thiophosphates sodium salts solution	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Dibromomethane	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.19
Dibutylamine	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	ACD	No	15.19.6
Dibutyl hydrogen phosphonate	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
2,6-Di-tert-butylphenol	X	P	1	2G	Open	No	-	-	Yes	O	No	ABC D	No	15.19, 16.2.9

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Dibutyl phthalate	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Dibutyl terephthalate	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.9
Dichlorobenzene (all isomers)	X	S/P	2	2G	Cont	No	T1	IIA	Yes	R	T	ABD	No	15.19.6
3,4-Dichloro-1-butene	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	ABC	Yes	15.12.3, 15.17, 15.19.6
1,1-Dichloroethane	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	A	Yes	15.19.6
Dichloroethyl ether	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	A	No	15.19.6
1,6-Dichlorohexane	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AB	No	15.19.6
2,2'-Dichloroisopropyl ether	Y	S/P	2	2G	Cont	No			Yes	R	T	ACD	No	15.12, 15.17, 15.19
Dichloromethane	Y	S/P	3	2G	Cont	No	T1	IIA	Yes	R	T	No	No	15.19.6
2,4-Dichlorophenol	Y	S/P	2	2G	Cont	Dry			Yes	R	T	A	No	15.19.6, 16.2.6, 16.2.9
2,4-Dichlorophenoxyacetic acid, diethanolamine salt solution	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.9
2,4-Dichlorophenoxyacetic acid, dimethylamine salt solution (70% or less)	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.9
2,4-Dichlorophenoxyacetic acid, triisopropanolamine salt solution	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.6, 16.2.9
1,1-Dichloropropane	Y	S/P	2	2G	Cont	No	T4	IIA	No	R	FT	AB	No	15.12, 15.19.6
1,2-Dichloropropane	Y	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	AB	No	15.12, 15.19.6
1,3-Dichloropropene	X	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AB	Yes	15.12, 15.17, 15.18, 15.19
Dichloropropene/Dichloropropane mixtures	X	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	ABD	Yes	15.12, 15.17, 15.18, 15.19
2,2-Dichloropropionic acid	Y	S/P	3	2G	Cont	Dry			Yes	R	No	A	No	15.11.2, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.19.6, 16.2.9
Dicyclopentadiene, Resin Grade, 81-89%	Y	S/P	2	2G	Cont	Inert	T2	IIB	No	C	FT	ABC	Yes	15.12, 15.13, 15.17, 15.19
Diethanolamine	Y	S/P	3	2G	Open	No	T1	IIA	Yes	O	No	A	No	16.2.6, 16.2.9
Diethylamine	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	A	Yes	15.12, 15.19.6
Diethylaminoethanol	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.19.6
2,6-Diethylaniline	Y	S/P	3	2G	Open	No			Yes	O	No	BCD	No	15.19.6, 16.2.9
Diethylbenzene	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Diethylene glycol dibutyl ether	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	A	No	
Diethylene glycol diethyl ether	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	
Diethylene glycol phthalate	Y	P	3	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6
Diethylenetriamine	Y	S/P	3	2G	Open	No	T2	IIA	Yes	O	No	A	No	15.19.6
Diethylenetriaminepentaacetic acid, pentasodium salt solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	
Diethyl ether	Z	S/P	2	1G	Cont	Inert	T4	IIB	No	C	FT	A	Yes	15.4, 15.14, 15.19

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Di-(2-ethylhexyl) adipate	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6
Di-(2-ethylhexyl) phosphoric acid	Y	S/P	2	2G	Open	No			Yes	O	No	AD	No	15.19.6
Diethyl phthalate	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Diethyl sulphate	Y	S/P	2	2G	Cont	No			Yes	C	T	A	No	15.19.6
Diglycidyl ether of bisphenol A	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Diglycidyl ether of bisphenol F	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6
Diheptyl phthalate	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6
Di-n-hexyl adipate	X	P	1	2G	Open	No			Yes	O	No	A	No	15.19
Dihexyl phthalate	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6
Diisobutylamine	Y	S/P	2	2G	Cont	No	T4	IIB	No	R	FT	ACD	No	15.12.3, 15.19.6
Diisobutylene	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Diisobutyl ketone	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Diisobutyl phthalate	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Diisononyl adipate	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6
Diisooctyl phthalate	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6
Diisopropanolamine	Z	S/P	3	2G	Open	No	T2	IIA	Yes	O	No	A	No	16.2.9
Diisopropylamine	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	A	Yes	15.12, 15.19
Diisopropylbenzene (all isomers)	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Diisopropylnaphthalene	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6
N,N-Dimethylacetamide	Z	S/P	3	2G	Cont	No	-	-	Yes	C	T	ACD	No	15.12, 15.17
N,N-Dimethylacetamide solution (40% or less)	Z	S/P	3	2G	Cont	No			Yes	R	T	B	No	15.12.1, 15.17
Dimethyl adipate	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Dimethylamine solution (45% or less)	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	ACD	No	15.12, 15.19.6
Dimethylamine solution (greater than 45% but not greater than 55%)	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	ACD	Yes	15.12, 15.17, 15.19
Dimethylamine solution (greater than 55% but not greater than 65%)	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	ACD	Yes	15.12, 15.14, 15.17, 15.19
N,N-Dimethylcyclohexylamine	Y	S/P	2	2G	Cont	No	T3	IIB	No	R	FT	AC	No	15.12, 15.17, 15.19.6
Dimethyl disulphide	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	B	No	15.12.3, 15.12.4, 15.19.6
N,N-Dimethyldodecylamine	X	S/P	1	2G	Open	No			Yes	O	No	B	No	15.19
Dimethylethanolamine	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	FT	AD	No	15.19.6
Dimethylformamide	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	AD	No	15.19.6
Dimethyl glutarate	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6

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Dimethyl hydrogen phosphite	Y	S/P	3	2G	Cont	No			Yes	R	T	AD	No	15.12.1, 15.19.6
Dimethyl octanoic acid	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Dimethyl phthalate	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Dimethylpolysiloxane	Y	P	3	2G	Open	No			Yes	O	No	AB	No	15.19.6
2,2-Dimethylpropane-1,3-diol (molten or solution)	Z	P	3	2G	Open	No	-	-	Yes	O	No	AB	No	16.2.9
Dimethyl succinate	Y	P	3	2G	Open	No			Yes	O	No	A	No	16.2.9
Dinitrotoluene (molten)	X	S/P	2	2G	Cont	No			Yes	C	T	A	No	15.12, 15.17, 15.19, 15.21, 16.2.6, 16.2.9, 16.6.4
Dinonyl phthalate	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6
Diethyl phthalate	X	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6
1,4-Dioxane	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	A	No	15.12, 15.19, 16.2.9
Dipentene	Y	P	3	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
Diphenyl	X	P	2	2G	Open	No			Yes	O	No	B	No	15.19.6, 16.2.6, 16.2.9
Diphenylamine (molten)	Y	P	2	2G	Open	No	-	-	Yes	O	No	BD	No	15.19.6, 16.2.6, 16.2.9
Diphenylamine, reaction product with 2,2,4-Trimethylpentene	Y	S/P	1	2G	Open	No			Yes	O	No	A	No	15.19, 16.2.6
Diphenylamines, alkylated	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Diphenyl/Diphenyl ether mixtures	X	P	2	2G	Open	No			Yes	O	No	B	No	15.19.6, 16.2.9
Diphenyl ether	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Diphenyl ether/Diphenyl phenyl ether mixture	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Diphenylmethane diisocyanate	Y	S/P	2	2G	Cont	Dry	-	-	Yes (a)	C	T(a) (b)D	ABC (b)D	No	15.12, 15.16.2, 15.17, 15.19.6, 16.2.6, 16.2.9
Diphenylol propane-epichlorohydrin resins	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Di-n-propylamine	Y	S/P	2	2G	Cont	No	T3	IIB	No	R	FT	A	No	15.12.3, 15.19.6
Dipropylene glycol	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Dithiocarbamate ester (C7-C35)	X	P	2	2G	Open	No			Yes	O	No	AD	No	15.19.6, 16.2.9
Ditridecyl adipate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6
Ditridecyl phthalate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6
Diundecyl phthalate	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Dodecane (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	AB	No	15.19.6
tert-Dodecanethiol	X	S/P	1	2G	Cont	No	-	-	Yes	C	T	ABD	Yes	15.12, 15.17, 15.19
Dodecene (all isomers)	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Dodecyl alcohol	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9

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Dodecylamine/Tetradecylamine mixture	Y	S/P	2	2G	Cont	No			Yes	R	T	AD	No	15.19.6, 16.2.9
Dodecylbenzene	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AB	No	15.12.3, 15.12.4, 15.19.6
Dodecyl diphenyl ether disulphonate solution	X	S/P	2	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.6
Dodecyl hydroxypropyl sulphide	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Dodecyl methacrylate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.13, 15.19.6
Dodecyl/Octadecyl methacrylate mixture	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.13, 15.19.6, 16.2.6, 16.6.1, 16.6.2
Dodecyl/Pentadecyl methacrylate mixture	Y	S/P	2	2G	Open	No			Yes	O	No	AD	No	15.13, 15.19.6, 16.6.1, 16.6.2
Dodecyl phenol	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6
Dodecyl Xylene	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6
Drilling brines (containing zinc salts)	X	P	2	2G	Open	No			Yes	O	No	No	No	15.19.6
Drilling brines, including:calcium bromide solution, calcium chloride solution and sodium chloride solution	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Epichlorohydrin	Y	S/P	2	2G	Cont	No		IIB	No	C	FT	A	Yes	15.12, 15.17, 15.19
Ethanolamine	Y	S/P	3	2G	Open	No	T2	IIA	Yes	O	FT	A	No	16.2.9
2-Ethoxyethyl acetate	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Ethoxylated long chain (C16+) alkyloxyalkylamine	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AB	No	15.19.6, 16.2.9
Ethoxylated tallow amine (> 95%)	X	S/P	2	2G	Cont	Inert	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Ethyl acetate	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	AB	No	
Ethyl acetoacetate	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Ethyl acrylate	Y	S/P	2	2G	Cont	No	T2	IIB	No	R	FT	A	Yes	15.13, 15.19.6, 16.6.1, 16.6.2
Ethylamine	Y	S/P	2	1G	Cont	No	T2	IIA	No	C	FT	CD	Yes	15.12, 15.14, 15.19.6
Ethylamine solutions (72% or less)	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 15.14, 15.17, 15.19
Ethyl amyl ketone	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Ethylbenzene	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Ethyl tert-butyl ether	Y	P	3	2G	Cont	No	T2	IIB	No	R	F	A	No	15.19.6
Ethyl butyrate	Y	P	3	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6
Ethylcyclohexane	Y	P	2	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6
N-Ethylcyclohexylamine	Y	S/P	2	2G	Cont	No	T3	IIB	No	R	FT	A	No	15.19.6
S-Ethyl dipropylthiocarbamate	Y	P	2	2G	Open	No			Yes	O	No	A	No	16.2.9
Ethylene chlorohydrin	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AD	Yes	15.12, 15.17, 15.19
Ethylene cyanohydrin	Y	S/P	3	2G	Open	No		IIB	Yes	O	No	A	No	15.19.6

