

# Handbook for Inspection of Ships and Issuance of Ship Sanitation Certificates



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## FOREWORD

On 23 May 2005, the Fifty-eighth World Health Assembly adopted the International Health Regulations (IHR) (2005), and the Deratting Certificate/Deratting Exemption Certificate required by the IHR (1969) was replaced by the broader-scope ship sanitation certificates (SSCs), which came into force on 15 June 2007.

The IHR (2005) states that parties can authorize certain ports to issue the SSCs and their extensions, as well as to provide the services referred to in Annex 1 of the regulations. The authorized ports should have, among other capacities, trained personnel available to board a ship and to identify any significant risk to public health, as well as to take control measures. Thus, it is imperative to have a global, standardized operational procedure for inspecting ships.

After the IHR (2005) took effect in June 2007, the World Health Organization (WHO), Health Security and Environment (IHR ports, airports and ground crossings) developed the *Interim technical advice for inspection and issuance of ship sanitation certificates*. This technical advice, which was published in August 2007, assists States Parties to manage ship inspection and issue SSCs.

This document, *Handbook for inspection of ships and issuance of ship sanitation certificates* (the handbook), replaces the previous interim technical advice, and reflects the need for a common understanding of the purpose and scope of the application of SSCs worldwide. It is an important tool for helping to prevent and control known public health risks (not just rodents), and provides a common way to register and communicate events and measures taken on board. The handbook is intended to raise conveyance operators' awareness and response to public health events, and provide the opportunity for routine verification of health status on board at least twice each year.

This handbook may be used in conjunction with the *Guide to ship sanitation* (WHO, 2011) and the *International medical guide for ships* (WHO, 2007), which are oriented towards preventive health and curative health, respectively, on board ships.

The handbook was developed through an iterative series of drafting and peer-review steps. The following expert meetings were held to revise the handbook:

- informal Transportation Working Group Meeting for Ship Sanitation Certificates, Lyon, France, 6–8 November 2007;
- informal Transportation Draft Working Group Meeting on procedures for inspection and issuance of ship sanitation certificates, Lyon, France, 17–19 December 2007;
- informal consultation for draft on procedures for inspection and issuance of ship sanitation certificates, Lyon, France, 14–16 April 2008;
- meeting on recommended procedures for inspection and issuance of ship sanitation certificates, Lyon, France, 14–15 April 2009;
- informal consultation meetings for the ship sanitation guidelines, Lyon, France, 12–16 October 2009.



A public consultation version of this handbook was posted on the WHO website in May 2010. During the course of meetings and peer review, participants and experts from represented cruise ship operators, seafarer associations, collaborating Member States for the IHR (2005), Port State Control, port health authorities and other regulatory agencies were involved from diverse developing and developed countries. The acknowledgements section contains a complete list of contributors.

From 2008 to 2010, several workshops and field activities were held at the subregional, regional and interregional level. Experts from all WHO regions participated, and the workshops provided an opportunity to revise previous interim technical advice and test the new draft handbook using training exercises onboard ships. The workshops and field activities were supported by WHO regional and country offices, as well as public health authorities in different countries, including Sines, Portugal (2009); Santos (2008), Fortaleza (2010), Brazil; Palma de Majorca (2008), Cartagena (2009), Las Palmas de Gran Canaria (2010), Spain; Amsterdam, the Netherlands (2007); Hamburg, Germany (2008); Miami, United States of America (2008); Bridgetown, Barbados (2008); Manila, the Philippines (2009); Colombo, Sri Lanka (2010); and Paris, France (2009).

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## GLOSSARY

- **Acceptable non-rat-proof material**

A material with a surface that is treated (“flashed”) to be resistant to rat gnawing when the edges are exposed to gnawing (the “gnawing-edges”), but that is subject to penetration by rats if the gnawing-edges are not treated.

- **Accessible**

Capable of being exposed for cleaning and inspection with the use of simple tools, such as a screwdriver, pliers or an open-ended wrench.

- **Affected**

Persons, baggage, cargo, containers, conveyances, goods, postal parcels or human remains that are infected or contaminated, or carry sources of infection or contamination, so as to constitute a public health risk.

- **Affected area**

A geographical location specifically for which health measures have been recommended by WHO under International Health Regulations (2005)

- **Airbreak**

A piping arrangement in which a drain from a fixture, appliance or device discharges indirectly into another fixture, receptacle or interceptor at a point below the flood-level rim.

- **Airgap**

The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture or other device and the flood-level rim of the receptacle or receiving fixture. The air gap should typically be at least twice the diameter of the supply pipe or faucet, or at least 25 mm.

- **Backflow**

The flow of water or other liquids, mixtures or substances into the distribution pipes of a potable supply of water from any source or sources other than the potable water supply. Back-siphonage is one form of backflow.

- **Backflow preventer**

A mechanical device installed in a water or waste line to prevent the reversal of flow under conditions of back pressure. An approved backflow-prevention plumbing device is typically used on potable water distribution lines where there is a direct connection or a potential connection between the potable water distribution system and other liquids, mixtures or substances from any source other than the potable water supply. Some devices are designed for use under continuous water pressure, whereas others are non-pressure types. In the check-valve type, the flap should swing into a recess when the line is flowing full to preclude obstructing the flow.

- **Back-siphonage**

The backward flow of used, contaminated or polluted water from a plumbing fixture or vessel or other source into a water-supply pipe as a result of negative pressure in the pipe.

- **Black water**

Waste from toilets, urinals or medical facilities.

- **Biohazard bag**

Bag used to secure biohazard waste that requires microbiological inactivation in an approved manner for final disposal. Must be disposable and impervious to moisture, and have sufficient strength to preclude tearing or bursting under normal conditions of usage and handling.

- **Child care facility**

Facility for child-related activities where children are not yet out of diapers or require supervision using the toilet facilities, and are cared for by vessel staff.

- **Cleaning**

Removal of visible dirt or particles through mechanical action, reducing the microbial environment population through the application of chemical, mechanical or thermal processes for a certain period of time.

- **Closed joints, seams and crevices**

Those where the materials used in fabrication of the equipment join or fit together snugly. Suitable filling materials may be used to effect a proper closure.

- **Communicable disease**

Diseases caused by pathogenic microorganisms, such as bacteria, viruses, parasites or fungi. The diseases can be spread, directly or indirectly, from one person to another. Zoonotic diseases are communicable diseases of animals that can cause disease when transmitted to humans.

- **Competent authority**

Authority responsible for implementing and applying health measures under the International Health Regulations (2005).

- **Corrosion-resistant**

Capable of maintaining original surface characteristics under prolonged influence of the use environment, including the expected food contact and the normal use of cleaning compounds and sanitizing solutions. Corrosion-resistant materials must be non-toxic.

- **Coved**

A concave surface, moulding or other design that eliminates the usual angles of 90 degrees or less.

- **Cross-connection**

Any unprotected actual or potential connection or structural arrangement between a public or a consumer's potable water system and any other source or system through which it is possible to introduce into any part of the potable system any used water, industrial fluid, gas or substance other than the intended potable water with which the system is supplied. Bypass arrangements, jumper connections, removable sections, swivel or change-over devices and other temporary or permanent devices through which, or because of which, backflow can occur are considered to be cross-connections.

- **Disease**

An illness or medical condition, irrespective of origin or sources, that presents or could present significant harm to humans.

- **Disinfection**

The procedure whereby measures are taken to control or kill infectious agents on a human or animal body, on a surface or in or on baggage, cargo, containers, conveyances, goods and postal parcels by direct exposure to chemical or physical agents.

- **Easily cleanable**

Fabricated with a material, finish and design that allows for easy and thorough cleaning with normal cleaning methods and materials.

- **Flashing**

The capping or covering of corners, boundaries and other exposed edges of acceptable non-rat-proof material in rat-proof areas. The flashing strip should typically be of rat-proof material, wide enough to cover the gnawing-edges adequately and firmly fastened.

- **Food contact surfaces**

Surfaces of equipment and utensils with which food normally comes in contact, and surfaces from which food may drain, drip or splash back onto surfaces normally in contact with food. This includes the areas of ice machines over the ice chute to the ice bins.

- **Food display areas**

Any area where food is displayed for consumption by passengers and/or crew.

- **Food handling areas**

Any area where food is stored, processed, prepared or served.

- **Food preparation areas**

Any area where food is processed, cooked or prepared for service.

- **Food service areas**

Any area where food is presented to passengers or crew members (excluding individual cabin service).

- **Food storage areas**

Any area where food or food products are stored.

- **Free pratique**

The permission for a ship to enter a port, embark or disembark, discharge or load cargo or stores.

- **Grey water**

All used water, including drainage from galleys, dishwashers, showers, laundries, and bath and washbasin drains. It does not include black water or bilge water from the machinery spaces.

- **Halogenation**

In this context, halogenation refers to disinfection using halogen disinfectants, such as chlorine, bromine or iodine, to treat recreational water or potable water to reduce the concentration of pathogenic microorganisms.

- **International voyage**

(a) In the case of a conveyance, a voyage between points of entry in the territories of more than one state, or a voyage between points of entry in the territory or territories of the same state if the conveyance has contacts with the territory of any other state on its voyage, but only as regards those contacts.

(b) In the case of a traveller, a voyage involving entry into the territory of a state other than the territory of the state in which that traveller commences the voyage.

- **National IHR Focal Point**

The national centre, designated by each State Party, which shall be accessible at all times for communication with WHO IHR Contact Points.

- **Non-absorbent materials**

Materials with surfaces that are resistant to moisture penetration.

- **Non-food contact surfaces**

All exposed surfaces, other than food contact or splash contact surfaces, of equipment located in food storage, preparation and service areas.

- **Perishable food**

A food that is natural or synthetic and that requires temperature control because it is in a form capable of supporting:

- the rapid and progressive growth of infectious or toxigenic microorganisms;
- the growth and toxin production of *Clostridium botulinum*; or, in raw shell eggs, the growth of *Salmonella enteritidis*.

- **Personal protective equipment (PPE)**

Equipment used to create a protective barrier between the worker and the hazards in the workplace.

- **Point of entry**

A passage for international entry or exit of travellers, baggage, cargo, containers, conveyances, goods and postal parcels, as well as agencies and areas providing services to them on entry or exit.

- **Portable**

A description of equipment that is readily removable or mounted on casters, gliders or rollers; provided with a mechanical means so that it can be tilted safely for cleaning; or readily movable by one person.

- **Potable water**

Fresh water that is intended for human consumption, drinking, washing, teeth brushing, bathing or showering; for use in fresh-water recreational water environments; for use in the ship's hospital; for handling, preparing or cooking food; and for cleaning food storage and preparation areas, utensils and equipment. Potable water, as defined by the WHO *Guidelines for drinking-water quality* (2008) does not represent any significant risk to health over a lifetime of consumption, including different sensitivities that may occur between life stages.

- **Potable water tanks**

All tanks in which potable water is stored from bunkering and production for distribution and use as potable water.

- **Public health emergency of international concern**

An extraordinary event that is determined, as provided in the International Health Regulations (2005):

- to constitute a public health risk to other states through the international spread of disease; and
- to potentially require a coordinated international response.

- **Public health risk**

A likelihood of an event that may affect adversely the health of human populations, with an emphasis on one that may spread internationally or may present a serious and direct danger.

- **Readily removable**

Capable of being detached from the main unit without the use of tools.

- **Removable**

Capable of being detached from the main unit with the use of simple tools, such as a screwdriver, pliers or an open-ended wrench.

- **Scupper**

A conduit or collection basin that channels water run-off to a drain.

- **Sealed spaces**

Spaces that have been effectively closed, all joints, seams and crevices having been made impervious to insects, rodents, seepage, infiltration and food fragments or other debris.

- **Seam**

An open juncture between two similar or dissimilar materials. Continuously welded junctures, ground and polished smooth, are not considered seams.

- **Sewage**

According to the internationally accepted definition in the International Maritime Organization's International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), sewage is defined as:

- drainage and other wastes from any form of toilets, urinals and WC scuppers;
- drainage from medical premises (e.g. dispensary, sick bay) via washbasins, wash tubs and scuppers located in such premises;
- drainage from spaces containing living animals (e.g. livestock carriers); or
- other waste waters (e.g. grey water from showers) when mixed with the drainages defined above.

- **Sewage treatment**

The process of removing the contaminants from sewage to produce liquid and solid suitable for discharge to the environment or for reuse. It is a form of waste management. A septic tank or other on-site wastewater treatment system such as biofilters can be used to treat sewage close to where it is created.



The common method of sewage treatment is to flush sewage from toilets through a piping system into a holding tank where it is comminuted, decanted and broken down by naturally occurring bacteria in an aerobic process, and disinfected before it is discharged into the open sea. It is important to consider that an excessive use of cleaners and disinfectant in the sewage system may destroy the natural bacteria in the treatment plant. The aerobic process needs oxygen. Therefore, aerators blow air into the biological compartment. Toxic gases can be produced during the process.