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Ethylenediamine	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	A	No	15.19.6, 16.2.9
Ethylenediaminetetraacetic acid, tetrasodium salt solution	Y	S/P	3	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6
Ethylene dibromide	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.12, 15.19.6, 16.2.9
Ethylene dichloride	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AB	No	15.19
Ethylene glycol	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
Ethylene glycol acetate	Y	P	3	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6
Ethylene glycol butyl ether acetate	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
Ethylene glycol diacetate	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
Ethylene glycol methyl ether acetate	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
Ethylene glycol monoalkyl ethers	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	F	A	No	15.19.6, 16.2.9
Ethylene glycol phenyl ether	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	16.2.9
Ethylene glycol phenyl ether/Diethylene glycol phenyl ether mixture	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	16.2.9
Ethylene oxide/Propylene oxide mixture with an ethylene oxide content of not more than 30% by mass	Y	S/P	2	1G	Cont	Inert	T2	IIB	No	C	FT	AC	No	15.8, 15.12, 15.14, 15.19
Ethylene-vinyl acetate copolymer (emulsion)	Y	P	3	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Ethyl-3-ethoxypropionate	Y	P	3	2G	Cont	No	T2	IIA	No	R	No	A	No	15.19.6
2-Ethylhexanoic acid	Y	P	3	2G	Open	No			Yes	O	No	AB	No	15.19.6
2-Ethylhexyl acrylate	Y	S/P	3	2G	Open	No	T3	IIB	Yes	O	No	A	No	15.13, 15.19.6, 16.6.1, 16.6.2
2-Ethylhexylamine	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	A	No	15.12, 15.19.6
2-Ethyl-2-(hydroxymethyl) propane-1,3-diol (C8-C10) ester	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Ethylidene norbornene	Y	S/P	2	2G	Cont	No	T3	IIB	No	R	FT	AD	No	15.12.1, 15.19.6
Ethyl methacrylate	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	AD	No	15.13, 15.19.6, 16.6.1, 16.6.2
N-Ethylmethylallylamine	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	F	AC	Yes	15.12.3, 15.17, 15.19
Ethyl propionate	Y	P	3	2G	Open	No	T1	IIA	No	R	F	A	No	15.19.6
2-Ethyl-3-propylacrolein	Y	S/P	3	2G	Cont	No		IIA	No	R	FT	A	No	15.19.6, 16.2.9
Ethyl toluene	Y	P	2	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6
Fatty acid (saturated C13+)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.9
Fatty acid methyl esters (m)	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Fatty acids, (C8-C10)	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19, 16.2.6, 16.2.9
Fatty acids, (C12+)	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Fatty acids, (C16+)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6

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Fatty acids, essentially linear (C6-C18) 2-ethylhexyl ester	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6
Ferric chloride solutions	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.11, 15.19.6, 16.2.9
Ferric nitrate/Nitric acid solution	Y	S/P	2	2G	Cont	No			NF	R	T	No	Yes	15.11, 15.19
Fish oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Fluorosilicic acid (20-30%) in water solution	Y	S/P	3	1G	Cont	No	-	-	NF	R	T	No	Yes	15.11, 15.19.6
Formaldehyde solutions (45% or less)	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	A	Yes	15.19.6, 16.2.9
Formamide	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Formic acid (85% or less)	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T(g)	A	No	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.19.6, 16.2.9
Formic acid mixture (containing up to 18% propionic acid and up to 25% sodium formate)	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T(g)	AC	No	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.12.4, 15.19.6
Furfural	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	A	No	15.19.6
Furfuryl alcohol	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
Glucitol/glycerol blend propoxylated (containing less than 10% amines)	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
Glutaraldehyde solutions (50% or less)	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6
Glycerol monooleate	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Glycerol propoxylated	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
Glycerol, propoxylated and ethoxylated	Z	P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Glycerol/sucrose blend propoxylated and ethoxylated	Z	P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Glyceryl triacetate	Z	P	3	2G	Open	No			Yes	O	No	AB	No	
Glycidyl ester of C10 trialkylacetic acid	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Glycine, sodium salt solution	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Glycolic acid solution (70% or less)	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	15.19.6, 16.2.9
Glyoxal solution (40% or less)	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Glyoxylic acid solution (50 % or less)	Y	S/P	3	2G	Open	No	-	-	Yes	O	No	ACD	No	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.19.6, 16.2.9, 16.6.1, 16.6.2, 16.6.3
Glyphosate solution (not containing surfactant)	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Groundnut oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Heptane (all isomers)	X	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6, 16.2.9
n-Heptanoic acid	Z	P	3	2G	Open	No			Yes	O	No	AB	No	
Heptanol (all isomers) (d)	Y	P	3	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
Heptene (all isomers)	Y	P	3	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6

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Heptyl acetate	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
1-Hexadecylnaphthalene / 1,4-bis(hexadecyl)naphthalene mixture	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6
Hexamethylenediamine (molten)	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.17, 15.18, 15.19, 16.2.9
Hexamethylenediamine adipate (50% in water)	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Hexamethylenediamine solution	Y	S/P	3	2G	Cont	No			Yes	R	T	A	No	15.19.6
Hexamethylene diisocyanate	Y	S/P	2	1G	Cont	Dry	T1	IIB	Yes	C	T	AC (b)D	Yes	15.12, 15.16.2, 15.17, 15.18, 15.19
Hexamethylene glycol	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Hexamethyleneimine	Y	S/P	2	2G	Cont	No	T4	IIB	No	R	FT	AC	No	15.19.6
Hexane (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
1,6-Hexanediol, distillation overheads	Y	P	3	2G	Open	No	-	-	Yes	O	No	A	No	15.12.3, 15.12.4, 15.19.6, 16.2.9
Hexanoic acid	Y	P	3	2G	Open	No			Yes	O	No	AB	No	15.19.6
Hexanol	Y	P	3	2G	Open	No			Yes	O	No	AB	No	15.19.6
Hexene (all isomers)	Y	P	3	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
Hexyl acetate	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Hydrochloric acid	Z	S/P	3	1G	Cont	No			NF	R	T	No	Yes	15.11
Hydrogen peroxide solutions (over 60% but not over 70% by mass)	Y	S/P	2	2G	Cont	No			NF	C	No	No	No	15.5.1, 15.19.6
Hydrogen peroxide solutions (over 8% but not over 60% by mass)	Y	S/P	3	2G	Cont	No			NF	C	No	No	No	15.5.2, 15.18, 15.19.6
2-Hydroxyethyl acrylate	Y	S/P	2	2G	Cont	No			Yes	C	T	A	No	15.12, 15.13, 15.19.6, 16.6.1, 16.6.2
N-(Hydroxyethyl)ethylenediaminetriacetic acid, trisodium salt solution	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
2-Hydroxy-4-(methylthio)butanoic acid	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Illipe oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Isoamyl alcohol	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	AB	No	
Isobutyl alcohol	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	AB	No	
Isobutyl formate	Z	P	3	2G	Cont	No	T4	IIA	No	R	F	AB	No	
Isobutyl methacrylate	Z	P	3	2G	Cont	No	-	-	No	R	F	A	No	15.12, 15.13, 15.17, 16.6.1, 16.6.2
Isophorone	Y	S/P	3	2G	Cont	No			Yes	R	No	A	No	15.19.6
Isophoronediamine	Y	S/P	3	2G	Cont	No			Yes	R	T	A	No	16.2.9
Isophorone diisocyanate	X	S/P	2	2G	Cont	Dry			Yes	C	T	ABD	No	15.12, 15.16.2, 15.17, 15.19.6
Isoprene	Y	S/P	3	2G	Cont	No	T3	IIB	No	R	F	B	No	15.13, 15.14, 15.19.6, 16.6.1, 16.6.2
Isopropanolamine	Y	S/P	3	2G	Open	No	T2	IIA	Yes	O	FT	A	No	15.19.6, 16.2.6, 16.2.9

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Isopropyl acetate	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	AB	No	
Isopropylamine	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	CD	Yes	15.12, 15.14, 15.19
Isopropylamine (70% or less) solution	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	CD	Yes	15.12, 15.19.6, 16.2.9
Isopropylcyclohexane	Y	P	2	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6, 16.2.9
Isopropyl ether	Y	S/P	3	2G	Cont	Inert	T2	IIA	No	R	F	A	No	15.4.6, 15.13.3, 15.19.6
Jatropha oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Lactic acid	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Lactonitrile solution (80% or less)	Y	S/P	2	1G	Cont	No			Yes	C	T	ACD	Yes	15.12, 15.13, 15.17, 15.18, 15.19, 16.6.1, 16.6.2, 16.6.3
Lard	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Latex, ammonia (1% or less)- inhibited	Y	S/P	3	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Latex: Carboxylated styrene-Butadiene copolymer; Styrene-Butadiene rubber	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	16.2.9
Lauric acid	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Ligninsulphonic acid, magnesium salt solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Ligninsulphonic acid, sodium salt solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	16.2.9
Linseed oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Liquid chemical wastes	X	S/P	2	2G	Cont	No			No	C	FT	A	Yes	15.12, 15.19.6, 20.5.1
Long-chain alkaryl polyether (C11-C20)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Long-chain alkaryl sulphonic acid (C16-C60)	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.9
Long-chain alkylphenate/Phenol sulphide mixture	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
L-Lysine solution (60% or less)	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Magnesium chloride solution	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Magnesium long-chain alkaryl sulphonate (C11-C50)	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Magnesium long-chain alkyl salicylate (C11+)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Maleic anhydride	Y	S/P	3	2G	Cont	No			Yes	R	No	AC (f)	No	16.2.9
Mango kernel oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Mercaptobenzothiazol, sodium salt solution	X	S/P	2	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.9
Mesityl oxide	Z	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	A	No	15.19.6
Metam sodium solution	X	S/P	2	2G	Cont	No	-	-	NF	C	T	No	Yes	15.12, 15.17, 15.19
Methacrylic acid	Y	S/P	3	2G	Cont	No			Yes	R	T	A	No	15.13, 15.19.6, 16.2.9, 16.6.1