- **Ship**

A seagoing or inland navigation vessel on an international voyage (IHR, 2005).

- **Ship water system**

On-board treatment equipment and facilities, water storage tanks, and all the plumbing and fixtures on the ship.

- **Smooth**

A food contact surface that is free from pits and inclusions, with a cleanability equal to or exceeding that of (100 grit) number 3 stainless steel.

A non-food contact surface that is equal to commercial grade hot-rolled steel and is free from visible scale.

A deck, bulkhead or deck head that has an even or level surface with no roughness or projections that render it difficult to clean.

- **Surveillance**

Systematic ongoing collection, collation and analysis of data for public health purposes, and the timely dissemination of public health information for assessment and public health response as necessary.

- **State Party**

Under the International Health Regulations, "States Parties» are those states that have become bound by the revised International Health Regulations (2005).

- **Traveller**

Natural person taking an international voyage.

- **Turbidity**

Cloudiness or lack of transparency of a solution due to presence of suspended particles. Typically measured in nephelometric turbidity units (NTU).

- **Vector**

An insect or other animal that normally transports an infectious agent that constitutes a public health risk.

- **Verification**

Final monitoring for reassurance that the system as a whole is operating safely. Verification may be undertaken by the supplier, by an independent authority or by a combination of these, depending on the administrative regime of a given country. Typically includes testing for faecal indicator organisms and hazardous chemicals.

## ACRONYMS

BWMP	ballast-water management plan
CAC	Codex Alimentarius Commission
FAO	Food and Agriculture Organization of the United Nations
FSP	food safety plan
GDWQ	<i>Guidelines for drinking-water quality</i> (World Health Organization)
HACCP	hazard analysis critical control point
HPC	heterotrophic plate count
IHR	International Health Regulations
ILO	International Labour Organization
IMGS	<i>International medical guide for ships</i> (International Labour Organization, International Maritime Organization, World Health Organization)
IMO	International Maritime Organization
ISM manual	International Safety Management manual
ISO	International Organization of Standardization
ISPP certificate	International Sewage Pollution Prevention certificate
MEPC	Marine Environment Protection Committee
MFAG	<i>Medical first aid guide for use in accidents involving dangerous goods</i> (International Maritime Organization)
PPE	personal protective equipment
SSC	ship sanitation certificate
SSCC	Ship Sanitation Control Certificate
SSCEC	Ship Sanitation Control Exemption Certificate
UV	ultraviolet
WHO	World Health Organization



# INTRODUCTION

The International Sanitary Regulations were first adopted in 1951. In 1969, they were renamed as the International Health Regulations (IHR). The 1951 IHR were intended to monitor and control six serious infectious diseases: cholera, plague, yellow fever, smallpox, relapsing fever and typhus. In the intervening 50 years, many developments affected the international transmission of disease, including changes in international ship traffic. Therefore, on 23 May 2005, the World Health Assembly adopted a revised IHR by way of resolution WHA58.3, which entered into force on 15 June 2007.

Beginning with the 1951 IHR, the Deratting Certificate/Deratting Exemption Certificate was a required document for the international public health control of ships visiting international ports. The Deratting Certificate helped to reduce the international spread of rodent-borne diseases, especially plague. All ships on international voyages were required to renew this certificate every six months, and this renewal required all areas of the ship to be inspected. In the IHR (2005), the Deratting Certificate/Deratting Exemption Certificate was replaced by the much broader ship sanitation certificates (SSCs) and was no longer valid after 2007.

The IHR (2005) SSCs are of particular importance for the prevention and control of public health risks on board ships on international voyages. They provide internationally recognized documentation regarding the sanitary conditions of a ship, while reducing the need for further and more frequent inspections of the ship during the period for which the certificate is valid (but with options for additional inspections under certain limited circumstances).

This handbook is intended to be used as reference material for port health officers, regulators, ship operators and other competent authorities in charge of implementing the IHR (2005) at ports and on ships. The handbook is based on the IHR (2005) provisions regarding ship inspection and issue of SSCs. They provide guidance for preparing and performing the inspection, completing the certificates and applying public health measures within the framework of the IHR (2005).<sup>1</sup>

1. IHR Article 2, purpose and scope: "to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade".



## SCOPE

SSCs are used to identify and record all areas of ship-borne public health risks (not limited to rodents).<sup>2</sup> They require the application of comprehensive and detailed inspection procedures and techniques by personnel who are trained in public health issues. The relevant IHR (2005) provisions include Articles 20, 22, 23, 24, 25, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 41, 42, 43, 44 and 45, and Annexes 1, 3, 4 and 5.

SSCs emphasize the criteria to be considered during the inspection of areas of the ship. They also provide information for determining which public health measures should be adopted to prevent and control public health risks on board, in turn preventing the international spread of disease. At the completion of the inspection, a new SSC should be issued—either a Ship Sanitation Control Exemption Certificate or a Ship Sanitation Control Certificate, according to the results of the inspection. If the inspection cannot be accomplished at an authorized port (listed on the World Health Organization [WHO] website), the existing certificate may be extended by no more than one month (this must also be done at an authorized port). As provided in the regulations, when an SSC is issued, there is no distinction as to nationality, flag, registry or ownership of the ship.

**Part A** of this document is a reference for pre-inspection planning and administrative arrangements for issuing the Ship Sanitation Control Exemption Certificate or the Ship Sanitation Control Certificate. Part A describes activities that are the responsibility of port health officers, and national or local public health authorities. These activities maintain adequate standards for ship inspection and issue of SSCs.

**Part B** of this document is a template for the inspection and issue of SSCs. It describes the areas to be inspected; the relevant standards that apply; the possible evidence that may be found or sample results that could constitute a public health risk; the documentation that must be reviewed before, during and after the inspection process; and control measures or corrective actions that must be taken. The format of this template follows the IHR model SSC in Annex 3 of the IHR (2005). Part B may also be used as reference material for regulators, ship operators and ship builders, and serve as a checklist for understanding and assessing the potential health impacts of projects involving the design of ships.

Throughout this document, references are provided on occupational health issues for ships' crews or other events that affect public health, and inspections applicable to items of IHR Annex 3. References are also provided on the prevention and control of events that may constitute a public health event of international concern (as defined in the IHR).

This handbook also addresses environmental issues that may constitute public health risks, such as the discharge by ships of sewage, waste and ballast water. Harmful contamination (other than microbial contamination), such as from radionuclear sources, could also be found on ships. Such contamination is subject to the IHR (2005) and the requirements of Article 39 and Annex 3; however, specific control measures are outside the scope of this handbook. This

2. IHR Annex 3 provides a comprehensive list of areas, facilities and systems to be inspected with a view to issue of an SSC.

handbook only address the adoption of preliminary control measures, and the mobilization of specialized experts and agencies to respond to radiological events if detected on board.

In summary, Parts A and B of this document have been developed to assist the competent authority at the port in determining:

- recommended competencies for the personnel inspecting ships for the issue of SSCs;
- administrative arrangements for routine enquiries for the planning of ship inspection and issue of SSCs;
- methods of identification, measurement and control of public health risks related to ships, travellers, cargo or discharge;
- procedures relating to the prevention of international spread of disease;
- recording of information on the SSC, including for further action by the ship's crew or the competent authorities at future ports of call;
- communication and response requirements for events of public health concern, including incidents and emergencies on board.

*The Guide to ship sanitation* (WHO, 2011) and the *International medical guide for ships* (WHO, 2007) are companion volumes to this document, oriented towards preventive health and curative health, respectively, on board ships.



**PART A:  
INSPECTION SYSTEM  
REQUIREMENTS**



## 1. OVERVIEW OF LEGAL AND POLICY FRAMEWORK

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When the International Health Regulations (IHR) (2005) came into force on 15 June 2007, competent authorities could require from international ships the IHR model ship sanitation certificate (SSC) (IHR Annex 3), which covers public health risks on board, and the necessary inspections and control measures taken in accordance with the IHR (2005). Competent authorities are required to use the Annex 3 SSC to identify and record all evidence of contamination or infection and other risks to human health in different areas, facilities or systems, together with any required control measures that must be applied (as authorized by the IHR) to control public health risks<sup>1</sup>. The SSCs may be required from all ships, whether seagoing or inland navigation ships, on international voyages that call at a port of a State Party.

According to the IHR (2005), States Parties authorize certain ports to inspect ships and issue the certificates (or their extensions) and to provide related services and control measures, as referred to in Article 20.3 and Annex 1 of the IHR (2005). Any port authorized to issue the Ship Sanitation Control Certificate (SSCC) must have the capability to inspect ships, issue certificates and implement (or supervise the implementation of) necessary health control measures. States Parties can also authorize ports to issue the Ship Sanitation Control Exemption Certificate (SSCEC) or to grant extensions of up to one month to conveyance operators, if they are unable to carry out the necessary measures at the port in question.

The IHR (2005) requires States Parties to ensure that all SSCs are issued according to IHR Article 39 and Annex 3.

The States Parties must also send to the World Health Organization (WHO) the list of their ports authorized to:

- issue SSCCs and provide the related services referred to in IHR (2005) Annex 3 (Requirements for the SSC) and Annex 1B (Core capacity requirements for designated ports);
- issue SSCECs only, and extend a valid SSCEC or SSCC for one month until the ship arrives in a port at which the certificate may be issued.

Each State Party must inform WHO of any changes that occur in the status of the listed ports. WHO publishes and updates a list of these authorized ports, with related information. This list is available on the WHO (IHR 2005) website ([http://www.who.int/ihr/ports\\_airports/en](http://www.who.int/ihr/ports_airports/en)).

According to the IHR (2005), the SSCs of each State Party must conform to the IHR model SSC in Annex 3. The use of the model certificate facilitates the international movement of shipping, minimizes unnecessary delays, helps to standardize the inspection process, and allows uniform and easily recognizable communication of risks. Certificates must have correct formatting and content as specified in the IHR (2005);

1. According to the IHR (2005), "public health risk" is defined as "a likelihood of an event that may affect adversely the health of human populations, with an emphasis on one which may spread internationally or may present a serious and direct danger". This central concept underpins these guidelines and, together with other definitions, is important in understanding how the inspection process described here achieves the IHR (2005) goals.

certificates that do not conform to the model may be viewed by other competent authorities as invalid or may be invalid according to the IHR (2005).

Use of the template does not impose any obligation on the ship, other than those prescribed by the IHR (2005).

SSCs may be used as international communication tools and will usually be delivered in countries (or, sometimes, regions) other than the place of issue. Therefore, States Parties should usually issue and complete the certificates in English or in French.

## 2. ROLES AND RESPONSIBILITIES

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States Parties shall take all practical measures consistent with the IHR (2005) to ensure that conveyance operators permanently keep conveyances for which they are responsible free from infection or contamination, including vectors and vector reservoirs (IHR [2005] Article 24). The application of control measures may be required if evidence of sources of infection or contamination is found. These measures may be carried out by the conveyance operator (either by the crew or by a private company under contract) or by the competent authority. The control measures applied should always be agreed upon and supervised by the competent authority (usually the port health authority).

The SSCs are designed to identify, assess and record any public health risks, and the consequent control measures that should be taken, while ships are in port. Public health risks are identified by epidemiological evidence, direct observation or measurement (or any combination of these). The competent authority should evaluate the risk in terms of the epidemiological situation and the severity of the risk. Control measures shall be applied at the point of entry, according to the conditions specified by the IHR (2005).

If clinical signs or symptoms of illness or disease and factual evidence of a public health risk (including sources of infection and contamination) are found on board a ship on an international voyage, the competent authority shall consider the ship as affected and may:

- (a) disinfect, decontaminate, disinsect or derat the conveyance, as appropriate, or cause these measures to be carried out under its supervision; and
- (b) decide in each case the technique employed to secure an adequate level of control of the public health risk as provided in these regulations. Where there are methods or materials advised by WHO for these procedures, these should be employed, unless the competent authority determines that other methods are as safe and reliable (IHR [2005] Article 27.1).

If the competent authority for the points of entry is not able to carry out the control measures required under IHR Article 27, the ship may nevertheless be allowed to depart, subject to the following conditions:

- (a) the competent authority shall, at the time of departure, inform the competent authority of the next known port of entry of the type of information referred to under subparagraph (b); and

## PART A: INSPECTION SYSTEM REQUIREMENTS

- (b) in the case of a ship, the evidence found and the control measures shall be noted in the SSCC (IHR [2005] Article 27.2).

Therefore, ports should have the capacity to support the control measures adopted to prevent the spread of disease and disease agents. Such measures include cleaning, disinfection, decontamination, deratting and disinsection.