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Methacrylic acid - alkoxypoly (alkylene oxide) methacrylate copolymer, sodium salt aqueous solution (45% or less)	Z	S/P	3	2G	Open	No	-	-	NF	O	No	AC	No	16.2.9
Methacrylic resin in ethylene dichloride	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AB	No	15.19, 16.2.9
Methacrylonitrile	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	A	Yes	15.12, 15.13, 15.17, 15.19
3-Methoxy-1-butanol	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	
3-Methoxybutyl acetate	Y	P	3	2G	Open	No			Yes	O	No	AB	No	15.19.6
N-(2-Methoxy-1-methyl ethyl)-2-ethyl-6-methyl chloroacetanilide	X	P	1	2G	Open	No			Yes	O	No	A	No	15.19, 16.2.6
Methyl acetate	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	A	No	
Methyl acetoacetate	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Methyl acrylate	Y	S/P	2	2G	Cont	No	T1	IIB	No	R	FT	A	Yes	15.13, 15.19.6, 16.6.1, 16.6.2
Methyl alcohol	Y	P	3	2G	Cont	No	T1	IIA	No	R	F	A	No	15.19.6
Methylamine solutions (42% or less)	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	ACD	Yes	15.12, 15.17, 15.19
Methylamyl acetate	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Methylamyl alcohol	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Methyl amyl ketone	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
N-Methylaniline	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.19.6
alpha-Methylbenzyl alcohol with acetophenone (15% or less)	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Methylbutenol	Y	P	3	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6, 16.2.9
Methyl tert-butyl ether	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	AB	No	
Methyl butyl ketone	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	AB	No	15.19.6
Methylbutynol	Z	P	3	2G	Cont	No	T4	IIB	No	R	F	A	No	
Methyl butyrate	Y	P	3	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6
Methylcyclohexane	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
Methylcyclopentadiene dimer	Y	P	2	2G	Cont	No	T4	IIB	No	R	F	B	No	15.19.6
Methylcyclopentadienyl manganese tricarbonyl	X	S/P	1	1G	Cont	No	-	-	Yes	C	T	ABC D	Yes	15.12, 15.18, 15.19, 16.2.9
Methyl diethanolamine	Y	S/P	3	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6
2-Methyl-6-ethyl aniline	Y	S/P	3	2G	Open	No			Yes	O	No	AD	No	15.19.6
Methyl ethyl ketone	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	A	No	
2-Methyl-5-ethyl pyridine	Y	S/P	3	2G	Open	No		IIA	Yes	O	No	AD	No	15.19.6
Methyl formate	Z	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	A	Yes	15.12, 15.14, 15.19
2-Methylglutaronitrile with 2-Ethylsuccinonitrile (12% or less)	Z	S	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19

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2-Methyl-2-hydroxy-3-butyne	Z	S/P	3	2G	Cont	No		IIA	No	R	FT	ABD	No	15.19.6, 16.2.9
Methyl isobutyl ketone	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	AB	No	
Methyl methacrylate	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	A	No	15.13, 15.19.6, 16.6.1, 16.6.2
3-Methyl-3-methoxybutanol	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Methyl naphthalene (molten)	X	S/P	2	2G	Cont	No			Yes	R	No	AD	No	15.19.6
2-Methyl-1,3-propanediol	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	
2-Methylpyridine	Z	S/P	2	2G	Cont	No	T1	IIA	No	C	F	A	No	15.12.3, 15.19.6
3-Methylpyridine	Z	S/P	2	2G	Cont	No	T1	IIA	No	C	F	AC	No	15.12.3, 15.19
4-Methylpyridine	Z	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	A	No	15.12.3, 15.19, 16.2.9
N-Methyl-2-pyrrolidone	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
Methyl salicylate	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
alpha-Methylstyrene	Y	S/P	2	2G	Cont	No	T1	IIB	No	R	FT	AD (j)	No	15.13, 15.19.6, 16.6.1, 16.6.2
3-(methylthio)propionaldehyde	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	BC	Yes	15.12, 15.17, 15.19
Molybdenum polysulfide long chain alkyl dithiocarbamide complex	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Morpholine	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Motor fuel anti-knock compound (containing lead alkyls)	X	S/P	1	1G	Cont	No	T4	IIA	No	C	FT	AC	Yes	15.6, 15.12, 15.18, 15.19
Myrcene	X	P	2	2G	Cont	No	-	-	No	R	F	A	No	15.19.6, 16.2.9
Naphthalene (molten)	X	S/P	2	2G	Cont	No	T1	IIA	Yes	R	No	AD	No	15.19.6, 16.2.9
Naphthalenesulphonic acid-Formaldehyde copolymer, sodium salt solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	16.2.9
Neodecanoic acid	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Nitrating acid (mixture of sulphuric and nitric acids)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.16.2, 15.17, 15.19
Nitric acid (70% and over)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.19
Nitric acid (less than 70%)	Y	S/P	2	2G	Cont	No			NF	R	T	No	Yes	15.11, 15.19
Nitrilotriacetic acid, trisodium salt solution	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
Nitrobenzene	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	AD	No	15.12, 15.17, 15.18, 15.19, 16.2.9
Nitroethane	Y	S/P	3	2G	Cont	No		IIB	No	R	FT	A(f)	No	15.19.6, 16.6.1, 16.6.2, 16.6.4
Nitroethane(80%)/ Nitropropane(20%)	Y	S/P	3	2G	Cont	No		IIB	No	R	FT	A(f)	No	15.19.6, 16.6.1, 16.6.2, 16.6.3
Nitroethane, 1-Nitropropane (each 15% or more) mixture	Y	S/P	3	2G	Cont	No	-	-	No	R	F	A	No	15.19.6, 16.2.6, 16.6.1, 16.6.2, 16.6.3
o-Nitrophenol (molten)	Y	S/P	2	2G	Cont	No			Yes	C	T	AD	No	15.12, 15.19.6, 16.2.6, 16.2.9
1- or 2-Nitropropane	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	A	No	15.19.6

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Nitropropane (60%)/Nitroethane (40%) mixture	Y	S/P	3	2G	Cont	No	T4	IIB	No	R	FT	A(f)	No	15.19.6
o- or p-Nitrotoluenes	Y	S/P	2	2G	Cont	No		IIB	Yes	C	T	AB	No	15.12, 15.17, 15.19.6
Nonane (all isomers)	X	P	2	2G	Cont	No	T4	IIA	No	R	F	BC	No	15.19.6
Nonanoic acid (all isomers)	Y	P	3	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.9
Non-edible industrial grade palm oil	Y	S/P	2	2G	Cont	No	-	-	Yes	R	No	ABC	No	15.12.3, 15.12.4, 15.19.6, 16.2.6, 16.2.9
Nonene (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
Nonyl alcohol (all isomers)	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Nonyl methacrylate monomer	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.9
Nonylphenol	X	P	1	2G	Open	No			Yes	O	No	A	No	15.19, 16.2.6, 16.2.9
Nonylphenol poly(4+)ethoxylate	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6
Noxious liquid, NF, (1) n.o.s. (trade name, contains) ST1, Cat. X	X	P	1	2G	Open	No	-	-	Yes	O	No	A	No	15.19, 16.2.6
Noxious liquid, F, (2) n.o.s. (trade name, contains) ST1, Cat. X	X	P	1	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19, 16.2.6
Noxious liquid, NF, (3) n.o.s. (trade name, contains) ST2, Cat. X	X	P	2	2G	Open	No	-		Yes	O	No	A	No	15.19, 16.2.6
Noxious liquid, F, (4) n.o.s. (trade name, contains) ST2, Cat. X	X	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19, 16.2.6
Noxious liquid, NF, (5) n.o.s. (trade name, contains) ST2, Cat. Y	Y	P	2	2G	Open	No	-		Yes	O	No	A	No	15.19, 16.2.6, 16.2.9(I)
Noxious liquid, F, (6) n.o.s. (trade name, contains) ST2, Cat. Y	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19, 16.2.6, 16.2.9(I)
Noxious liquid, NF, (7) n.o.s. (trade name, contains) ST3, Cat. Y	Y	P	3	2G	Open	No	-	-	Yes	O	No	A	No	15.19, 16.2.6, 16.2.9(I)
Noxious liquid, F, (8) n.o.s. (trade name, contains) ST3, Cat. Y	Y	P	3	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19, 16.2.6, 16.2.9(I)
Noxious liquid, NF, (9) n.o.s. (trade name, contains) ST3, Cat. Z	Z	P	3	2G	Open	No	-		Yes	O	No	A	No	
Noxious liquid, F, (10) n.o.s. (trade name, contains) ST3, Cat. Z	Z	P	3	2G	Cont	No	T3	IIA	No	R	F	A	No	
Octamethylcyclotetrasiloxane	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.19.6, 16.2.9
Octane (all isomers)	X	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
Octanoic acid (all isomers)	Y	P	3	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6
Octanol (all isomers)	Y	P	2	2G	Open	No			Yes	O	No	A	No	
Octene (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
n-Octyl acetate	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Octyl aldehydes	Y	P	2	2G	Cont	No	T4	IIB	No	R	F	A	No	15.19.6, 16.2.9
Octyl decyl adipate	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.9
Olefin-Alkyl ester copolymer (molecular weight 2000+)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Olefin Mixture (C7-C9) C8 rich, stabilised	X	S/P	2	2G	Cont	No	T3	IIB	No	R	F	ABC	No	15.13, 15.19.6
Olefin mixtures (C5-C7)	Y	P	3	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6

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Olefin mixtures (C5-C15)	X	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
Olefins (C13+, all isomers)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.9
alpha-Olefins (C6-C18) mixtures	X	P	2	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6, 16.2.9
Oleic acid	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.9
Oleum	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11.2 to 15.11.8, 15.12.1, 15.16.2, 15.17, 15.19, 16.2.6
Oleylamine	X	S/P	2	2G	Cont	No			Yes	R	T	A	No	15.19.6, 16.2.9
Olive oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Oxygenated aliphatic hydrocarbon mixture	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Palm acid oil	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Palm fatty acid distillate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Palm kernel acid oil	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Palm kernel fatty acid distillate	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.19.6, 16.2.6, 16.2.9
Palm kernel oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Palm kernel olein	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Palm kernel stearin	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Palm mid-fraction	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Palm oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Palm oil fatty acid methyl ester	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.9
Palm olein	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Palm stearin	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Paraffin wax	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Paraldehyde	Z	S/P	3	2G	Cont	No	T3	IIB	No	R	F	A	No	15.19.6, 16.2.9
Paraldehyde-ammonia reaction product	Y	S/P	2	2G	Cont	No	T4	IIB	No	C	FT	A	No	15.12.3, 15.19
Pentachloroethane	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12, 15.17, 15.19.6
1,3-Pentadiene	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	AB	No	15.13, 15.19.6, 16.6.1, 16.6.2, 16.6.3
1,3-Pentadiene (greater than 50%), cyclopentene and isomers, mixtures	Y	S/P	2	2G	Cont	Inert	T3	IIB	No	C	FT	ABC	Yes	15.12, 15.13, 15.17, 15.19
Pentaethylenehexamine	X	S/P	2	2G	Open	No			Yes	O	No	B	Yes	15.19
Pentane (all isomers)	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.14, 15.19.6
Pentanoic acid	Y	P	3	2G	Open	No			Yes	O	No	AB	No	15.19.6
n-Pentanoic acid (64%)/2-Methyl butyric acid (36%) mixture	Y	S/P	2	2G	Open	No	T2		Yes	C	No	AD	No	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.12.3, 15.19