A port on the WHO list of ports authorized to issue SSCs should also have available trained personnel who can board ships, identify any significant risks to public health and take appropriate control measures. Thus, States should have nationally recognized training and competency requirements for public health or environmental health officers assigned to issue SSCs.

Subject to IHR (2005) Article 43, or as provided in applicable international agreements, ships shall not be refused *free pratique* by States Parties for public health reasons. In particular, they shall not be prevented from embarking or disembarking; discharging or loading cargo or stores; or taking on fuel, water, food and supplies. States Parties may subject the granting of *free pratique* to inspection and, if a source of infection or contamination is found on board, the carrying out of necessary disinfection, decontamination, disinsection or deratting, or other measures necessary to prevent the spread of the infection or contamination (IHR [2005] Article 28).

If the public health risk appears significant or if evidence of potential international spread of disease exists, the National IHR Focal Point and community-level health authorities should be alerted immediately by the competent authority.

### 2.1 Role of Competent Authority

The competent authority responsible for the implementation and application of health measures at points of entry is required, according to the IHR (2005) (Article 22), to:

- be responsible for monitoring baggage, cargo, containers, conveyances, goods, postal parcels and human remains departing and arriving from affected areas, so that they are maintained in such a condition that they are free from sources of infection or contamination, including vectors and reservoirs;
- ensure, as far as practicable, that facilities used by travellers at points of entry are maintained in a sanitary condition and are kept free from sources of infection or contamination, including vectors and reservoirs;
- be responsible for supervising any deratting, disinfection, disinsection or decontamination of baggage, cargo, containers, conveyances, goods, postal parcels and human remains, or sanitary measures for persons, as appropriate under these regulations;
- advise conveyance operators, as far in advance as possible, of their intent to apply control measures to a conveyance, and shall provide, where available, written information concerning the methods to be employed;
- be responsible for supervising the removal and safe disposal of any contaminated water or food, human or animal dejecta, wastewater and any other contaminated matter from a conveyance;

- take all practicable measures consistent with these regulations to monitor and control the discharge by ships of sewage, refuse, ballast water and other potentially disease-causing matter that might contaminate the waters of a port, river, canal, strait, lake or other international waterway;
- be responsible for supervising service providers for services concerning travellers, baggage, cargo, containers, conveyances, goods, postal parcels and human remains at points of entry, including the conduct of inspections and medical examinations as necessary;
- have effective contingency arrangements to deal with an unexpected public health event;
- communicate with the National IHR Focal Point on the relevant public health measures taken pursuant to these regulations.

## 2.2 Role of conveyance operators

According to the IHR (2005) (Article 24), States Parties must take all practicable measures consistent with the IHR to ensure that conveyance operators:

- comply with the health measures recommended by WHO and adopted by the State Party;
- inform travellers of the health measures recommended by WHO and adopted by the State Party for application on board;
- permanently keep conveyances for which they are responsible free from sources of infection or contamination, including vectors and reservoirs. The application of measures to control sources of infection and contamination may be required if evidence is found.

The ship's master must ensure that any cases of illness that are indicative of an infectious disease or evidence of a public health risk on board are relayed to the competent authority at port on arrival, as required by Article 28 and Annex 3.

The IHR (2005) (Annex 4) also requires that conveyance operators shall facilitate:

- inspections of the cargo, containers and conveyance;
- medical examinations of persons on board;
- application of other health measures under these regulations;
- provision of relevant public health information requested by the State Party.

Conveyance operators shall also provide to the competent authority a valid SSCEC or SSCC and a Maritime Declaration of Health (IHR [2005] Articles 37 and 39; Annexes 3, 4 and 8).

With regard to vector-borne diseases, the IHR (2005) Annex 5 provides specific measures applicable to conveyances and conveyance operators.

## 2.3 Role of inspecting officers

The role of the competent authority is to inspect areas, systems and services on board; verify the practical implementation of these systems and services; ascertain the sanitary condition of areas inspected; and recommend corrective actions or require measures to be taken when and where applicable. Any control measures required should be noted on the Evidence Report Form (see Annex 7) and will lead to the issuance of an SSCC.

The IHR (2005) Annex 3 identifies areas, systems and services to be inspected on a conveyance. The IHR (2005) Annex 1 requires that States Parties should provide trained personnel at points of entry to inspect conveyances, to conduct inspection programmes and to ensure a safe environment for travellers using port facilities, as appropriate. In order to perform these duties, inspecting officers should demonstrate competency in the following areas before being assigned to inspection duties:

- Assessment of public health risks (including the effectiveness of systems implemented to control risks) by direct observation and by measurement with testing and sampling equipment. The assessment should be based on the information received from conveyance operators, agents or the ship's master, such as information from the Maritime Declaration of Health<sup>2</sup>; communications to port before a ship's arrival about public health events on board (IHR [2005] Article 28); traveller information; the disease status at port of origin, in transit and at the port of entry; and the application of personal protective techniques and related equipment.
- An understanding of the manner in which public health risks from microbiological, chemical and radiological agents affect human health and can be transmitted to individuals via other individuals, food, air, water, waste, vectors, fomites and the environment; appropriate measures to restrict radiation exposure to levels as low as reasonably practicable, if radiation risks are identified; and the protocol for seeking professional help for management of radiation risks and their effects.
- Use of operational procedures for notification, assessment and response, equipment and medicines; knowledge of environmental requirements relating to the size and type of conveyance; and knowledge of related, applicable guidelines (e.g. WHO, International Labour Organization [ILO], International Maritime Organization [IMO]).

## 3. PRE-INSPECTION PLANNING AND ADMINISTRATIVE ARRANGEMENTS FOR ISSUING SHIP SANITATION CERTIFICATES

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Before establishing an inspection programme, the inspection procedures and the administrative arrangements necessary for inspections and the issue of certificates should be in place.

2. The ship's master must ascertain the health status on board before arrival at port. The master must also deliver to the competent authority a complete Maritime Declaration of Health, which should be countersigned by the ship's surgeon (if one is on board), unless the competent authority does not require a declaration (include Article 37 and Annex 8; see WHO interim technical advice for case management of pandemics [H1N1] on ships).

## 3.1 General preparation and administrative arrangements for inspection of ships and issue of ship sanitation certificates

### 3.1.1 Communication

- Develop procedures for notification, assessment and response with regard to public health events on board (e.g. disease outbreaks, sources of infection and contamination, incidents and emergencies).
- Establish and maintain communication, reporting and tracking systems, in cooperation with other key agencies and departments such as the National IHR Focal Point and the national health surveillance system.
- Maintain an up-to-date, easily accessible list of ports authorized to issue SSCs; include an up-to-date list of contact details for the ports.
- Ensure that inspectors are capable of clear communication with ships' operators or agents and their crews.
- Determine and disseminate the correct information for communication to the competent authority, the conveyances and their operators or agents.
- Assess the volume, frequency and type of ship arrivals.

### 3.1.2 Training

- Develop and implement plans that identify training needs, qualification requirements and competency criteria.
- Ensure that inspectors can issue SSCs, including in English
- Familiarize inspectors with the checklists in this document.
- Familiarize inspectors with all necessary procedures for inspecting ships and issuing SSCs.
- Ensure that inspectors demonstrate appropriate knowledge of the types of certificates defined in this document and of the legal text of the IHR (2005).
- Train inspectors in the likely flow of inspections, according to the size and type of ships.

### 3.1.3 Equipment

- Ensure that the tools and equipment necessary for inspection and control measures, including personal protective equipment (PPE) and sampling equipment, are always available and in a good condition (see list of PPE and recommended equipment in Annexes 4 and 5).
- Ensure that the correct forms, the unique seals or stamps to authenticate certificates, and other administrative supplies are accessible and in good condition.

### 3.1.4 Administration

- Develop and implement a high-quality management scheme for monitoring, auditing and assessing the outcomes of inspections.
- Develop and implement a system for the administrative control and record management of issued SSCs; for example, establish and maintain a file system or secure database of inspections performed and certificates issued. The system should be able to identify previous deficiencies.

## PART A: INSPECTION SYSTEM REQUIREMENTS

- Establish a system for collecting the agreed inspection fees.
- Identify the port areas required for the safe inspection of ships; the adoption of control measures, when applicable; and the facilities and services as listed in IHR (2005) Annex 1B.

### 3.2 Planning for on-site inspection

- Request and record the pre-arrival information supplied by the ship's operator or agent (i.e. confirm time of arrival, berth, request for inspection, previous and next port, health status on board, identity and contact details of conveyance operator or agent).
- Based on the received information, perform an assessment of public health risks; assemble the personnel and equipment necessary for the individual inspection.
- Prepare easy-to-understand information about the inspection procedures in a form that can be transmitted to the ship in advance (e.g. a leaflet). For unannounced inspections, this information should not be transmitted in advance. The information should contain:
  - a list of the documents required for inspection;
  - advice that a contact person must be available on board;
  - advice that all areas must be accessible for inspection, in order that the inspection proceeds unhindered.

## 4. MEASURES AND OPERATIONAL PROCEDURES FOR SHIP INSPECTION AND THE ISSUE OF SHIP SANITATION CERTIFICATES

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Inspections are designed to confirm that ships are operating in accordance with appropriate practices for assessment and control of health risks on board.

An inspection provides a snapshot of a ship's operations and the manner in which its systems are implemented and maintained. The inspecting officer should typically identify risks that arise from the activities on the ship, and the effectiveness of the ship's own assessment of risks and control measures. Both the quality of operating procedures and the extent of their implementation should be assessed. Specifically, the inspection should determine whether the ship's operator and/or master have identified relevant hazards, assessed health risks and identified suitable control measures to effectively manage those risks.

With regard to the issue of SSCs, a port should have appropriately trained personnel available to board a ship, identify any significant public health risks and order control measures. Before boarding, inspectors need to comply with all necessary administrative and technical procedures to ensure efficient and safe access to the ship. They should also follow procedures to ensure a reasonable level of safety while the ship is in dock, when boarding and during onboard inspections.

If a new certificate is to be issued, all areas must be inspected. The areas must be in a condition that prevents cross-contamination by the inspection process (e.g. as described in Annex 3).

Before an inspection begins, the ship's master should, if possible, be informed of the purpose of the inspection, be advised to prepare all the required documentation and be instructed to provide a contact person on board to facilitate the inspection.

An inspection usually includes a preliminary discussion with the ship's operator or agent and the master on matters relating to the ship's sanitation systems and procedures. Additionally, the relevant documentation sent to the master or representative by the competent authority before the inspection should be reviewed.

If a ship's risk assessment and risk management systems are unsatisfactory, evidence of implementation is inadequate, or unforeseen potential hazards are identified, the inspection officer should discuss these matters with the master at the conclusion of the visit. The discussion may include previous inspection reports, relevant current documentation and all food- and water-related activities undertaken on the ship.

Subsequently, a summary of the matters that do not comply with this document or with other associated technical documents (e.g. the WHO *Guide to ship sanitation*) should be confirmed in writing by the officer on the Evidence Report Form (see Annex 7). The officer should also note the relevant advice given, including an expected timeframe for any corrective action.

If control measures are noted on the existing SSCC or on an existing Evidence Report Form (see Annex 7), the inspection shall verify that these measures have been successfully implemented.

If the conditions under which the inspection and/or control measures are performed are incompatible with obtaining satisfactory results, the competent authority shall make a note to that effect on the SSCC.

### 4.1 Documentation review

For inspection purposes, information on the ship, its cargo and possible public health risks is needed, but the requested information and documents from conveyance operators need to be public health information necessary for these public health purposes.

With regard to health documents, the practice should follow the requirements in the IHR (2005) and documents listed in other international agreements, such as IMO conventions that relate to environmental protection and sanitation in general (e.g. the International Convention for the Prevention of Pollution from Ships 1973, as modified by the 1978 protocol [MARPOL]; and the Convention on Facilitation of International Maritime Traffic 1965, as amended 2006).

To help the ship's master prepare for the inspection, a list of all required documents should be sent in advance by the national authority (e.g. to the maritime agent) before the port health officer boards the ship for inspection.



## PART A: INSPECTION SYSTEM REQUIREMENTS

The Maritime Declaration of Health (see model provided in IHR [2005] Annex 8) contains basic data relating to the state of health of crew and passengers during the voyage and on arrival at the port, and provides valuable information on:

- identification of the ship;
- ports of call within past 30 days (to be listed);
- all crew members and travellers within past 30 days (to be listed);
- validity of the existing SSC and whether re-inspection is required;
- affected areas visited.

The SSC (see model provided in IHR [2005] Annex 3) identifies all areas of public health risks and any required control measures to be applied.

The International Certificate of Vaccination or Prophylaxis (see model provided in IHR [2005] Annex 6) verifies that crew members and passengers have been vaccinated according to entry requirements.