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Pentene (all isomers)	Y	P	3	2G	Cont	No	T3	IIA	No	R	F	A	No	15.14, 15.19.6
n-Pentyl propionate	Y	P	3	2G	Cont	No	T4	IIA	No	R	F	A	No	15.19.6
Perchloroethylene	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12.1, 15.12.2, 15.19.6
Petrolatum	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Phenol	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	A	No	15.12, 15.19, 16.2.9
1-Phenyl-1-xylyl ethane	Y	P	3	2G	Open	No			Yes	O	No	AB	No	
Phosphate esters, alkyl (C12-C14) amine	Y	P	2	2G	Cont	No	-	-	No	R	F	A	No	15.19.6, 16.2.6, 16.2.9
Phosphoric acid	Z	S/P	3	2G	Open	No			NF	O	No	No	No	15.11.1, 15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 16.2.9
Phosphorus, yellow or white	X	S/P	1	1G	Cont	Pad+ (vent or inert)			No (c)	C	No	C	Yes	15.7, 15.19, 16.2.9
Phthalic anhydride (molten)	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	R	No	AD	No	15.19.6, 16.2.6, 16.2.9
alpha-Pinene	X	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
beta-Pinene	X	P	2	2G	Cont	No	T4	IIB	No	R	F	A	No	15.19.6
Pine oil	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Polyacrylic acid solution (40% or less)	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Polyalkyl (C18-C22) acrylate in xylene	Y	P	2	2G	Cont	No	T4	IIB	No	R	F	AB	No	15.19.6, 16.2.6, 16.2.9
Polyalkylalkenaminesuccinimide, molybdenum oxysulphide	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Poly(2-8)alkylene glycol monoalkyl(C1-C6) ether	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	
Poly(2-8)alkylene glycol monoalkyl (C1-C6) ether acetate	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6
Polyalkyl (C10-C20) methacrylate	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Polyalkyl (C10-C18) methacrylate/ethylene-propylene copolymer mixture	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Polybutene	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6
Polybutenyl succinimide	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Poly(2+)cyclic aromatics	X	P	1	2G	Cont	No			Yes	R	No	AD	No	15.19, 16.2.6, 16.2.9
Polyether (molecular weight 1350+)	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6
Polyethylene glycol	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Polyethylene glycol dimethyl ether	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Poly(ethylene glycol) methylbutenyl ether (MW>1000)	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Polyethylene polyamines	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6
Polyethylene polyamines (more than 50% C5 -C20 paraffin oil)	Y	S/P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9

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Polyferric sulphate solution	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6
Poly(iminoethylene)-graft-N-poly(ethyleneoxy) solution (90% or less)	Z	S/P	3	2G	Open	No	-	-	NF	O	No	AC	No	16.2.9
Polyisobutenamine in aliphatic (C10-C14) solvent	Y	P	3	2G	Open	No	T3	IIA	Yes	O	No	A	No	15.19.6
Polyisobutenyl anhydride adduct	Z	P	3	2G	Open	No			Yes	O	No	AB	No	
Poly(4+)isobutylene	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.9
Polymethylene polyphenyl isocyanate	Y	S/P	2	2G	Cont	Dry			Yes (a)	C	T(a)	A	No	15.12, 15.16.2, 15.19.6, 16.2.9
Polyolefin (molecular weight 300+)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Polyolefin amide alkeneamine (C17+)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6
Polyolefin amide alkeneamine borate (C28-C250)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Polyolefin amide alkeneamine polyol	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Polyolefinamine (C28-C250)	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Polyolefinamine in alkyl (C2-C4) benzenes	Y	P	2	2G	Cont	No	T4	IIB	No	R	F	A	No	15.19.6, 16.2.6, 16.2.9
Polyolefinamine in aromatic solvent	Y	P	2	2G	Cont	No	T4	IIB	No	R	F	A	No	15.19.6, 16.2.6, 16.2.9
Polyolefin aminoester salts (molecular weight 2000+)	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Polyolefin anhydride	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Polyolefin ester (C28-C250)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Polyolefin phenolic amine (C28-C250)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Polyolefin phosphorusulphide, barium derivative (C28-C250)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Poly(20)oxyethylene sorbitan monooleate	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Poly(5+)propylene	Y	P	3	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.9
Polypropylene glycol	Z	S/P	3	2G	Cont	No			Yes	O	No	ABC	No	15.19.6
Polysiloxane	Y	P	3	2G	Cont	No	T4	IIB	No	R	F	AB	No	15.19.6, 16.2.9
Potassium chloride solution	Z	S/P	3	2G	Open	No	-	-	NF	O	No	A	No	16.2.9
Potassium hydroxide solution	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6
Potassium oleate	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Potassium thiosulphate (50% or less)	Y	P	3	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.9
n-Propanolamine	Y	S/P	3	2G	Open	No			Yes	O	No	AD	No	15.19.6, 16.2.9
2-Propene-1-aminium, N,N-dimethyl-N-2-propenyl-, chloride, homopolymer solution	Y	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	15.19.6
beta-Propiolactone	Y	S/P	2	2G	Cont	No		IIA	Yes	R	T	A	No	15.19.6
Propionaldehyde	Y	S/P	3	2G	Cont	No	T4	IIB	No	R	FT	A	Yes	15.17, 15.19.6

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Propionic acid	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	F	A	Yes	15.11.2, 15.11.3, 15.11.4, 15.11.6, 15.11.7, 15.11.8, 15.19.6
Propionic anhydride	Y	S/P	3	2G	Cont	No	T2	IIA	Yes	R	T	A	No	15.19.6
Propionitrile	Y	S/P	2	1G	Cont	No	T1	IIB	No	C	FT	AD	Yes	15.12, 15.17, 15.18, 15.19
n-Propyl acetate	Y	P	3	2G	Cont	No	T1	IIA	No	R	F	AB	No	15.19.6
n-Propyl alcohol	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
n-Propylamine	Z	S/P	2	2G	Cont	Inert	T2	IIA	No	C	FT	AD	Yes	15.12, 15.19
Propylbenzene (all isomers)	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.19.6
Propylene glycol methyl ether acetate	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	
Propylene glycol monoalkyl ether	Z	P	3	2G	Cont	No	T3	IIA	No	R	F	AB	No	
Propylene glycol phenyl ether	Z	P	3	2G	Open	No			Yes	O	No	AB	No	
Propylene oxide	Y	S/P	2	2G	Cont	Inert	T2	IIB	No	C	FT	AC	No	15.8, 15.12.1, 15.14, 15.19
Propylene tetramer	X	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
Propylene trimer	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6
Pyridine	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	F	A	No	15.19.6
Pyrolysis gasoline (containing benzene)	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AB	No	15.12, 15.17, 15.19.6
Rapeseed oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Rapeseed oil (low erucic acid containing less than 4% free fatty acids)	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Rape seed oil fatty acid methyl esters	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6
Resin oil, distilled	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 15.17, 15.19.6
Rice bran oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Rosin	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Safflower oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Shea butter	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Sodium alkyl (C14-C17) sulphonates (60-65% solution)	Y	P	2	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.6, 16.2.9
Sodium aluminosilicate slurry	Z	P	3	2G	Open	No			Yes	O	No	AB	No	
Sodium benzoate	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Sodium borohydride (15% or less)/Sodium hydroxide solution	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.6, 16.2.9
Sodium bromide solution (less than 50%) (*)	Y	S/P	3	2G	Open	No	-	-	NF	R	No	No	No	15.19.6
Sodium carbonate solution	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Sodium chlorate solution (50% or less)	Z	S/P	3	2G	Open	No			NF	O	No	No	No	15.9, 15.19.6, 16.2.9

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Sodium dichromate solution (70% or less)	Y	S/P	2	2G	Open	No			NF	C	No	No	No	15.12.3, 15.19
Sodium hydrogen sulphide (6% or less)/Sodium carbonate (3% or less) solution	Z	P	3	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.9
Sodium hydrogen sulphite solution (45% or less)	Z	S/P	3	2G	Open	No			NF	O	No	No	No	16.2.9
Sodium hydrosulphide/Ammonium sulphide solution	Y	S/P	2	2G	Cont	No	T4	IIB	No	C	FT	A	Yes	15.12, 15.14, 15.17, 15.19, 16.6.1, 16.6.2, 16.6.3
Sodium hydrosulphide solution (45% or less)	Z	S/P	3	2G	Cont	Vent or pad (gas)			NF	R	T	No	No	15.19.6, 16.2.9
Sodium hydroxide solution	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.6, 16.2.9
Sodium hypochlorite solution (15% or less)	Y	S/P	2	2G	Cont	No	-	-	NF	R	No	No	No	15.19.6
Sodium methylate 21-30% in methanol	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	AC	Yes	15.12, 15.17, 15.19, 16.2.6(only if >28%), 16.2.9
Sodium nitrite solution	Y	S/P	2	2G	Open	No			NF	O	No	No	No	15.12.3.1, 15.12.3.2, 15.19, 16.2.9
Sodium petroleum sulphonate	Y	S/P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6
Sodium poly(4+)acrylate solutions	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	16.2.9
Sodium silicate solution	Y	P	3	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.9
Sodium sulphide solution (15% or less)	Y	S/P	3	2G	Cont	No			NF	C	T	No	No	15.19.6, 16.2.9
Sodium sulphite solution (25% or less)	Y	P	3	2G	Open	No			NF	O	No	No	No	15.19.6, 16.2.9
Sodium thiocyanate solution (56% or less)	Y	P	3	2G	Open	No			Yes	O	No	No	No	15.19.6, 16.2.9
Soyabean oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Styrene monomer	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	F	AB	No	15.13, 15.19.6, 16.6.1, 16.6.2
Sulphohydrocarbon (C3-C88)	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Sulpholane	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Sulphur (molten)	Z	S	3	1G	Open	Vent or pad (gas)	T3		Yes	O	FT	No	No	15.10, 16.2.9
Sulphuric acid	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.11, 15.16.2, 15.19.6
Sulphuric acid, spent	Y	S/P	3	2G	Open	No			NF	O	No	No	No	15.11, 15.16.2, 15.19.6
Sulphurized fat (C14-C20)	Z	P	3	2G	Open	No			Yes	O	No	AB	No	
Sulphurized polyolefinamide alkene (C28-C250) amine	Z	P	3	2G	Open	No	-	-	Yes	O	No	A	No	
Sunflower seed oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Tall oil, crude	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Tall oil, distilled	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6
Tall oil fatty acid (resin acids less than 20%)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6
Tall oil pitch	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6