The following documents, according to the document list in the Convention on Facilitation of International Maritime Traffic 1965 (as amended 2006), may be requested by the competent authority to assess public health risk:

- a General Declaration, to ascertain the ship's name, type and flag State; it also provides valuable information on the ship's requirements in terms of waste and residues, reception facilities and brief particulars of voyage;
- a Cargo Declaration and Ship's Stores Declaration, for information on the cargo (e.g. port of loading and discharge, description of goods);
- a Dangerous Goods Manifest, which details information on dangerous goods (e.g. subsidiary risk(s), mass, stowage position on board).

The following additional sources of information may be required, if appropriate, for assessment of public health risk:

- management plans concerning, for example, water bunkering, food safety, pest control, sewage or waste;
- an IMO Ballast Water Reporting Form;
- a medical log, for information on incidents on board the ship that may constitute health events under the IHR (2005);
- a list of medicines, providing information on the kinds and amounts of medicines carried in the medical chest;
- a Potable Water Analysis Report, which provides the results of any microbiological examinations or chemical analyses of potable water on board.

The competent authority should develop protocols and procedures for the transmission of pre-arrival and pre-departure information, to effectively process the required information.

### 4.2 Inspection process

Inspection is undertaken by observing areas of the ship. When a ship requests a new certificate, all areas as listed in this document (see Annex 3) should be inspected. The main purpose of the inspection is to confirm that all points of control have been correctly identified, and that any appropriate control measures have been implemented or corrective actions taken.

While performing inspections on board or in port areas, inspectors must wear appropriate identification, clothing and PPE, including, but not limited to, life jackets, safety helmets, safety boots, high-visibility clothing, respiratory and noise (ear) protection, rubber gloves, protection goggles, face masks (FFP3) and single-use overalls, as required.

Previous identification and security clearance of port authorities and ship operators should be granted before starting the inspection.

Generally, the inspector starts the inspection by introducing the team and outlining the objective of the inspection to the master. The inspector then receives information about operating conditions and safety rules on board from the master. This exchange should occur in a private space, if available. The inspection process is then outlined to the master, and the documentation in place is reviewed.

The order of inspection (see Annex 3) is at the inspector's discretion. However, cross-contamination from inspection activities should be avoided. Therefore, personal hygiene, cleanliness of clothes and the inspector's health status should be considered.

If a new certificate is to be issued, all areas have to be inspected. If the ship's holds are in use, the cargo should also be inspected, if applicable, especially for presence of vectors. If enough personnel are available in the inspection team, team members can be assigned different areas for inspection. The aim is to achieve all the objectives of the inspection, taking into consideration the availability of time, the number of inspectors, and the size and type of the ship.

The areas for inspection, the kind of evidence sought, the potential sources of information and the appropriate control measures to be taken are identified in the checklists of this handbook. This handbook can help identify deficiencies and non-compliance before completing the certificate.

### 4.3 Taking samples

The model SSC in IHR (2005) Annex 3 contains columns for recording "sample results" as part of the inspection and related information; however, such samples may not be required in all inspections according to the IHR. Whether a sample should be taken and analysed depends on factors such as the particular circumstances described in the checklists; the evidence found by the inspectors; the nature of any potential public health risks; and the adequacy, in a particular context, of the usual inspection techniques that do not involve taking samples. For example, if the cold potable water system shows temperatures above 25 °C, the risk of *Legionella* contamination increases. Therefore, this temperature is a trigger for taking a water sample.

Harmful contamination other than microbial contamination (e.g. from chemical or radioactive sources) may also be found on ships. Methods of sampling for these contaminants are described in the WHO *Guide to ship sanitation*.

If sample results are pending, issue an SSCC and note "Results are pending" on the certificate.

## PART A: INSPECTION SYSTEM REQUIREMENTS

In general, when clinical signs or symptoms of illness or disease are present, evidence of a public health risk (including sources of infection and contamination) is found on board, or a public health risk is definitively identified, the competent authority determines the appropriate public health measures to be applied for an adequate level of control. Methods or materials advised by WHO for these measures should be employed, unless the competent authority determines that other methods are similarly safe and reliable.

### 4.4 Issue of certificates

SSCECs and SSCCs consist of two parts: (a) the model certificate, which outlines the key physical areas of the ship for inspection; and (b) the attached references to the systems for management of food, water, waste, swimming pools and spas, and medical and other facilities that may require closer inspection, according to the size and type of the ship. The Evidence Report Form can be used to list the evidence found and measures indicated.

After the inspection, the inspecting officer should debrief the master before issuing an SSC. The master or representative must be allowed sufficient time to address any deficiencies and to retrieve the necessary documentation before completing the certificate. According to the evidence of the adequacy of sanitary measures detected during the inspection, either an SSCEC or an SSCC is issued (see the flow chart in IHR [2005] Article 39, Appendix 2).

Instructions for completing the certificate are as follows:

- Strike through the non-applicable certificate in the heading (either SSCEC or SSCC).
- Fill in the required information in the two tables (name of ship, flag, etc.).
- Choose the applicable table (left: SSCEC, right: SSCC).
- Complete every box in all the columns.
- Write legibly and use consistent wording from the checklists of this handbook.
- Use the Evidence Report Form if there is insufficient space on the SSC.
- Note areas not applicable by marking "NA".
- Use the wording "None" or "Nil" in areas in which no evidence is found.
- List the documents reviewed.
- Use the wording "None" or "Nil" if no documents were reviewed.
- Clearly indicate if sample results were reviewed by noting "Yes" or "No".
- Indicate if sample results are not yet available by noting "Sample results pending".
- Sign (identifying the inspecting officer), date and stamp the certificate.
- Ensure that all certificates are legible.
- Ensure that English is at least one of the languages on the certificate.

If a re-inspection is performed on a ship holding a valid certificate, an Evidence Report Form should be attached to the original certificate to record further information. The attachment must be referenced on the original certificate, preferably with a stamp as shown in Section 4.4.4, with the signature of the inspector. The attachment should also refer to the original document.

#### 4.4.1 Ship Sanitation Control Certificate

An SSCC is issued when evidence of a public health risk, including sources of infection and contamination, was detected on board and the required control measures have been satisfactorily completed. The SSCC records the evidence found, the control measures taken, and the samples taken and corresponding results (if applicable); if necessary, an Evidence Report Form can be attached.

If the conditions under which control measures are taken are such that, in the opinion of the competent authority, a satisfactory result cannot be achieved at the port where the operation was performed, the competent authority shall make a note to this effect on the certificate. The note identifies all evidence of ship-borne public health risks and any required control measures to be applied at the next port of call. If the ship is allowed to depart, at the time of departure the competent authority shall inform the next known port of call by a rapid means of communication (e.g. e-mail, fax, telephone) of the type of evidence and the requisite control measures. These procedures particularly apply in contexts in which the public health risk could spread internationally or could present a serious and direct danger to the health of human populations.

Any evidence of public health risks identified, required control measures or notation of sample results pending that could lead to the issue of an SSCC should be documented on the certificate, when applicable.

#### 4.4.2 Ship Sanitation Control Exemption Certificate

According to the IHR (2005), an SSCEC is issued when no evidence of a public health risk is found on board and the competent authority is satisfied that the ship is free from infection and contamination, including vectors and reservoirs. This certificate is usually issued, as far as practicable, only if the inspection has been performed when the ship and the holds are empty, or when the holds contain only ballast or other material of similar nature and a thorough inspection of the holds is possible (IHR [2005] Article 39).

Despite the presence of a valid SSCEC or an extension, according to the IHR (2005), inspections may nonetheless be required in various circumstances, as stated in IHR (2005) Articles 23 and 27 and Annex 4 (e.g. if the pre-assessment indicates evidence of a public health risk).

#### 4.4.3 Extension of ship sanitation certificates

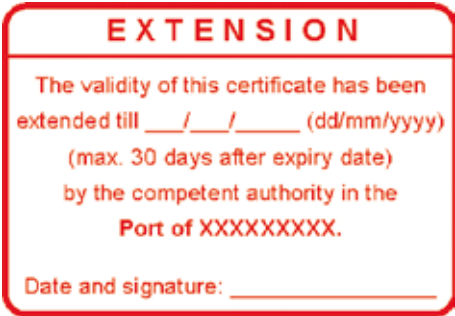
SSCECs and SSCCs are valid for a maximum of six months. This period may be extended by one month if the inspection or control measures required cannot be accomplished at the port. However, if a ship constitutes a serious risk for the spread of disease, the necessary disinfection, decontamination, disinsection, deratting or other measures to prevent the spread of the infection or contamination must be performed at the next point of entry. At the time of departure, the competent authority shall inform the competent authority of the next point of entry of the evidence found and the control measures required.

**PART A: INSPECTION SYSTEM REQUIREMENTS**

An extension allows a ship to reach a port at which the inspection and necessary control measures can be performed, without the necessity to travel with an expired certificate.

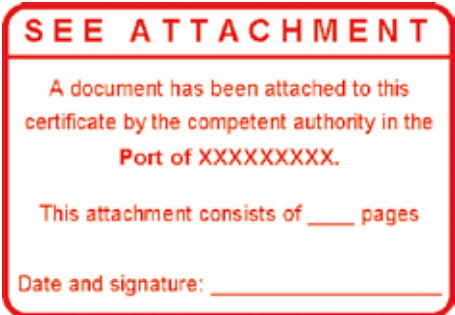
An extension may be granted up to 30 days before the expiry date of the existing SSC. However, the SSC cannot be extended for longer than 30 days after the expiry date (IHR [2005] Article 39).

Use of an "extension stamp" similar to that shown below is recommended to ensure a common standard among competent authorities. Place the stamp on the existing certificate.



**4.4.4 Evidence Report Form**

The Evidence Report Form (see Annex 7) can be used to document evidence of public health risks found during an inspection, and also the prescribed control measures or corrective actions. The words "required" and "recommended" are used, according to the evidence found, samples tested and documents reviewed. The inspecting officer then submits the SSC and attached Evidence Report Form to the ship's master. If a report form is used, a note is made on the SSC. Use of an "attachment stamp" similar to that shown below is recommended to ensure a common standard among competent authorities.



Some control measures required to avoid dissemination of disease and to control an existing serious and direct danger should be adopted immediately. Any required control measure automatically results in the issue of an SSCC.

According to the risk assessment performed by the competent authority during the inspection, the crew and conveyance operator should follow any other recommendations for preventive measures to avoid potential risks.

Existing international standards and regulations are used as a baseline for defining the control measures advised as "required" or "recommended" measures. When "shall" is used to address a measure in the relevant articles and accounts of the international conventions, standards and regulations, the measure is deemed as a required measure. For example, the ILO (No. 68) Food and Catering (Ships' Crews) Convention specifies matters of food supply and catering arrangements designed to secure the health and well-being of ships' crews. This measure is addressed by "shall", and thus leads to a "required" designation.

Articles published in scientific journals provide evidence of public health risks that trigger public health emergencies at points of entry or in conveyances. The effects of such events justify specified measures to control contamination and infection. These articles provide a scientific basis to determine which measures should be required. For example, huge outbreaks of foodborne diseases that are often caused by pathogens resulting from improper temperature control in the food chain have been documented. Therefore, preventive measures concerning temperature control in food source, preparation, processing and service are crucial. Such measures are therefore identified as required measures.

Some measures draw on international best practices to achieve the goal of controlling infection and contamination in an effective and efficient manner.

#### **4.4.5 Affected conveyances and ship sanitation certificates**

According to IHR (2005) Articles 27 and 39, a conveyance shall be considered affected:

- if a valid SSCEC or SSCC cannot be produced;
- if clinical signs or symptoms of illness or disease are present and information based on fact or evidence of a public health risk exists, including sources of infection and contamination. In these circumstances, a conveyance is considered infected even if it possesses an SSCEC or an SSCC.

If the competent authority is unable to carry out the required control measures, or the results of control measures are ineffective, this should be clearly stated on an attachment to the certificate (e.g. an Evidence Report Form as in Annex 7). The attachment should detail the facts or evidence of public health risks and the required control measures. The attachment should be clearly marked as an attachment to the original certificate and cross-referenced by, for example, the date and port of issue (see Annex 2).

## PART A: INSPECTION SYSTEM REQUIREMENTS

After a re-inspection of the ship in the next port to check that the control measures required by the previous competent authority have been performed, and that the measures have been verified as effective, notes to that effect must be made on the attachment. The ship shall then cease to be regarded as an affected conveyance under IHR (2005) Article 27, unless other public health risks were discovered on the re-inspection. The original validity date of the exemption certificate remains unaffected, unless a full inspection is performed and a new certificate issued, with the agreement of the master of the ship.

### 5. CONTROL MEASURES

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Once the public health risks have been identified based on the information or evidence found, the competent authority should determine appropriate control measures and consider the adequacy of existing control measures. Public health risks can be controlled by a variety of means. The competent authority should enforce reasonable and practicable control measures, according to the risk assessment. Unnecessary or excessive measures should be avoided. In addition, the availability of technical resources and reasonable costs should be considered when assessing options for control.