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Tallow	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Tallow fatty acid	Y	P	2	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Tetrachloroethane	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12, 15.17, 15.19.6
Tetraethylene glycol	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Tetraethylene pentamine	Y	S/P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Tetrahydrofuran	Z	S	3	2G	Cont	No	T3	IIB	No	R	FT	A	No	15.19.6
Tetrahydronaphthalene	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Tetramethylbenzene (all isomers)	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Titanium dioxide slurry	Z	P	3	2G	Open	No			Yes	O	No	AB	No	
Toluene	Y	P	3	2G	Cont	No	T1	IIA	No	R	F	A	No	15.19.6
Toluenediamine	Y	S/P	2	2G	Cont	No			Yes	C	T	AD	Yes	15.12, 15.17, 15.19, 16.2.6, 16.2.9
Toluene diisocyanate	Y	S/P	2	2G	Cont	Dry	T1	IIA	Yes	C	FT	AC (b)D	Yes	15.12, 15.16.2, 15.17, 15.19, 16.2.9
o-Toluidine	Y	S/P	2	2G	Cont	No			Yes	C	T	A	No	15.12, 15.17, 15.19
Tributyl phosphate	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
1,2,3-Trichlorobenzene (molten)	X	S/P	1	2G	Cont	No			Yes	C	T	ACD	Yes	15.12.1, 15.17, 15.19, 16.2.6, 16.2.9
1,2,4-Trichlorobenzene	X	S/P	1	2G	Cont	No			Yes	R	T	AB	No	15.19, 16.2.9
1,1,1-Trichloroethane	Y	P	3	2G	Open	No			Yes	O	No	A	No	15.19.6
1,1,2-Trichloroethane	Y	S/P	3	2G	Cont	No			NF	R	T	No	No	15.12.1, 15.19.6
Trichloroethylene	Y	S/P	2	2G	Cont	No	T2	IIA	Yes	R	T	No	No	15.12, 15.17, 15.19.6
1,2,3-Trichloropropane	Y	S/P	2	2G	Cont	No			Yes	C	T	ABD	No	15.12, 15.17, 15.19
1,1,2-Trichloro-1,2,2-Trifluoroethane	Y	P	2	2G	Open	No			NF	O	No	No	No	15.19.6
Tricresyl phosphate (containing 1% or more ortho-isomer)	Y	S/P	1	2G	Cont	No	T2	IIA	Yes	C	No	AB	No	15.12.3, 15.19, 16.2.6
Tricresyl phosphate (containing less than 1% ortho-isomer)	Y	S/P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6
Tridecane	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6
Tridecanoic acid	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6, 16.2.9
Tridecyl acetate	Y	P	3	2G	Open	No	-	-	Yes	O	No	A	No	15.19.6
Triethanolamine	Z	S/P	3	2G	Open	No		IIA	Yes	O	No	A	No	16.2.9
Triethylamine	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AC	Yes	15.12, 15.19.6
Triethylbenzene	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Triethylenetetramine	Y	S/P	2	2G	Open	No	T2	IIA	Yes	O	No	A	No	15.19.6

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Triethyl phosphate	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Triethyl phosphite	Z	S/P	3	2G	Cont	No	T3	IIA	No	R	FT	AB	No	15.12.1, 15.19.6, 16.2.9
Triisopropanolamine	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Triisopropylated phenyl phosphates	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6
Trimethylacetic acid	Y	S/P	2	2G	Cont	No			Yes	R	No	A	No	15.11.2, 15.11.3, 15.11.4, 15.11.5, 15.11.6, 15.11.7, 15.11.8, 15.19.6, 16.2.6, 16.2.9
Trimethylamine solution (30% or less)	Z	S/P	2	2G	Cont	No	T3	IIB	No	C	FT	AC	Yes	15.12, 15.14, 15.19, 16.2.9
Trimethylbenzene (all isomers)	X	P	2	2G	Cont	No	T1	IIA	No	R	F	A	No	15.19.6
Trimethylol propane propoxylated	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
2,2,4-Trimethyl-1,3-pentanediol diisobutyrate	Y	P	3	2G	Open	No	-	-	Yes	O	No	AB	No	15.19.6
2,2,4-Trimethyl-1,3-pentanediol-1-isobutyrate	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
1,3,5-Trioxane	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	F	AD	No	15.19.6, 16.2.9
Tripropylene glycol	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Trixylyl phosphate	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.6
Tung oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Turpentine	X	P	2	2G	Cont	No	T1	IIA	No	R	F	A	No	15.19.6
Undecanoic acid	Y	P	2	2G	Open	No			Yes	O	No	A	No	16.2.6, 16.2.9
1-Undecene	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Undecyl alcohol	X	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6, 16.2.9
Urea/Ammonium nitrate solution	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Urea/Ammonium nitrate solution (containing less than 1% free ammonia)	Y	S/P	2	2G	Cont	No			NF	R	T	A	No	15.12.3, 15.12.4, 15.19.6
Urea/Ammonium phosphate solution	Y	P	2	2G	Open	No			Yes	O	No	A	No	15.19.6
Urea solution	Z	P	3	2G	Open	No			Yes	O	No	A	No	
Valeraldehyde (all isomers)	Y	S/P	3	2G	Cont	Inert	T3	IIB	No	R	FT	A	No	15.4.6, 15.19.6
Vegetable acid oils (m)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Vegetable fatty acid distillates (m)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	15.19.6, 16.2.6, 16.2.9
Vinyl acetate	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F	A	No	15.13, 15.19.6, 16.6.1, 16.6.2
Vinyl ethyl ether	Z	S/P	2	1G	Cont	Inert	T3	IIB	No	C	FT	A	Yes	15.4, 15.13, 15.14, 15.19.6, 16.6.1, 16.6.2
Vinylidene chloride	Y	S/P	2	2G	Cont	Inert	T2	IIA	No	R	FT	B	Yes	15.13, 15.14, 15.19.6, 16.6.1, 16.6.2
Vinyl neodecanoate	Y	S/P	2	2G	Open	No			Yes	O	No	AB	No	15.13, 15.19.6, 16.6.1, 16.6.2
Vinyltoluene	Y	S/P	2	2G	Cont	No		IIA	No	R	F	AB	No	15.13, 15.19.6, 16.6.1, 16.6.2

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Waxes	Y	P	2	2G	Open	No	-	-	Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
White spirit, low (15-20%) aromatic	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	A	No	15.19.6, 16.2.9
Wood lignin with sodium acetate/oxalate	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	
Xylenes	Y	P	2	2G	Cont	No	T1	IIA	No	R	F	A	No	15.19.6, 16.2.9 (h)
Xylenes/ethylbenzene (10% or more) mixture	Y	P	2	2G	Cont	No	-	-	No	R	F	A	No	15.19.6
Xylenol	Y	S/P	2	2G	Open	No		IIA	Yes	O	No	AB	No	15.19.6, 16.2.9
Zinc alkaryl dithiophosphate (C7-C16)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6, 16.2.9
Zinc alkenyl carboxamide	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6
Zinc alkyl dithiophosphate (C3-C14)	Y	P	2	2G	Open	No			Yes	O	No	AB	No	15.19.6, 16.2.6

Chapter 17

- a If the product to be carried contains flammable solvents such that the flashpoint does not exceed 60°C, then special electrical systems and a flammable-vapour detector shall be provided.
- b Although water is suitable for extinguishing open-air fires involving chemicals to which this footnote applies, water shall be allowed to contaminate closed tanks containing these chemicals because of the risk of hazardous gas generation.
- c Phosphorous, yellow or white is carried above its autoignition temperature and therefore flashpoint is not appropriate. Electrical equipment requirements may be similar to those for substances with a flashpoint above 60°C.
- d Requirements are based on those isomers having a flashpoint of 60°C, or less; some isomers have a flashpoint greater than 60°C, and therefore the requirements based on flammability would not apply to such isomers.
- e Applies to n-decyl alcohol only.
- f Dry chemical shall not be used as fire extinguishing media.
- g Confined spaces shall be tested for both formic acid vapours and carbon monoxide gas, a decomposition product.
- h Applies to p-xylene only.
- i For mixtures containing no other components with safety hazards and where the pollution category is Y or less.
- j Only certain alcohol-resistant foams are effective.
- k Requirements for Ship Type identified in *column e* might be subject to regulation 4.1.3 of Annex II of MARPOL 73/78.
- l Applicable when the melting point is equal to or greater than 0°C.
- m From vegetable oils specified in the IBC Code.

* Indicates that, with reference to chapter 21 of the IBC Code (paragraph 21.1.3), deviations from the normal assignment criteria used for some carriage requirements have been implemented.

Chapter 18

List of products to which the Code does not apply

18.1 The following are products which have been reviewed for their safety and pollution hazards and determined not to present hazards to such an extent as to warrant application of the Code.

18.2 Although the products listed in this chapter fall outside the scope of the Code, the attention of Administrations is drawn to the fact that some safety precautions may be needed for their safe transportation. Accordingly, Administrations shall prescribe appropriate safety requirements.

18.3 Some liquid substances are identified as falling into Pollution Category Z and, therefore, subject to certain requirements of Annex II of MARPOL.

18.4 Liquid mixtures which are assessed or provisionally assessed under regulation 6.3 of MARPOL Annex II as falling into Pollution Category Z or OS, and which do not present safety hazards, may be carried under the appropriate entry in this chapter for "Noxious or Non-Noxious Liquid Substances, not otherwise specified (n.o.s.)".

EXPLANATORY NOTES

Product name	The product name shall be used in the shipping document for any cargo offered for bulk shipments. Any additional name may be included in brackets after the product name. In some cases, the product names are not identical with the names given in previous issues of the Code.
Pollution Category	The letter Z means the Pollution Category assigned to each product under Annex II of MARPOL. OS means the product was evaluated and found to fall outside Categories X, Y or Z.