When a public health risk exists, control measures that will reduce the risk to an acceptable level should be identified. The conveyance operator is responsible for controlling any onboard risks. Nevertheless, the competent authority should provide reasonable assistance to identify suitable and relevant control options.

Control measures for public health risks on ships should be applied only after all key parties (i.e. the master, the conveyance operator or agent and the port authorities involved in this activity) have been fully informed of the intended methods. Critical activities, such as the designation of port areas for quarantine of ships suspected of carrying a public health risk, should be identified well in advance, in cooperation with the port operator for ship movement. The schedule of work to be performed should be confirmed with the ship's supervisory crew members and noted in any corrective actions.

The methods suggested for detecting and measuring public health risks on ships (in Part B of this document) are based on information from existing guidelines, WHO State Party experts, international organizations and the shipping industry.

Disinsection, decontamination, deratting, disinfection and other sanitary procedures taken pursuant to the IHR (2005) shall be performed in a manner that avoids injury and, as far as possible, discomfort to persons. Also, environmental damage that affects public health, baggage, cargo, containers, conveyances, goods or postal parcels should be avoided (IHR [2005] Annex 4B.1). As far as practicable, facilities used by travellers at points of entry should be maintained in a sanitary condition and kept free from sources of infection or contamination, including vectors and reservoirs (IHR [2005] Article 22.2). These measures shall be initiated and completed without delay, and applied in a transparent and non-discriminatory manner (IHR [2005] Article 42).

## 6. OTHER RELEVANT INTERNATIONAL AGREEMENTS AND INSTRUMENTS

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While this document focuses on specific provisions of the IHR (2005), other international instruments and agreements also address related issues, such as crew safety and comfort, and some operational aspects such as facilitation, communication, maritime pollution, and safety and security of ships and ports. Such instruments and agreements include those adopted under the auspices of the ILO and the IMO. These international instruments should be compatible and, indeed, synergistic, with the IHR (2005). In any event, the IHR (2005) provides that the IHR and other instruments be interpreted in a compatible manner. A number of these instruments and agreements are referred to, where applicable, in parts of this document.

As provided in the IHR (2005) and subject to the preceding paragraph, the regulations do not prevent States Parties having certain common interests in terms of their health, geographical, social or economic conditions. States Parties are also not precluded from concluding special treaties or arrangements to facilitate the application of the regulations, with particular regard to:

- direct and rapid exchange of public health information between neighbouring territories of different States Parties;
- health measures to be applied to international coastal traffic and to international traffic in waters within their jurisdiction;
- health measures to be applied in contiguous territories of different States Parties at their common frontier;
- arrangements for carrying affected crew and passengers or affected human remains by means of transport specially adapted for the purpose;
- deratting, disinsection, disinfection, decontamination or other treatment designed to render goods free from disease-causing agents.

The IHR (2005) also provides that, without prejudice to their obligations under the regulations, States Parties that are members of a regional economic integration organization shall apply in their mutual relations the common rules in force in that organization.







**PART B:  
CHECKLISTS FOR  
SHIP INSPECTION**

# Area 1 Quarters

## Introduction

The operator is accountable for maintaining a safe environment on board for crew and passengers. As the IHR (2005) and other relevant international agreements should be interpreted in a compatible manner (Article 57), quarters for crew members should comply with existing conventions on crew accommodation and food and catering in the ILO conventions. For ships constructed before July 2006, all crew accommodation should comply with the Accommodation of Crews Convention (Revised) 1949 No. 92 and the Accommodation of Crews (Supplementary Provisions) Convention 1970 No. 133. For ships constructed after July 2006, accommodation should comply with the Maritime Labour Convention 2006.

## International standards and recommendations

### ILO Maritime Labour Convention 2006

1. Article IV, Seafarers' employment and social rights, paragraph 3: Every seafarer has a right to decent working and living conditions on board ship; paragraph 4: Every seafarer has a right to health protection, medical care, welfare measures and other forms of social protection;
2. Regulation 3.1, Accommodation and recreational facilities.

### ILO Convention No. 92 concerning crew accommodation on board ship (revised 1949).

Accommodation of Crews Convention (Revised), 1949, lays down detailed specifications concerning matters as sleeping accommodation, mess and recreation rooms, ventilation, heating, lighting and sanitary facilities on board ship.

### ILO Convention No. 133 on Accommodation of Crews 1970

### ILO R140 Crew Accommodation (air Conditioning) Recommendation 1970

### ILO Convention No. 147 on Minimum Standards in Merchant Ships 1976

## Main risks

Factors contributing to the occurrence of public health risks on board include the design, construction, management and operation of quarters.

## Document review

- Construction drawings of sanitary facilities and ventilation.
- Cleaning procedures and logs.
- Construction plans demonstrating how cross-contamination is avoided in specified clean and dirty areas.
- Smoke tests at exhaust and at air intakes close to exhaust.

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Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>1.1 Construction</b>				
1.1.1 <input type="checkbox"/>	Surfaces and fixtures not properly sealed or difficult to clean.	Accommodation should be constructed of material that is easily sealed and cleaned.		<input type="checkbox"/>
1.1.2 <input type="checkbox"/>	Accommodation constructed of unsuitable material that creates conditions for potential infestation by vectors.	All accommodation to be kept free from vector entry.		<input type="checkbox"/>
1.1.3 <input type="checkbox"/>	No window available or ventilation system inadequate, which affects the health of occupants.	Adequate ventilation system or properly screened window should be in place, especially in sleeping rooms and mess rooms, to prevent the spread of disease. Adjust ventilation dependent on climate in which ship is sailing.		<input type="checkbox"/>
1.1.4 <input type="checkbox"/>	No heating system.	Provide adequate heating system.		<input type="checkbox"/>
1.1.5 <input type="checkbox"/>	Sleeping rooms for crew or passengers constructed from inferior materials.	Provide separate sleeping rooms constructed of steel or other approved substance; rooms must be watertight and gas-tight.		<input type="checkbox"/>
1.1.6 <input type="checkbox"/>	No toilet facility available for crew members.	Provide toilet facility for crew members, either in their quarters or in a common lavatory outside individual quarters.	<input type="checkbox"/>	
1.1.7 <input type="checkbox"/>	Bathrooms or shower rooms not provided.	Equip sleeping rooms with private or common bathroom, including toilet.		<input type="checkbox"/>
1.1.8 <input type="checkbox"/>	Absence of drainage system or drainage system unable to cope with demand.	Install drainage system sufficient to cope with demand.		<input type="checkbox"/>
1.1.9 <input type="checkbox"/>	External doors or windows not vector-protected.	Where appropriate, apply measures to ensure effective screening against vector entry.		<input type="checkbox"/>
		Construct doors that open outward and are self-closing.		<input type="checkbox"/>
		Provide informative material on individual preventive measures.		<input type="checkbox"/>
1.1.10 <input type="checkbox"/>	Screen mesh not sufficiently small gauge (i.e. max.1.6 mm)	Install screen mesh of gauge 1.6 mm or less.		<input type="checkbox"/>
1.1.11 <input type="checkbox"/>	Lack of ventilated space between toilet facilities, quarters and food spaces.	Modify construction of toilet facilities to enable open-air ventilation (prevents cross-contamination).		<input type="checkbox"/>
1.1.12 <input type="checkbox"/>	Exhaust air vents from sanitary spaces physically connected to air supply systems, or the two systems are too close.	Correct the construction or design so that no exhaust air from sanitary or other spaces is connected to air supply systems.		<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>1.2 Equipment</b>				
1.2.1 <input type="checkbox"/>	Hand-washing facilities absent or inadequate.	Install proper hand-washing facilities (including liquid soap, paper towels, etc.) Provide informative material on personal hygiene, signage and a regular awareness programme for crew on use of toilet facilities and the importance of hand washing.		<input type="checkbox"/>
1.2.2 <input type="checkbox"/>	Toilet facilities insufficiently equipped.	Equip toilet facilities with means for hand drying (preferably disposable paper towels), toilet paper and individual or liquid soap.	<input type="checkbox"/>	
1.2.3 <input type="checkbox"/>	Inadequate storage of personal effects creating conditions for cross-contamination.	Provide adequate storage space for personal effects, or remove to individual quarters.		<input type="checkbox"/>
<b>1.3 Cleaning and maintenance</b>				
1.3.1 <input type="checkbox"/>	Cleaning and maintenance programme absent or inadequate.	Instigate adequate cleaning and maintenance programme.		<input type="checkbox"/>
1.3.2 <input type="checkbox"/>	Poor hygiene conditions with presence of dust, waste, vectors.	Instigate cleaning and disinfection schedule.	<input type="checkbox"/>	
1.3.3 <input type="checkbox"/>	Contamination by chemicals or other agents.	Apply decontamination measures.	<input type="checkbox"/>	
1.3.4 <input type="checkbox"/>	Toilet leaks or overflows, or cross-connection exists.	Maintain toilet system free from leaks and backups.	<input type="checkbox"/>	
1.3.5 <input type="checkbox"/>	Toilet flushing system poorly maintained.	Keep toilet flushing system maintained.		<input type="checkbox"/>
1.3.6 <input type="checkbox"/>	Dirty linens and cloths.	Provide laundry facilities with appropriate equipment for laundry treatment, storage and distribution (clean and dirty circuits well defined).		<input type="checkbox"/>
1.3.7 <input type="checkbox"/>	Evidence of vectors or reservoirs found.	Perform disinfection and appropriate disinsection or deratting measures.	<input type="checkbox"/>	
		Repair or replace surfaces or fixtures to be durable, perform as originally designed, allow for easy cleaning and prevent vector infestation.		<input type="checkbox"/>
<b>1.4 Lighting</b>				
1.4.1 <input type="checkbox"/>	Natural or artificial lighting insufficient.	Provide artificial lighting when adequate natural light not available.		<input type="checkbox"/>
<b>1.5 Ventilation</b>				
1.5.1 <input type="checkbox"/>	Evidence of dirt and debris in heating or cooling systems, or poor air quality.	Relocate air-conditioning and heating systems to facilitate easy cleaning and disinfection.		<input type="checkbox"/>

## Area 2 Galley, pantry and service areas

### Introduction

Major risk factors that contribute to foodborne outbreaks on board ships are primarily associated with temperature control of perishable food, infected food handlers, cross-contamination, heat treatment of perishable food, contaminated raw ingredients and use of non-potable water in the galley. Some diseases can be transmitted from one country to another by infectious agents or contaminants due to poor control measures on board. Therefore, detecting contamination in the sources, preparation and processing of food, as well as in the service of food at restaurants and in mess rooms, is crucial for the prevention and control of foodborne disease.

### International standards and recommendations

#### **Codex Alimentarius Commission (CAC)**

The Codex Alimentarius is a collection of internationally adopted food standards created in 1963 by the Food and Agriculture Organization of the United Nations (FAO) and WHO. The standards in the collection are presented in a uniform manner. The Codex also includes advice in the form of codes of practice, guidelines and other recommended measures to assist in achieving the purposes of the Codex Alimentarius (CAC 1995; 1997a, b; 1999; 2003). The CAC guidance provides important information on basic food safety, which will be referred to throughout this section.

#### **ILO, Maritime Labour Convention 2006**

Regulation 3.2, Food and catering, paragraph 2: Each Member shall ensure that ships that fly its flag meet the following minimum standards: (b) the organization and equipment of the catering department shall be such as to permit the provision to the seafarers of adequate, varied and nutritious meals prepared and served in hygienic conditions; and (c) catering staff shall be properly trained or instructed for their positions.

The regulation also contains further requirements and guidance related to proper food handling and hygiene.

#### **ILO (No. 68), Food and Catering (Ships' Crews) Convention 1946**

Article 5: Each Member shall maintain in force laws or regulations concerning food supply and catering arrangements designed to secure the health and well-being of the crew of the vessels mentioned in Article 1.

These laws or regulations shall require:

- (a) the provision of food and water supplies which, having regard to the size of the crew and the duration and nature of the voyage, are suitable in respect of quantity, nutritive value, quality and variety;
- (b) the arrangement and equipment of the catering department in every vessel in such a manner as to permit of the service of proper meals to the members of the crew.

Article 6: National laws or regulations shall provide for a system of inspection by the competent authority of:

- (a) supplies of food and water;
- (b) all spaces and equipment used for the storage and handling of food and water;

- (c) galley and other equipment for the preparation and service of meals; and
- (d) the qualification of such members of the catering department of the crew as is required by such laws or regulations to possess prescribed qualifications.