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Product Name	Pollution Category
Acetone	Z
Alcoholic beverages, n.o.s.	Z
Apple juice	OS
n-Butyl alcohol	Z
sec-Butyl alcohol	Z
Calcium carbonate slurry	OS
Calcium nitrate solutions (50% or less)	Z
Clay slurry	OS
Coal slurry	OS
Diethylene glycol	Z
Ethyl alcohol	Z
Ethylene carbonate	Z
Glucose solution	OS
Glycerine	Z
Glycerol ethoxylated	OS
Hexamethylenetetramine solutions	Z
Hexylene glycol	Z
Hydrogenated starch hydrolysate	OS
Isopropyl alcohol	Z
Kaolin slurry	OS
Lecithin	OS
Magnesium hydroxide slurry	Z
Maltitol solution	OS
N-Methylglucamine solution (70% or less)	Z
Methyl propyl ketone	Z
Microsilica slurry	OS
Molasses	OS
Noxious liquid, (11) n.o.s. (trade name, contains) Cat. Z	Z
Non noxious liquid, (12) n.o.s. (trade name, contains) Cat. OS	OS
Orange juice (concentrated)	OS
Orange juice (not concentrated)	OS
Polyaluminium chloride solution	Z
Polyglycerin, sodium salt solution (containing less than 3% sodium hydroxide)	Z
Potassium chloride solution (less than 26%)	OS
Potassium formate solutions	Z
Propylene carbonate	Z
Propylene glycol	Z
Sodium acetate solutions	Z
Sodium bicarbonate solution (less than 10%)	OS
Sodium sulphate solutions	Z
Sorbitol solution	OS
Sulphonated polyacrylate solution	Z
Tetraethyl silicate monomer/oligomer (20% in ethanol)	Z
Triethylene glycol	Z
Vegetable protein solution (hydrolysed)	OS

Product Name

Pollution Category

Water

OS

Chapter 19

Index of Products Carried in Bulk

19.1 The first column of the Index of Products Carried in Bulk (hereafter referred to as "the Index") provides the so-called Index Name. Where the Index Name is in capitals and in bold, the Index Name is identical to the Product Name in either chapter 17 or chapter 18. The second column listing the relevant Product Name is therefore empty. Where the Index Name is non-bold lower case it reflects a synonym for which the Product Name in either chapter 17 or chapter 18 is given in the second column. The relevant chapter of the IBC Code is reflected in the third column.

19.2 Following a review of chapter 19, a column listing UN numbers which was previously included has been removed from the Index. Since UN numbers are only available for a limited number of Index Names and there are inconsistencies between some of the names used in chapter 19 and those linked to UN numbers, it was decided to remove UN number references in order to avoid any confusion.

19.3 The Index has been developed for information purposes only. None of the Index Names indicated in non-bold lower case in the first column shall be used as the Product Name on the shipping document.

19.4 Prefixes forming an integral part of the name are shown in ordinary (roman) type and are taken into account in determining the alphabetical order of entries. These include such prefixes as:

Mono Di Tri Tetra Penta Iso Bis Neo Ortho Cyclo

19.5 Prefixes that are disregarded for purposes of alphabetical order are in italics and include the following:

n-	(normal-)
sec-	(secondary-)
tert-	(tertiary-)
o-	(ortho-)
m-	(meta-)
p-	(para-)
N-	
O-	
S-	
sym-	(symmetrical)
uns-	(unsymmetrical)
dl-	
D-	
L-	
cis-	
trans-	
(E)-	
(Z)-	
alpha-	(α -)
beta-	(β -)
gamma-	(γ -)
epsilon	(ϵ -)
omega	(ω -)

19.6 The Index utilizes a note after the index name for some entries (shown as (a) or (b)) which indicates that the following qualifications apply:

- (a) this Index Name represents a subset of the corresponding Product Name.
- (b) The Product Name corresponding to this Index Name contains a carbon chain length qualification. Since the Index Name should always represent a subset or be an exact synonym of the corresponding Product Name, the carbon chain length characteristics should be checked for any product identified by this Index Name.

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Index Name	Product Name	Chapter
Abietic anhydride	ROSIN	17
acedimethylamide	N,N-DIMETHYLACETAMIDE	17
Acetaldehyde cyanohydrin solution (80% or less)	LACTONITRILE SOLUTION (80% OR LESS)	17
Acetaldehyde trimer	PARALDEHYDE	17
ACETIC ACID		17
Acetic acid anhydride	ACETIC ANHYDRIDE	17
Acetic acid, ethenyl ester	VINYL ACETATE	17
Acetic acid, methyl ester	METHYL ACETATE	17
Acetic acid, vinyl ester	VINYL ACETATE	17
ACETIC ANHYDRIDE		17
Acetic ester	ETHYL ACETATE	17
Acetic ether	ETHYL ACETATE	17
Acetic oxide	ACETIC ANHYDRIDE	17
Acetoacetic acid, methyl ester	METHYL ACETOACETATE	17
Acetoacetic ester	ETHYL ACETOACETATE	17
ACETOCHLOR		17
ACETONE		18
ACETONE CYANOHYDRIN		17
ACETONITRILE		17
ACETONITRILE (LOW PURITY GRADE)		17
Acetyl anhydride	ACETIC ANHYDRIDE	17
Acetylene tetrachloride	TETRACHLOROETHANE	17
Acetyl ether	ACETIC ANHYDRIDE	17
Acetyl oxide	ACETIC ANHYDRIDE	17
ACID OIL MIXTURE FROM SOYABEAN, CORN (MAIZE) AND SUNFLOWER OIL REFINING		17
Acroleic acid	ACRYLIC ACID	17
ACRYLAMIDE SOLUTION (50% OR LESS)		17
ACRYLIC ACID		17
Acrylic acid, 2-hydroxyethyl ester	2-HYDROXYETHYL ACRYLATE	17
Acrylic amide solution, 50% or less	ACRYLAMIDE SOLUTION (50% OR LESS)	17
Acrylic resin monomer	METHYL METHACRYLATE	17
ACRYLONITRILE		17
ACRYLONITRILE-STYRENE COPOLYMER DISPERSION IN POLYETHER POLYOL		17
Adipic acid, bis(2-ethylhexyl) ester	DI-(2-ETHYLHEXYL) ADIPATE	17
ADIPONITRILE		17
ALACHLOR TECHNICAL (90% OR MORE)		17
Alcohol	ETHYL ALCOHOL	18
Alcohol, C10	DECYL ALCOHOL (ALL ISOMERS)	17
Alcohol, C11	UNDECYL ALCOHOL	17
Alcohol, C12	DODECYL ALCOHOL	17
Alcohol, C7 (a)	HEPTANOL (ALL ISOMERS) (D)	17
Alcohol, C8	OCTANOL (ALL ISOMERS)	17
Alcohol, C9	NONYL ALCOHOL (ALL ISOMERS)	17
ALCOHOLIC BEVERAGES, N.O.S.		18
ALCOHOL (C9-C11) POLY (2.5-9) ETHOXYLATE		17

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Index Name	Product Name	Chapter
ALCOHOL (C6-C17) (SECONDARY) POLY(3-6) ETHOXYLATES		17
ALCOHOL (C6-C17) (SECONDARY) POLY(7-12) ETHOXYLATES		17
ALCOHOL (C12-C16) POLY(1-6)ETHOXYLATES		17
ALCOHOL (C12-C16) POLY(20+)ETHOXYLATES		17
ALCOHOL (C12-C16) POLY(7-19)ETHOXYLATES		17
ALCOHOLS (C13+)		17
Alcohols, C13 - C15	ALCOHOLS (C13+)	17
ALCOHOLS (C12+), PRIMARY, LINEAR		17
ALCOHOLS (C8-C11), PRIMARY, LINEAR AND ESSENTIALLY LINEAR		17
ALCOHOLS (C12-C13), PRIMARY, LINEAR AND ESSENTIALLY LINEAR		17
ALCOHOLS (C14-C18), PRIMARY, LINEAR AND ESSENTIALLY LINEAR		17
Aldehyde collidine	2-METHYL-5-ETHYL PYRIDINE	17
Aldehydine	2-METHYL-5-ETHYL PYRIDINE	17
ALKANES (C6-C9)		17
ISO- AND CYCLO-ALKANES (C10-C11)		17
ISO- AND CYCLO-ALKANES (C12+)		17
ALKANES(C10-C26), LINEAR AND BRANCHED, (FLASHPOINT >60°C)		17
N-ALKANES (C10+)		17
Alkane(C10-C18)sulfonic acid, phenyl ester (a)	ALKYL SULPHONIC ACID ESTER OF PHENOL	17
ALKARYL POLYETHERS (C9-C20)		17
ALKENOIC ACID, POLYHYDROXY ESTER BORATED		17
ALKENYL (C11+) AMIDE		17
ALKENYL (C16-C20) SUCCINIC ANHYDRIDE		17
ALKYL ACRYLATE-VINYLPYRIDINE COPOLYMER IN TOLUENE		17
ALKYLARYL PHOSPHATE MIXTURES (MORE THAN 40% DIPHENYL TOLYL PHOSPHATE, LESS THAN 0.02% ORTHO-ISOMERS)		17
ALKYLATED (C4-C9) HINDERED PHENOLS		17
ALKYLBENZENE, ALKYLINDANE, ALKYLINDENE MIXTURE (EACH C12-C17)		17
ALKYL BENZENE DISTILLATION BOTTOMS		17
ALKYLBENZENE MIXTURES (CONTAINING AT LEAST 50% OF TOLUENE)		17
ALKYL (C3-C4) BENZENES		17
ALKYL (C5-C8) BENZENES		17
ALKYL(C9+)BENZENES		17
ALKYL (C11-C17) BENZENE SULPHONIC ACID		17
ALKYLBENZENE SULPHONIC ACID, SODIUM SALT SOLUTION		17
ALKYL (C12+) DIMETHYLAMINE		17
ALKYL DITHIOCARBAMATE (C19-C35)		17
ALKYLDITHIOTHIADIAZOLE (C6-C24)		17
ALKYL ESTER COPOLYMER (C4-C20)		17