Article 7: National laws or regulations or, in the absence of such laws or regulations, collective agreements between employers and workers shall provide for inspection at sea at prescribed intervals by the master, or an officer specially deputed for the purpose by him, together with a responsible member of the catering department of:

(a) supplies of food and water;

(b) all spaces and equipment used for the storage and handling of food and water, and galley and other equipment for the preparation and service of meals.

The results of each such inspection shall be recorded.

### **Hazard Analysis Critical Control Point system (HACCP)**

HACCP is noted as a system to identify and monitor the critical control points in the food manufacturing and distribution chain, including the source and stockpile. At these critical points, control is essential to prevent, eliminate or reduce a hazard and to take corrective action. Food safety plans or programmes (FSPs) are required to manage the process of providing safe food. Typically, the FSP is based on the HACCP system.

#### **Main risks**

Foodborne diseases have been associated with loading poor-quality food. Nevertheless, even if the loaded food is safe, this does not ensure that the food will remain safe during the storage, preparation, cooking and serving activities that follow on board. The main risks to food safety in the galley, pantry and service areas are related to the following:

- Biological hazards (bacteria, viruses, fungi and parasites)

Biological hazards occur when bacteria, viruses, moulds, yeasts or parasites contaminate food. These organisms are commonly associated with humans and with raw products entering food preparation sites. Therefore, raw ingredients in the galley are high-risk factors. Storage time and temperature of food, and awareness and implementation of hygienic practices by food handlers on board ship also play significant roles in food safety.

- Chemical hazards (e.g. cleaning agents)

Chemical contamination of food may inadvertently occur “naturally” before loading or during processing (e.g. by the misuse of cleaning chemicals or pesticides). Examples of naturally occurring chemicals are mycotoxins (e.g. aflatoxin), scombrotxin (histamine), ciguatoxin and shellfish toxins.

- Equipment and utensils

The equipment and utensils contacting food are designed and constructed to ensure that, when necessary, they can be adequately cleaned, disinfected and maintained to avoid the contamination of food. Equipment and containers are typically made of materials with no toxic effects when used as intended. Where necessary, equipment should be durable and movable, or capable of being disassembled to allow for maintenance, cleaning, disinfection, monitoring and inspection for pests.



### Document review

- Cleaning schedule and logs.
- Purchase records and shipboard documentation of food sources (wrapping or other identification on the packaging, or a written product identification sheet).
- Food storage in–out record.
- Drainage construction drawings.
- Previous inspection reports.
- Pest logbook with information on sightings.
- Temperature records for food storage, cooling logs and thermometer readings.

### References

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### **Guidelines and standards**

WHO, Hazard Analysis Critical Control Point System (HACCP) ([http://www.who.int/food-safety/fs\\_management/haccp/en/](http://www.who.int/food-safety/fs_management/haccp/en/))

Recommended international code of practice—general principles of food hygiene, CAC/RCP 1-1969, Rev. 4-2003. CAC

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>2.1 Documents and management practices review</b>				
2.1.1 <input type="checkbox"/>	No food safety plan, written policies or informative material (documents and signage) on food preparation, handling and services in place.	Develop and implement food safety plan, based on HACCP principles, in terms of source, preparation, service, roles and responsibilities.	<input type="checkbox"/>	<input type="checkbox"/>
		Post written policies and informative material (documents and signage) on food handling and production, hand washing and hygiene in a noticeable place in or near the galley.	<input type="checkbox"/>	<input type="checkbox"/>
2.1.2 <input type="checkbox"/>	Medical logs indicate that crew affected by communicable diseases returned to work in the galley before being symptom free for a minimum of 48 hours, or the presence of other communicable diseases affecting the crew.	Food handlers or galley crew members with symptoms of gastrointestinal illness must not perform any food-related work until symptom free for a minimum of 48 hours.	<input type="checkbox"/>	<input type="checkbox"/>
		Re-evaluate communicable disease status.	<input type="checkbox"/>	<input type="checkbox"/>
2.1.3 <input type="checkbox"/>	No routine cleaning programme and schedule.	Develop written policies for hygiene, cleaning and maintenance procedures. Provide informative material (e.g. documents, videos, text books, signage) for crew.	<input type="checkbox"/>	<input type="checkbox"/>
		Develop training manual and improved supervision of programme application.	<input type="checkbox"/>	<input type="checkbox"/>
2.1.4 <input type="checkbox"/>	No temperature logs for received goods, freezers, cold storage, holding temperatures or preparation temperatures. No calibrated thermometers available.	Set up temperature logs for freezers and hot and cold holding units. Keep temperature control and cooking time calibration logs of food thermometers.	<input type="checkbox"/>	<input type="checkbox"/>
2.1.5 <input type="checkbox"/>	No waste management plan or cleaning schedule available.	Develop and implement waste management plan to prevent odour and nuisances, minimize attraction of vectors, avoid contamination of food and pollution of the environment. Set up cleaning schedule and logs.	<input type="checkbox"/>	<input type="checkbox"/>
2.1.6 <input type="checkbox"/>	No food safety training programmes or documented evidence that crew have undergone training.	Formulate and implement training programme and set up training log.	<input type="checkbox"/>	<input type="checkbox"/>
<b>2.2 Equipment, utensils and materials</b>				
2.2.1 <input type="checkbox"/>	Hand-washing station in the galley absent or inadequately equipped.	Equip at least one dedicated hand-washing station, preferably in the galley area, with soap, means for hand drying (preferably disposable paper towels) and waste towel receptacle.	<input type="checkbox"/>	<input type="checkbox"/>
		Post signage that indicates location of hand-washing station, and proper hand-washing technique and time.	<input type="checkbox"/>	<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
2.2.2 <input type="checkbox"/>	Multi-use sink used for food preparation without proper cleaning and disinfection.	Set up food preparation sinks in as many areas as necessary and feasible—that is, in all meat, fish and vegetable preparation rooms; cold pantries or grade mangers; and any other areas where crew wash or soak food. Provide at least one sink dedicated to food preparation only.	<input type="checkbox"/>	
		Strict cleaning, disinfection and sanitizing of sink before food preparation, especially if only one sink available.	<input type="checkbox"/>	
2.2.3 <input type="checkbox"/>	Food contact surfaces, utensils and equipment not durable, corrosion resistant and non-absorbent.	Replace materials of food contact surfaces with corrosion-resistant, non-toxic, non-absorbent, easily cleanable, smooth, durable materials.	<input type="checkbox"/>	
2.2.4 <input type="checkbox"/>	Tight-fitting doors or similar protective closures not available or not functioning.	Install or repair tight-fitting doors or similar protective closures for openings to ice bins, food display cases, and other food- and ice-holding facilities to prevent contamination of stored products.		<input type="checkbox"/>
2.2.5 <input type="checkbox"/>	Inadequate waste containers (e.g. not rodent proof, watertight or non-absorbent; difficult to clean).	Use material and containers that are rodent proof, watertight, non-absorbent and easy to clean.		<input type="checkbox"/>
2.2.6 <input type="checkbox"/>	Lids and covers on waste containers absent or not kept closed.	Keep lids and covers in food-handling spaces closed as much as possible during food preparation, food serving and cleaning operations.	<input type="checkbox"/>	
<b>2.3 Facilities</b>				
2.3.1 <input type="checkbox"/>	Evidence found of non-potable water use in galley, pantry and food stores.	Connect sinks with the potable water system.	<input type="checkbox"/>	
2.3.2 <input type="checkbox"/>	Construction of areas, surfaces and equipment makes cleaning difficult, and allows vectors to harbour and food residues to build up.	Make areas, surfaces and equipment of materials that are durable and easy to clean and allow proper drainage.	<input type="checkbox"/>	
2.3.3 <input type="checkbox"/>	Absent or inappropriate facilities for storing potable water and ice for use in food and drinks.	Ensure appropriate facilities for storage and distribution of an adequate supply of potable water.	<input type="checkbox"/>	
2.3.4 <input type="checkbox"/>	Sink drain directly connected to wastewater system.	Reconstruct sink drain with an indirect connection to wastewater system (i.e. an air break) to prevent wastewater backup.	<input type="checkbox"/>	
2.3.5 <input type="checkbox"/>	Absent or inadequate ventilation system (e.g. excessive condensation).	Redesign, reconstruct, adequately maintain and clean ventilation systems. Ensure louvres or registers in ventilation terminals are readily removable for cleaning.	<input type="checkbox"/>	
2.3.6 <input type="checkbox"/>	Insufficient lighting levels.	Provide artificial lighting if adequate natural light not available to properly evaluate sanitary conditions.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
2.3.7 <input type="checkbox"/>	Unprotected lighting over food preparation areas.	Install or fix lighting fixtures to ensure food is not contaminated by glass breakage.	<input type="checkbox"/>	
2.3.8 <input type="checkbox"/>	Toilet facilities for food-handling crew absent or not accessible.	Provide dedicated, appropriate and hygienic spaces with toilet, hand-washing and hand-drying facilities, and an adequate supply of soap. Ensure facilities do not open directly into galleys or other food-handling areas.		<input type="checkbox"/>
		Equip adequate changing facilities for food-handling crew; include suitable storage facilities for clothes, if possible.		<input type="checkbox"/>
2.3.9 <input type="checkbox"/>	Dining room station(s), decks and areas under equipment or in technical places are not constructed of hard, durable, non-absorbent materials.	Equip dining room service stations with hard, durable, non-absorbent deck (e.g. sealed granite or marble). Ensure a safe separation distance of at least 61 cm (2 ft) from the edge of the working sides of the service station. Decks behind service counters, under equipment and in technical spaces must be constructed of hard, durable, non-absorbent materials (e.g. tiles, epoxy resin or stainless steel).	<input type="checkbox"/>	
		Durable coving with radius at least 10 mm (0.4 in), or open design >90°, must be used as an integral part of the deck and bulkhead interface, and at the juncture between decks and equipment foundations. Stainless steel or other coving, if installed, should be securely installed and of sufficient thickness to be durable.	<input type="checkbox"/>	
2.3.10 <input type="checkbox"/>	Food contact surfaces not smooth or have breaks, open seams, cracks, chips, inclusions, pits or other imperfections; or have sharp internal angles, corners and crevices; or are not easily accessible for cleaning and inspection.	Repair or replace damaged surfaces and equipment to ensure they are non-toxic, durable, corrosion resistant, non-absorbent, smoothly finished and easy to clean, to prevent cross-contamination.	<input type="checkbox"/>	
		Clean, apply sanitizing measures, and disinfest or derat where vectors present.	<input type="checkbox"/>	
<b>2.4 Food processing</b>				
2.4.1 <input type="checkbox"/>	Evidence of lack of knowledge of hand hygiene found (e.g. same employee loads dirty dishes and removes clean dishes, but does not thoroughly wash hands between the two tasks).	Wash hands regularly, especially between different tasks.	<input type="checkbox"/>	
2.4.2 <input type="checkbox"/>	Evidence of cross-contamination between cooked and raw food.	Use separate utensils and cutting boards for preparation of raw and ready-to-eat foods. Clean and disinfect food contact surfaces, tableware and utensils whenever there is a change of use from raw to ready-to-eat foods.	<input type="checkbox"/>	
		Clean and disinfect the cross-contamination area before food preparation. Separate preparation and storage areas for raw and ready-to-eat foods.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
2.4.3 <input type="checkbox"/>	Foods in freezers visibly spoiled, refrozen or, when hand pressure is applied, partially thawed.	Repair or replace freezers that cannot maintain foods in a frozen state.	<input type="checkbox"/>	
		Discard any spoiled, refrozen, partially thawed and thawed foods, and any other food stored at incorrect temperatures.	<input type="checkbox"/>	
2.4.4 <input type="checkbox"/>	Perishable foods found stored at incorrect temperatures for the type or class of food. If time control used, no explanation or documentation for periods longer than 6 hours.	<p>Maintain correct temperatures for storing perishable foods to prevent food entering the danger zone for microbial growth, as follows:</p> <ul style="list-style-type: none"> <li>Place food held hot in a hot-holding apparatus already at a temperature of at least 62.8 °C (145 °F) and maintain at that temperature until required.</li> <li>Reheat cooked, cooled, perishable food for hot-holding until all parts of the food reach a temperature of at least 74 °C (165 °F). Maintain temperature until required.</li> <li>Store perishable foods and drinks at, or below, 4 °C (40 °F), except during preparation or when held for immediate serving after preparation. When such foods are stored for extended periods, a temperature of 4 °C (40 °F) is recommended.</li> <li>Usually store fruits and vegetables in cool rooms.</li> </ul>	<input type="checkbox"/>	
2.4.5 <input type="checkbox"/>	First-aid box not accessible.	Ensure first-aid box is readily accessible for use in food-handling areas, and trained crew are appointed to take charge of first-aid incidents.		<input type="checkbox"/>
2.4.6 <input type="checkbox"/>	Food handlers or galley crew members have exposed cuts and wounds.	Treat wounds with waterproof dressings. Wear disposable gloves if wounds become infected; apply medical treatment immediately.	<input type="checkbox"/>	
<b>2.5 Hygiene control system</b>				
2.5.1 <input type="checkbox"/>	Temperature logs for hot- and cold-holding units not up to date, or inspection verifies temperature logs inaccurate.	Monitor temperature in hot- and cold-holding units on a regular basis. Maintain temperature logs and record any deviations accurately.		<input type="checkbox"/>
2.5.2	Ambient air temperature and food probe thermometers absent or malfunctioning.	Provide at least one air temperature thermometer in cold-holding unit, and ensure at least one accurate food probe thermometer is used in the galley.		<input type="checkbox"/>
2.5.3 <input type="checkbox"/>	Expired food.	Discard expired food and check all expiry dates on a regular basis.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>2.6 Personal hygiene</b>				
2.6.1 <input type="checkbox"/>	Evidence of poor personal hygiene practices.	<p>Strictly clean hands when personal cleanliness may affect food safety:</p> <ul style="list-style-type: none"> <li>•at the start of food-handling activities;</li> <li>•immediately after using the toilet;</li> <li>•between handling raw food or any material that could contaminate other food items and handling ready-to-eat food (avoid if possible);</li> <li>•between handling money and handling ready-to-eat food (avoid if possible).</li> </ul> <p>Refrain from:</p> <ul style="list-style-type: none"> <li>•smoking in or near food preparation and serving areas;</li> <li>•spitting in or near food preparation and serving areas;</li> <li>•chewing or eating in or near food preparation and serving areas;</li> <li>•sneezing or coughing over unprotected food.</li> </ul> <p>Always wear clean clothes.</p>	<input type="checkbox"/>	
2.6.2 <input type="checkbox"/>	Food handlers or galley crew members with signs or symptoms of communicable diseases (discharge from nose, eyes or ears; cough; diarrhoea; vomiting; fever; visibly infected skin lesions or boils; jaundice, etc.).	Any galley crew members showing signs or symptoms of communicable diseases must immediately report to the assigned medical officer. Food handlers or galley crew members should refrain from any food-related work until symptom free for a minimum 48 hours.	<input type="checkbox"/>	
<b>2.7 Cleaning and maintenance</b>				
2.7.1 <input type="checkbox"/>	Construction of, and materials used for, equipment and other galley features conducive to the build-up of food debris, grease and soil; galley fixtures not made of non-corroding metal or other durable material; or fixtures not close fitting.	<p>Repair or replace galley surfaces, equipment and fixtures to be durable, close fitting and easily cleaned, and to prevent contamination of food and harbouring of vectors. Clean or replace equipment showing signs of grease or soil accumulation.</p> <p>Implement a routine maintenance schedule for fixtures, fittings and equipment used during food production and food handling.</p>		<input type="checkbox"/>
2.7.2 <input type="checkbox"/>	Evidence of improper cleaning procedures and improper use of cleaning chemicals and disinfectants.	<p>Handle, use and store cleaning chemicals carefully, in accordance with manufacturers' instructions.</p> <p>Implement a checklist system for scheduled cleaning of all necessary items.</p>		<input type="checkbox"/>
2.7.3 <input type="checkbox"/>	Waste containers are a source of contamination and attract vectors.	After each emptying, thoroughly scrub, wash and treat waste containers with disinfectant.		<input type="checkbox"/>
2.7.4 <input type="checkbox"/>	Evidence of accumulated soil and grease on previously cleaned food contact surfaces.	Properly clean and disinfect food contact surfaces, tableware and utensils after each use.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
2.7.5 <input type="checkbox"/>	Evidence of inadequate cleaning and sanitizing of utensils or areas before using.	Use warm, soapy water and designated clean cloths to clean and thoroughly rinse utensils or areas after use. Additionally, apply approved chemical sanitizer at correct concentration, where appropriate.	<input type="checkbox"/>	
2.7.6 <input type="checkbox"/>	Openings evident between decks and bulkheads; decks damaged or corroded.	Tighten bulkhead joints to prevent contamination of food and vector infestation.	<input type="checkbox"/>	
		Repair or replace decks to be hard, durable, non-absorbent and non-slip.		<input type="checkbox"/>
		Repair or replace any junctions between fixtures, decks and ceilings where openings allow for vector entry (use temporary measures, if needed, to close openings until appropriate permanent construction can take place).	<input type="checkbox"/>	
2.7.7 <input type="checkbox"/>	Evidence of vector infestation.	Clean and disinfect food contact surfaces and apply vector control measures.	<input type="checkbox"/>	
		Keep record of traps, baits (location, dates and results) and potential breeding sites for mosquitoes and other pests.	<input type="checkbox"/>	
2.7.8 <input type="checkbox"/>	Evidence of vectors feeding or breeding inside or outside waste containers.	Apply disinfection and vector control measures.	<input type="checkbox"/>	
<b>2.8 Food hygiene training</b>				
2.8.1 <input type="checkbox"/>	Food handlers do not demonstrate competencies concerning hygiene.	Strengthen training of food handlers; first-level training should cover: <ul style="list-style-type: none"> <li>•types and sources of public health risks related to the food chain;</li> <li>•basic knowledge of microbiology, toxins, spores, including growth and destruction of food contaminants;</li> <li>•food operation areas and equipment;</li> <li>•personal hygiene (basic rules and responsibilities);</li> <li>•preventing food contamination and spoilage;</li> <li>•cleaning, disinfection and sterilization;</li> <li>•legal obligations;</li> <li>• pest awareness;</li> <li>•effective temperature control of food, including: <ul style="list-style-type: none"> <li>-chilled or frozen food</li> <li>-storage, thawing and cooking food</li> <li>-cooling, reheating and holding food;</li> </ul> </li> <li>•common food hazards, including physical, chemical and microbiological hazards; symptoms and causes of food poisoning.</li> </ul>		<input type="checkbox"/>
2.8.2 <input type="checkbox"/>	Managers and supervisors of food processing demonstrate lack of necessary knowledge of food hygiene principles and practices.	Improve training of managers and supervisors to enable them to judge potential risks and take necessary action to remedy deficiencies.		<input type="checkbox"/>