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ALKYL (C8-C10)/(C12-C14):(40% OR LESS/60% OR MORE) POLYGLUCOSIDE SOLUTION (55% OR LESS)		17
ALKYL (C8-C10)/(C12-C14):(60% OR MORE/40% OR LESS) POLYGLUCOSIDE SOLUTION(55% OR LESS)		17
ALKYL (C7-C9) NITRATES		17
2,2'- [3-(Alkyl(C16-C18)oxy)propylimino]diethanol (a)	ETHOXYLATED LONG CHAIN (C16+) ALKYLOXYALKYLAMINE	17
ALKYL(C7-C11)PHENOL POLY(4-12) ETHOXYLATE		17
ALKYL (C8-C40) PHENOL SULPHIDE		17
ALKYL (C8-C9) PHENYLAMINE IN AROMATIC SOLVENTS		17
ALKYL (C9-C15) PHENYL PROPOXYLATE		17
ALKYL (C8-C10) POLYGLUCOSIDE SOLUTION (65% OR LESS)		17
ALKYL (C8-C10)/(C12-C14):(50%/50%) POLYGLUCOSIDE SOLUTION (55% OR LESS)		17
ALKYL (C12-C14) POLYGLUCOSIDE SOLUTION (55% OR LESS)		17
ALKYL(C12-C16) PROPOXYAMINE ETHOXYLATE		17
ALKYL(C10-C20, SATURATED AND UNSATURATED) PHOSPHITE		17
ALKYL SULPHONIC ACID ESTER OF PHENOL		17
ALKYL (C18+) TOLUENES		17
ALKYL(C18-C28)TOLUENESULFONIC ACID		17
ALKYL(C18-C28)TOLUENESULFONIC ACID, CALCIUM SALTS, BORATED		17
Alkyltoluenesulfonic acid, calcium salts, high overbase (up to 70% in mineral oil)	ALKYL (C18-C28) TOLUENESULPHONIC ACID, CALCIUM SALTS, HIGH OVERBASE	17
ALKYL (C18-C28) TOLUENESULFONIC ACID, CALCIUM SALTS, LOW OVERBASE		17
Alkyl(C18-C28)toluenesulfonic acid,calcium salts, low overbase (up to 60% in mineral oil)	ALKYL (C18-C28) TOLUENESULFONIC ACID, CALCIUM SALTS, LOW OVERBASE	17
ALKYL (C18-C28) TOLUENESULPHONIC ACID, CALCIUM SALTS, HIGH OVERBASE		17
3-Alkyl(C16-C18)oxy-N,N'-bis(2-hydroxyethyl)propan-1-amine (a)	ETHOXYLATED LONG CHAIN (C16+) ALKYLOXYALKYLAMINE	17
ALLYL ALCOHOL		17
ALLYL CHLORIDE		17
ALUMINIUM CHLORIDE/HYDROGEN CHLORIDE SOLUTION		17
Aluminium silicate hydroxide	KAOLIN SLURRY	18
ALUMINIUM SULPHATE SOLUTION		17
Aminoacetic acid, sodium salt solution	GLYCINE, SODIUM SALT SOLUTION	17
1-Amino-3-aminomethyl-3,5,5-trimethylcyclohexane	ISOPHORONEDIAMINE	17
Aminobenzene	ANILINE	17
1-Aminobutane (a)	BUTYLAMINE (ALL ISOMERS)	17
2-Aminobutane	BUTYLAMINE (ALL ISOMERS)	17
Aminocyclohexane	CYCLOHEXYLAMINE	17
Aminoethane	ETHYLAMINE	17
Aminoethane solutions, 72% or less	ETHYLAMINE SOLUTIONS (72% OR LESS)	17

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2-Aminoethanol	ETHANOLAMINE	17
2-(2-AMINOETHOXY) ETHANOL		17
2-(2-Aminoethylamino)ethanol	AMINOETHYL ETHANOLAMINE	17
AMINOETHYLDIETHANOLAMINE/AMINOETHYLETHANOLAMINE SOLUTION		17
AMINOETHYL ETHANOLAMINE		17
N-(2-aminoethyl)ethylenediamine	DIETHYLENETRIAMINE	17
1-(2-Aminoethyl)piperazine	N-AMINOETHYLPIPERAZINE	17
N-AMINOETHYLPIPERAZINE		17
2-Aminoisobutane (a)	BUTYLAMINE (ALL ISOMERS)	17
Aminomethane solutions, 42% or less	METHYLAMINE SOLUTIONS (42% OR LESS)	17
1-Amino-2-methylbenzene	O-TOLUIDINE	17
2-Amino-1-methylbenzene	O-TOLUIDINE	17
2-AMINO-2-METHYL-1-PROPANOL		17
3-Aminomethyl-3,5,5-trimethylcyclohexylamine	ISOPHORONEDIAMINE	17
Aminophen	ANILINE	17
1-Aminopropane	N-PROPYLAMINE	17
2-Aminopropane	ISOPROPYLAMINE	17
2-Aminopropane (70% or less) solution	ISOPROPYLAMINE (70% OR LESS) SOLUTION	17
1-Aminopropan-2-ol	ISOPROPANOLAMINE	17
1-Amino-2-propanol	ISOPROPANOLAMINE	17
3-Aminopropan-1-ol	N-PROPANOLAMINE	17
2-Aminotoluene	O-TOLUIDINE	17
o-Aminotoluene	O-TOLUIDINE	17
5-Amino-1,3,3-trimethylcyclohexylmethylamine	ISOPHORONEDIAMINE	17
AMMONIA AQUEOUS (28% OR LESS)		17
Ammonia water, 28% or less	AMMONIA AQUEOUS (28% OR LESS)	17
AMMONIUM CHLORIDE SOLUTION (LESS THAN 25%) (*)		17
AMMONIUM HYDROGEN PHOSPHATE SOLUTION		17
Ammonium hydroxide, 28% or less	AMMONIA AQUEOUS (28% OR LESS)	17
AMMONIUM LIGNOSULPHONATE SOLUTIONS		17
AMMONIUM NITRATE SOLUTION (93% OR LESS)		17
AMMONIUM POLYPHOSPHATE SOLUTION		17
AMMONIUM SULPHATE SOLUTION		17
AMMONIUM SULPHIDE SOLUTION (45% OR LESS)		17
AMMONIUM THIOSULPHATE SOLUTION (60% OR LESS)		17
AMYL ACETATE (ALL ISOMERS)		17
Amyl acetate, commercial (a)	AMYL ACETATE (ALL ISOMERS)	17
n-Amyl acetate (a)	AMYL ACETATE (ALL ISOMERS)	17
sec-Amyl acetate (a)	AMYL ACETATE (ALL ISOMERS)	17
Amylacetic ester (a)	AMYL ACETATE (ALL ISOMERS)	17
Amyl alcohol	N-AMYL ALCOHOL	17
N-AMYL ALCOHOL		17
AMYL ALCOHOL, PRIMARY		17

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SEC-AMYL ALCOHOL		17
TERT-AMYL ALCOHOL		17
Amyl aldehyde	VALERALDEHYDE (ALL ISOMERS)	17
Amylcarbinol	HEXANOL	17
Amylene hydrate	TERT-AMYL ALCOHOL	17
Amyl ethyl ketone	ETHYL AMYL KETONE	17
TERT-AMYL METHYL ETHER		17
n-Amyl methyl ketone	METHYL AMYL KETONE	17
n-Amyl propionate	N-PENTYL PROPIONATE	17
Anaesthetic ether	DIETHYL ETHER	17
ANILINE		17
Aniline oil	ANILINE	17
Anilinobenzene	DIPHENYLAMINE (MOLTEN)	17
Anthracene oil (coal tar fraction) (a)	COAL TAR	17
Ant oil, artificial	FURFURAL	17
APPLE JUICE		18
Aqua fortis	NITRIC ACID (70% AND OVER)	17
Argilla	KAOLIN SLURRY	18
ARYL POLYOLEFINS (C11-C50)		17
AVIATION ALKYLATES (C8 PARAFFINS AND ISO-PARAFFINS BPT 95 - 120°C)		17
Azacycloheptane	HEXAMETHYLENEIMINE	17
3-Azapentane-1,5-diamine	DIETHYLENETRIAMINE	17
Azepane	HEXAMETHYLENEIMINE	17
Azotic acid	NITRIC ACID (70% AND OVER)	17
BARIUM LONG CHAIN (C11-C50) ALKARYL SULPHONATE		17
Basic calcium alkyl salicylate in approximately 30% mineral oil (b)	CALCIUM LONG-CHAIN ALKYL SALICYLATE (C13+)	17
Battery acid	SULPHURIC ACID	17
Behenyl alcohol (a)	ALCOHOLS (C13+)	17
Benzenamine	ANILINE	17
1,4-Benzenedicarboxylic acid, butyl ester	DIBUTYL TEREPHTHALATE	17
1,2-Benzenedicarboxylic acid, diethyl ester	DIETHYL PHTHALATE	17
1,2-Benzenedicarboxylic acid, diundecyl ester	DIUNDECYL PHTHALATE	17
BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)		17
BENZENESULPHONYL CHLORIDE	BENZENE SULPHONYL CHLORIDE	17
BENZENE SULPHONYL CHLORIDE		17
BENZENETRICARBOXYLIC ACID, TRIOCTYL ESTER		17
Benzenol	PHENOL	17
Benzol	BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)	17
Benzole	BENZENE AND MIXTURES HAVING 10% BENZENE OR MORE (I)	17
Benzophenol	PHENOL	17
2-Benzothiazolethiol, sodium salt solution	MERCAPTOBENZOTHAZOL, SODIUM SALT SOLUTION	17

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Index Name	Product Name	Chapter
Benzothiazole-2-thiol, sodium salt solution	MERCAPTOBENZOTHAZOL, SODIUM SALT SOLUTION	17
(2-Benzothiazolylthio) sodium solution	MERCAPTOBENZOTHAZOL, SODIUM SALT SOLUTION	17
BENZYL ACETATE		17
BENZYL ALCOHOL		17
Benzyl butyl phthalate	BUTYL BENZYL PHTHALATE	17
BENZYL CHLORIDE		17
Betaprone	BETA-PROPIOLACTONE	17
Betula oil	METHYL SALICYLATE	17
Biformyl	GLYOXAL SOLUTION (40% OR LESS)	17
BIO-FUEL BLENDS OF DIESEL/GAS OIL AND ALKANES (C10-C26), LINEAR AND BRANCHED WITH A FLASHPOINT >60°C (>25% BUT <99% BY VOLUME)		17
DKQ/HWGN'DNGPF UQHF KGUGNII CU'QK'CPF CNMCP GU'E32/E48+'NPGCT'CPF'DTCPEJ GF Y K/J 'C'HNCUJ RQRP V'Ö82Ä'%'@47' 'DW'>; ; ' D['XQNWOG+		17
BIO-FUEL BLENDS OF DIESEL/GAS OIL AND FAME (>25% BUT <99% BY VOLUME)		17
BIO-FUEL BLENDS OF DIESEL/GAS OIL AND VEGETABLE OIL (>25% BUT <99% BY VOLUME)		17
BIO-FUEL BLENDS OF GASOLINE AND ETHYL ALCOHOL (>25% BUT <99% BY VOLUME)		17
Biphenyl	DIPHENYL	17
Bis(methylcyclopentadiene)	METHYLCYCLOPENTADIENE DIMER	17
2,5-Bis(alkyl(C7+)(thio)-1,3,4-thiadiazole	ALKYLDITHIOTHIADIAZOLE (C6-C24)	17
Bis(2-aminoethyl)amine	DIETHYLENETRIAMINE	17
N,N'-Bis(2-aminoethyl)ethane-1,2-diamine	TRIETHYLENETETRAMINE	17
N,N'-Bis(2-aminoethyl)ethylenediamine	TRIETHYLENETETRAMINE	17
N,N-Bis(2-(bis(carboxymethyl)amino)ethyl)glycine, pentasodium salt solution	DIETHYLENETRIAMINEPENTAACETIC ACID, PENTASODIUM SALT SOLUTION	17
Bis(2-butoxyethyl) ether	DIETHYLENE GLYCOL DIBUTYL ETHER	17
N,N- Bis(carboxymethyl)glycine trisodium salt solution	NITRILOTRIACETIC ACID, TRISODIUM SALT SOLUTION	17
Bis(chloroethyl) ether	DICHLOROETHYL ETHER	17
Bis(2-chloroethyl) ether	DICHLOROETHYL ETHER	17
Bis (2-chloroisopropyl) ether	2,2'-DICHLOROISOPROPYL ETHER	17
Bis(2-chloro-1-methylethyl) ether	2,2'-DICHLOROISOPROPYL ETHER	17
Bis[2-(2,3-epoxypropoxy)phenyl]methane	DIGLYCIDYL ETHER OF BISPHENOL F	17
2,2-Bis[4-(2,3-epoxypropoxy)phenyl]propane	DIGLYCIDYL ETHER OF BISPHENOL A	17
Bis(2-ethoxyethyl) ether	DIETHYLENE GLYCOL DIETHYL ETHER	17
Bis(2-ethylhexyl) adipate	DI-(2-ETHYLHEXYL) ADIPATE	17
Bis(2-ethylhexyl) hydrogen phosphate	DI-(2-ETHYLHEXYL) PHOSPHORIC ACID	17
Bis(2-ethylhexyl) phthalate	DIOCTYL PHTHALATE	17
Bis(2-hydroxyethyl)amine	DIETHANOLAMINE	17
Bis(2-hydroxyethyl)ammonium 2,4-dichlorophenoxyacetate solution	2,4-DICHLOROPHENOXYACETIC ACID, DIETHANOLAMINE SALT SOLUTION	17
Bis(2-hydroxyethyl) ether	DIETHYLENE GLYCOL	18
Bis(2-hydroxypropyl)amine	DIISOPROPANOLAMINE	17
Bis(6-methylheptyl) phthalate	DIOCTYL PHTHALATE	17