## Appendix 1 Examples of appropriate temperatures and conditions for foods supplied to ships

Item	Temperature on receiving	Condition on receiving
Meat and poultry	5 °C (41 °F) or below.	Obtained from an approved source (i.e. stamped with official inspection stamp). Good colour and no odour. Packaging clean and in good condition.
Seafood	5 °C (41 °F) or below. The Codex recommends a temperature as close as possible to 0 °C.	Obtained from an approved source. Good colour and fresh odour. Packaging clean and in good condition.
Shellfish	7 °C (45 °F) or below. The Codex recommends a temperature as close as possible to 0 °C.	Obtained from an approved source. Clean, shells closed, no broken shells. Shellstock tags must be readable and attached.
Crustacea (unprocessed)	7 °C (45 °F) or below.	Obtained from an approved source. Clean and in good condition.
Crustacea (cut or processed)	5 °C (41 °F) or below.	Obtained from an approved source. Clean and in good condition.
Dairy products	5 °C (41 °F) or below, unless labelled otherwise.	Obtained from an approved source. Packaging clean and in good condition.
Shell eggs	7 °C (45 °F) or below.	Obtained from an approved source. Clean, not cracked.
Liquid eggs	5 °C (41 °F) or below.	Obtained from an approved source. Liquid eggs frozen and pasteurized.

## Appendix 2 General principles of temperature control

Process	Operation	Temperature control	Required	Recommended
Thawing	a) In refrigerator or purpose-built thawing cabinet	4 °C or below.	<input type="checkbox"/>	
	b) In running potable water	Not above 21 °C for a period not exceeding 4 hours.	<input type="checkbox"/>	
	c) In commercial microwave oven	Only when the food will be immediately transferred to conventional cooking units as part of a continuous cooking process, or when the entire, uninterrupted cooking process takes place in the microwave oven.	<input type="checkbox"/>	
Cooking	a) Rare cooked beef	The centre of joints must reach a minimum of 63 °C.	<input type="checkbox"/>	
	b) Large poultry carcasses	Temperature of 74 °C is achieved in the deep thigh muscle.	<input type="checkbox"/>	
	c) Milk (Code of Hygienic Practice for Milk and Milk Products, CAC/RCP 57, 2004)	72°C for 15 seconds (continuous flow pasteurization), or 63 °C for 30 minutes (batch pasteurization).	<input type="checkbox"/>	
Portioning	a) Chilled product	Completed within the minimum practicable time, which should not exceed 30 minutes.	<input type="checkbox"/>	
		In large-scale systems in which cooking and chilling of foods cannot be performed in 30 minutes, portioning should take place in a separate area in which the ambient temperature should be 15 °C. Serve food immediately or place in cold storage at 4 °C.	<input type="checkbox"/>	
Chilling and storage of chilled food	a) Chilling	Reduce temperature in the centre of the food product from 60 °C to 10 °C in less than 2 hours. Immediately store product at 4 °C.	<input type="checkbox"/>	
	b) Storage	As soon as the chilling is complete the products should be put into a refrigerator. Temperature should not exceed 4 °C in any part of product and should be maintained until final use. Storage period between preparation of chilled food and its consumption should be less than 5 days, including both day of cooking and day of consumption.	<input type="checkbox"/>	
Freezing and storage conditions for frozen food	a) Freezing	Kept at or below -18 °C.	<input type="checkbox"/>	
	b) Storage	Stored at or below 4 °C for less than 5 days. Do not refreeze thawed or partially thawed food.	<input type="checkbox"/>	

Process	Operation	Temperature control	Required	Recommended
Transport	a) Vehicles and containers intended for transporting heated food.	Designed to maintain food temperature of at least 60 °C.	<input type="checkbox"/>	
	b) Vehicles and containers intended for transporting cooked-and-chilled food.	Designed to maintain temperature of already chilled (cooked) food, not to chill food. Ideally, maintain temperature of foods at 4 °C, but temperature may rise to 7 °C for a short period during transport.	<input type="checkbox"/>	
	c) Vehicles and containers intended for transporting cooked-and-frozen food.	Maintain at or below –18 °C, but may rise to –12 °C for a short time during transport.	<input type="checkbox"/>	
Reheating and service	a) Reheating.	At least 75 °C should be reached in centre of food within 1 hour of removing food from refrigeration.	<input type="checkbox"/>	
		Reheat rapidly to pass food quickly through the hazardous temperature range between 10 °C and 60 °C.	<input type="checkbox"/>	
	b) Service.	Serve reheated food to consumer as soon as possible and at a temperature of at least 60 °C.	<input type="checkbox"/>	
		In self-service establishments, maintain temperature of food either below 4 °C or above 60 °C, as appropriate.	<input type="checkbox"/>	

## Area 3 Stores

### Introduction

The above risk factors applicable to galleys also apply to the food stores, as food stores are not only areas for food storage, but also contain counters and equipment for food or drink preparation, limited cooking and ware washing used for temporary food storage.; often, however, counters and equipment for food or drink preparation, limited cooking and ware washing are used for temporary food storage. Review all galley sections above for application to pantries of standards, evidence and corrective actions in all general categories of food safety.

Non-food stores include spaces designed for storage of non-food items, such as cleaning equipment, chemicals and other non-food equipment or supplies for support of food areas. Appropriately and hygienically managed stores limit potential for soiling of clean supplies and attraction and breeding of pests (i.e. non-food stores should be clean, organized, well stocked and well run). Storage areas should be appropriately labelled.

### International standards and recommendations

#### **ILO (No. 155), Occupational Safety and Health Convention 1981**

Article 7: The situation regarding occupational safety and health and the working environment shall be reviewed at appropriate intervals either over-all or in respect of particular areas, with a view to identifying major problems, evolving effective methods for dealing with them and priorities of action, and evaluating results.

#### **ILO (No. 134), Prevention of Accidents (Seafarers) Convention 1970**

Article 4: These provisions shall refer to any general provisions on the prevention of accidents and the protection of health in employment which may be applicable to the work of seafarers, and shall specify measures for the prevention of accidents which are peculiar to maritime employment.

#### **ILO (No. 68), Food and Catering (Ships' Crews) Convention 1946**

Article 5: Each Member shall maintain in force laws or regulations concerning food supply and catering arrangements designed to secure the health and well-being of the crews of the vessels mentioned in Article 1.

These laws or regulations shall require:

- (a) the provision of food and water supplies which, having regard to the size of the crew and the duration and nature of the voyage, are suitable in respect of quantity, nutritive value, quality and variety;
- (b) the arrangement and equipment of the catering department in every vessel in such a manner as to permit of the service of proper meals to the members of the crew.