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Blackstrap molasses (a)	MOLASSES	18
Bolus alba	KAOLIN SLURRY	18
BRAKE FLUID BASE MIX: POLY(2-8)ALKYLENE (C2-C3) GLYCOLS/POLYALKYLENE (C2-C10) GLYCOLS MONOALKYL (C1-C4) ETHERS AND THEIR BORATE ESTERS		17
Bran oil	FURFURAL	17
BROMOCHLOROMETHANE		17
Butaldehyde (a)	BUTYRALDEHYDE (ALL ISOMERS)	17
Butanal (a)	BUTYRALDEHYDE (ALL ISOMERS)	17
n-Butanal (a)	BUTYRALDEHYDE (ALL ISOMERS)	17
1,3-Butanediol (a)	BUTYLENE GLYCOL	17
Butane-1,3-diol (a)	BUTYLENE GLYCOL	17
1,4-Butanediol (a)	BUTYLENE GLYCOL	17
Butane -1,4-diol (a)	BUTYLENE GLYCOL	17
2,3-Butanediol (a)	BUTYLENE GLYCOL	17
Butane-2,3-diol (a)	BUTYLENE GLYCOL	17
Butanoic acid	BUTYRIC ACID	17
Butanol	N-BUTYL ALCOHOL	18
1-Butanol	N-BUTYL ALCOHOL	18
Butanol-1	N-BUTYL ALCOHOL	18
Butan-1-ol	N-BUTYL ALCOHOL	18
2-Butanol	SEC-BUTYL ALCOHOL	18
Butan-2-ol	SEC-BUTYL ALCOHOL	18
Butanol acetate (a)	BUTYL ACETATE (ALL ISOMERS)	17
2-Butanol acetate (a)	BUTYL ACETATE (ALL ISOMERS)	17
1,4-Butanolide	GAMMA-BUTYROLACTONE	17
Butan-4-olide	GAMMA-BUTYROLACTONE	17
n-Butanol	N-BUTYL ALCOHOL	18
sec-Butanol	SEC-BUTYL ALCOHOL	18
tert-Butanol	TERT-BUTYL ALCOHOL	17
2-Butanone	METHYL ETHYL KETONE	17
Butan-2-one	METHYL ETHYL KETONE	17
2-Butenal	CROTONALDEHYDE	17
Butene dimer	OCTENE (ALL ISOMERS)	17
BUTENE OLIGOMER		17
1-Butoxybutane	N-BUTYL ETHER	17
2-Butoxyethanol (a)	ETHYLENE GLYCOL MONOALKYL ETHERS	17
2-tert-butoxyethanol (a)	ETHYLENE GLYCOL MONOALKYL ETHERS	17
2-(2-Butoxyethoxy)ethanol (a)	POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER	17
2-(2-Butoxyethoxy)ethyl acetate (a)	POLY(2-8)ALKYLENE GLYCOL MONOALKYL (C1-C6) ETHER ACETATE	17
2-Butoxyethyl acetate	ETHYLENE GLYCOL BUTYL ETHER ACETATE	17
1-Butoxypropan-2-ol (a)	PROPYLENE GLYCOL MONOALKYL ETHER	17
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1,4-Diethylene dioxide	1,4-DIOXANE	17
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GLYPHOSATE SOLUTION (NOT CONTAINING SURFACTANT)		17
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N-HEPTANOIC ACID		17
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n-Heptylic acid	N-HEPTANOIC ACID	17
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BETA-PROPIOLACTONE		17
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N-PROPYL ACETATE		17
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d-Sorbitol solution	SORBITOL SOLUTION	18
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TITANIUM DIOXIDE SLURRY		17
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Triglycol	TRIETHYLENE GLYCOL	18
Trihydroxypropane	GLYCERINE	18
Trihydroxytriethylamine	TRIETHANOLAMINE	17
TRIISOPROPANOLAMINE		17
TRIISOPROPYLATED PHENYL PHOSPHATES		17
TRIMETHYLACETIC ACID		17
TRIMETHYLAMINE SOLUTION (30% OR LESS)		17
TRIMETHYLBENZENE (ALL ISOMERS)		17
1,2,3-Trimethylbenzene (a)	TRIMETHYLBENZENE (ALL ISOMERS)	17
1,2,4-Trimethylbenzene (a)	TRIMETHYLBENZENE (ALL ISOMERS)	17
1,3,5-Trimethylbenzene (a)	TRIMETHYLBENZENE (ALL ISOMERS)	17
2,6,6-Trimethylbicyclo[3.1.1]hept-2-ene	ALPHA-PINENE	17
Trimethylcarbinol	TERT-BUTYL ALCOHOL	17
1,1,3-Trimethyl-3-cyclohexene-5-one	ISOPHORONE	17
3,5,5-Trimethylcyclohex-2-enone	ISOPHORONE	17
3,5,5-Trimethylcyclohex-2-en-one	ISOPHORONE	17
TRIMETHYLOL PROPANE PROPOXYLATED		17
2,2,4-Trimethylpentane (a)	OCTANE (ALL ISOMERS)	17
2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE		17
2,2,4-Trimethylpentane-1,3-diol diisobutyrate	2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE	17
2,2,4-TRIMETHYL-1,3-PENTANEDIOL-1-ISOBUTYRATE		17
2,4,4-Trimethylpentene-1	DIISOBUTYLENE	17
2,4,4-Trimethylpent-1-ene	DIISOBUTYLENE	17
2,4,4-Trimethylpentene-2	DIISOBUTYLENE	17
2,4,4-Trimethylpent-2-ene	DIISOBUTYLENE	17
2,4,6-Trimethyl-1,3,5-trioxane	PARALDEHYDE	17
2,4,6-Trimethyl-s-trioxane	PARALDEHYDE	17
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1,3,5-TRIOXANE		17

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3,6,9-Trioxaundecane	DIETHYLENE GLYCOL DIETHYL ETHER	17
Trioxymethylene	1,3,5-TRIOXANE	17
Tripropylene	PROPYLENE TRIMER	17
TRIPROPYLENE GLYCOL		17
Tripropylene glycol methyl ether (a)	POLY(2-8)ALKYLENE GLYCOL MONOALKYL(C1-C6) ETHER	17
Tris(dimethylphenyl) phosphate (all isomers)	TRIXYLYL PHOSPHATE	17
Tris(2-hydroxyethyl)amine	TRIETHANOLAMINE	17
2,4-D-tris(2-hydroxy-2-methylethyl)ammonium	2,4-DICHLOROPHENOXYACETIC ACID, TRIISOPROPANOLAMINE SALT SOLUTION	17
Tris(2-hydroxypropyl)amine	TRIISOPROPANOLAMINE	17
Tris(2-hydroxy-1-propyl)amine	TRIISOPROPANOLAMINE	17
Tris(2-hydroxypropyl)ammonium 2,4-dichlorophenoxyacetate solution	2,4-DICHLOROPHENOXYACETIC ACID, TRIISOPROPANOLAMINE SALT SOLUTION	17
Trisodium 2-[carboxylatomethyl(2-hydroxyethyl)amino] ethyliminodi(acetate) solution	N-(HYDROXYETHYL)ETHYLENEDIAMINETRIACETIC ACID, TRISODIUM SALT SOLUTION	17
Trisodium N-(carboxymethyl)-N'-(2-hydroxyethyl)-N,N'-ethylenediglycine solution	N-(HYDROXYETHYL)ETHYLENEDIAMINETRIACETIC ACID, TRISODIUM SALT SOLUTION	17
Trisodium N-(2-hydroxyethyl)ethylenediamine-N,N',N'-triacetate solution	N-(HYDROXYETHYL)ETHYLENEDIAMINETRIACETIC ACID, TRISODIUM SALT SOLUTION	17
Trisodium nitrilotriacetate solution	NITRILOTRIACETIC ACID, TRISODIUM SALT SOLUTION	17
Tritolyl phosphate, containing less than 1% ortho- isomer	TRICRESYL PHOSPHATE (CONTAINING LESS THAN 1% ORTHO-ISOMER)	17
Tritolyl phosphate, containing 1% or more ortho- isomer	TRICRESYL PHOSPHATE (CONTAINING 1% OR MORE ORTHO-ISOMER)	17
Trixylenyl phosphate	TRIXYLYL PHOSPHATE	17
TRIXYLYL PHOSPHATE		17
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Type A Zeolite slurry (a)	SODIUM ALUMINOSILICATE SLURRY	17
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N-Undecane (a)	N-ALKANES (C10+)	17
UNDECANOIC ACID		17
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UNDECYL ALCOHOL		17
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uns-Trimethylbenzene (a)	TRIMETHYLBENZENE (ALL ISOMERS)	17
unsym-Trichlorobenzene	1,2,4-TRICHLOROBENZENE	17
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UREA/AMMONIUM NITRATE SOLUTION (CONTAINING LESS THAN 1% FREE AMMONIA)		17
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UREA SOLUTION		17

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VINYL ACETATE		17
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White bole	KAOLIN SLURRY	18
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XYLENES/ETHYLBENZENE (10% OR MORE) MIXTURE		17
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Z-Octadec-9-enoic acid	OLEIC ACID	17
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