Article 6: National laws or regulations shall provide for a system of inspection by the competent authority of:

- (a) supplies of food and water;
- (b) all spaces and equipment used for the storage and handling of food and water;
- (c) galley and other equipment for the preparation and service of meals; and
- (d) the qualification of such members of the catering department of the crew as is required by such laws or regulations to possess prescribed qualifications.

Article 7: National laws or regulations or, in the absence of such laws or regulations, collective agreements between employers and workers shall provide for inspection at sea at prescribed intervals by the master, or an officer specially deputed for the purpose by him, together with a responsible member of the catering department of:

- (a) supplies of food and water;

(b) all spaces and equipment used for the storage and handling of food and water, and galley and other equipment for the preparation and service of meals.

The results of each such inspection shall be recorded.

### **Codex Alimentarius Commission (CAC)**

The Codex Alimentarius is a collection of internationally adopted uniform food standards. It also includes provisions of an advisory nature in the form of codes of practice, guidelines and other recommended measures to assist in achieving the purposes of the Codex Alimentarius (CAC 1995; 1997a, b; 1999; 2003). The CAC guidance provides important information on basic food safety, which will be referred to throughout this section.

### **Hazard Analysis Critical Control Point system (HACCP)**

HACCP is noted as a system to identify and monitor the critical control points in the food manufacturing and distribution chain, including the source and stockpile. At these critical points, control is essential to prevent, eliminate or reduce a hazard and to take corrective action. Food safety plans or programmes (FSPs) are required to manage the process of providing safe food. Typically, the FSP is based on the HACCP system.

### **Main risks**

The major risks include bacteria, viruses, fungi and parasites in, or on, food due to the improper storage of foods. For example:

- foods placed on the deck;
- improper holding temperatures in cold stores;
- eggs, fish, meat and poultry not separated from ready-to-eat foods (e.g. lunch meats from cut melons, salads and other ready-to-eat foods);
- washed and unwashed fruits and vegetables not separated.

Improper storage of chemicals is another risk.

### **Document review**

- Cleaning and maintenance schedule and logs.
- Purchase records and shipboard documentation of food source (e.g. wrapping or other identification on packaging, or written product identification sheets).
- Food storage in–out records.
- Construction drawings
- Previous inspection reports.
- Pest logbook with information on sightings.
- Records of food storage temperatures, cooling logs and thermometer readings.

### **References**

#### **International conventions**

ILO, Maritime Labour Convention 2006.

#### **Scientific literature**

Cramer EH, Gu DX, Durbin RE (2003). Diarrheal disease on cruise ships, 1990–2000: the impact of environmental health programs. *American Journal of Preventive Medicine*, 24:227–233.

McEvoy M et al. (1996). An outbreak of viral gastroenteritis on a cruise ship. *Communicable Disease Report CDR Review*, 6:R188–R192.

Rooney RM et al. (2004). A review of outbreaks of foodborne disease associated with passenger ships: evidence for risk management. *Public Health Reports*, 119:427–434.

#### **Guidelines and standards**

Codex Alimentarius Commission ([http://www.codexalimentarius.net/web/index\\_en.jsp](http://www.codexalimentarius.net/web/index_en.jsp))

WHO, HACCP (Hazard Analysis Critical Control Point System)

([http://www.who.int/foodsafety/fs\\_management/haccp/en/](http://www.who.int/foodsafety/fs_management/haccp/en/))

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>3.1 Construction</b>				
3.1.1 <input type="checkbox"/>	Poorly designed construction for protection against weather and sea.	Reconstruct to ensure protection against weather and sea, insulation from heat or cold and separation from other spaces.	<input type="checkbox"/>	
		Reconstruct to ensure that room is visually clean and structurally sound.	<input type="checkbox"/>	
3.1.2 <input type="checkbox"/>	Openings or damage.	Repair openings and areas of significant damage.	<input type="checkbox"/>	
<b>3.2 Cleaning and maintenance</b>				
3.2.1 <input type="checkbox"/>	Soiled stores.	Maintain cleaning programmes and logs.	<input type="checkbox"/>	
3.2.2 <input type="checkbox"/>	Evidence of standing water.	Eliminate standing water and its source.	<input type="checkbox"/>	
3.2.3 <input type="checkbox"/>	Evidence of vectors or reservoirs.	Perform disinfection, dissection and deratting measures.	<input type="checkbox"/>	
<b>3.3 Food sources</b>				
3.3.1 <input type="checkbox"/>	Foods found spoiled or unpackaged.  Containers or packaging have no source or suspicious source identifications.  Supervisory food crew members cannot provide satisfactory details of sources and countries of origin to enable tracing if a poisoning occurs	Document on food packaging or separately record sources to comply with country-of-origin laws and regulations.	<input type="checkbox"/>	
		Obtain all foods consumed on board from reputable sources ashore (i.e. sources approved or considered satisfactory by the relevant health administration).	<input type="checkbox"/>	
		Verify food quality and safety when purchasing: clean, free from spoilage and adulteration, safe for human consumption. Do not accept raw materials and ingredients if known to contain parasites; undesirable microorganisms, pesticides, veterinary drugs or toxins; decomposed or extraneous substances; unless contaminants can be reduced to an acceptable level by routine sorting or processing.	<input type="checkbox"/>	
		Discard spoiled foods.	<input type="checkbox"/>	
<b>3.4 Storage</b>				
3.4.1 <input type="checkbox"/>	Food and non-food, or raw and prepared products not separate.	Separate food and non-food stores. Clearly segregate storage of raw and prepared products.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
3.4.2 <input type="checkbox"/>	Disordered stores.	Post signage for storage and maintenance procedures.		<input type="checkbox"/>
3.4.3 <input type="checkbox"/>	Foods found in contact with the deck, standing water or other contamination.	Store food at safe distance (approximately 15 cm or 6 in) above the deck and protect from water entry and other potential contamination.	<input type="checkbox"/>	
		Dispose of contaminated foods and, where feasible, clean and sanitize food containers.	<input type="checkbox"/>	
3.4.4 <input type="checkbox"/>	Storage areas poorly constructed or maintained, allowing presence of vectors or soiling of stored foods with dirt, debris or droppings.	Stock raw materials and ingredients in an order for effective stock rotation.		<input type="checkbox"/>
		Reconstruct food storage areas with suitable materials for easy cleaning to deter harbouring vectors.		<input type="checkbox"/>
		Repair or construct decks with hard, durable, non-absorbent, non-skid material. Install durable coving with a radius of at least 10 mm (0.4 in), or an open design >90°. Make the coving an integral part of the deck and bulkhead interface, and of the juncture between decks and equipment foundations, for easy cleaning and prevention of vector entry.		<input type="checkbox"/>
		Apply dissection and deratting measures to eliminate evident vectors.	<input type="checkbox"/>	
3.4.5 <input type="checkbox"/>	Foods stored in locker rooms, toilet or bathing areas, garbage rooms, or mechanical or technical spaces; or under sewer lines, leaking water lines or lines on which water has condensed.	Always store foods in designated, secured rooms, protected from contamination and infestation.		<input type="checkbox"/>
		Transfer foods to rooms free from contamination or temperature abuse for safe storage.	<input type="checkbox"/>	
3.4.6 <input type="checkbox"/>	<p>Perishable foods found stored under inadequate temperature conditions for the type or class of food, for periods over 4 hours, without sufficient explanation or documentation (e.g. cooling without a cooling log).</p> <p>Frozen foods in freezers found visibly spoiled or partially thawed when hand pressure applied</p>	<p>Maintain correct temperatures for storing perishable foods to prevent food entering the danger zone for microbial growth, as follows:</p> <ul style="list-style-type: none"> <li>• Place food held hot in a hot-holding apparatus already at a temperature of at least 62.8 °C (145 °F), and maintain at that temperature until required.</li> <li>• Reheat cooked, cooled, perishable food for hot-holding until all parts of the food reach a temperature of at least 74 °C (165 °F). Maintain temperature until required.</li> <li>• Store perishable foods and drinks at or below 4 °C (40 °F), except during preparation or when held for immediate serving after preparation. When such foods are stored for extended periods, a temperature of 4 °C (40 °F) is recommended.</li> <li>• Usually store fruits and vegetables in cool rooms.</li> </ul>		<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
		Discard perishable foods immediately. If control measures applied in presence of inspector, note both date that control measures applied and re-inspection date (i.e. the same date) on the ship sanitation certificate.	<input type="checkbox"/>	
<b>3.5 Hazardous material</b>				
3.5.1 <input type="checkbox"/>	Chemicals used for cleaning and maintenance of food areas stored in food area.	Separate chemicals by storing in a locker.	<input type="checkbox"/>	
<b>3.6 Training</b>				
3.6.1 <input type="checkbox"/>	Evidence of absence or inadequate knowledge of correct use of cleaning chemicals.	Improve training in correct use of cleaning chemicals.		<input type="checkbox"/>



# Area 4 Child-care facilities

## Introduction

Infants and children are known reservoirs for infection. Therefore, child-care facilities on board ships contribute to public health risks. They are also important centres for surveillance and control of public health risks. Modes of infectious disease transmission within or from child-care facilities include the droplet-air and oral-faecal routes and person-to-person spread. The prevalence of disease may depend on the level of immunity in children and carers, country of origin and age of children, as well as onboard preventive and control measures. The main infections occurring on board may be vaccine-preventable diseases (e.g. influenza, measles and varicella), respiratory infections (e.g. common cold, pharyngitis and middle-ear infection), diarrhoeal disease (e.g. rotavirus, norovirus and hepatitis A) and parasitic diseases (e.g. pediculosis or disease caused by hookworm). Crew members designated to onboard child-care play key roles in the prevention, surveillance and control of communicable diseases to and from children.

## Background information

Types of child care that may be offered on board passenger ships include:

- care of infants and preschool children who are not toilet-trained and need supervision by staff, including changing diapers;
- care of children who are toilet-trained;
- provision and supervision of public playgrounds.

## International standards and recommendations

None

## Main risks

Ill-designed child-care facilities, lack of training for carers and inappropriate prevention and control procedures may pose a risk to all crew and passengers on board. General public health may also be at risk when children return to their communities.

Critical areas for controlling risks are:

- size, ventilation and lighting of child-care facilities;
- materials and cleanliness of surfaces of furniture, carpets and toys;
- diaper changing, hand-washing facilities and toilets;
- food preparation areas;
- training of crew in sanitation procedures, with an emphasis on hand washing;
- immunization of children and crew;
- communication procedures concerning notification of disease;
- isolation measures, including exclusion of sick children and crew from child-care facilities;
- methods to manage symptomatic passengers (such as isolation in cabin or departure from ship) to improve compliance with control measures.

## Document review

Required documents are:

- written procedures and policies on cleaning, maintenance and waste management;
- written guidance on control measures if symptoms of infection occur in children; guidelines will include handling of body fluids, record keeping, notification of disease, communication, outbreak management and exclusion policies in case of illness;
- vaccination list of child-care staff.

## References

### **International conventions**

ILO, Maritime Labour Convention 2006.

### **Scientific literature**

Carling PC, Bruno-Murtha LA, Griffiths JK (2009). Cruise ship environmental hygiene and the risk of norovirus infection outbreaks: an objective assessment of 56 vessels over 3 years. *Clinical Infectious Diseases*, 49:1312–1317.

Chimonas MA et al. (2008). Passenger behaviors associated with norovirus infection on board a cruise ship—Alaska, May to June 2004. *Journal of Travel Medicine*, 15:177–183.

Clover D (2009). Control of viral contamination of food and environment. *Food and Environmental Virology*, 1:3–9.

Cramer EH, Gu DX, Durbin RE (2003). Diarrheal disease on cruise ships, 1990–2000: the impact of environmental health programs. *American Journal of Preventive Medicine*, 24:227–233.

McCutcheon H, Fitzgerald M (2001). The public health problem of acute respiratory illness in childcare. *Journal of Clinical Nursing*, 10(3):305–310.

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>4.1 General design of child-care facility</b>				
4.1.1 <input type="checkbox"/>	Child-care facilities not appropriate in size and location.	Provide child care in a space of appropriate size and location.		<input type="checkbox"/>
4.1.2 <input type="checkbox"/>	Child-care facilities not well lit and not well ventilated.	Install sufficient lighting and/or ventilation.		<input type="checkbox"/>
4.1.3 <input type="checkbox"/>	Presence of disease vectors such as insects. Presence of other sources of contamination. Facilities not clean.	Clean, disinfect and/or apply insecticide as appropriate.		<input type="checkbox"/>
4.1.4 <input type="checkbox"/>	Potable water and hand-washing facilities not available and/or not appropriate for use by children.	Install appropriate washbasin with hot and cold potable water.		<input type="checkbox"/>
4.1.5 <input type="checkbox"/>	Paper towels or hand-drying device, liquid soap, waste receptacle, toilet brush or toilet paper missing.	Equip room with all required materials.		<input type="checkbox"/>
4.1.6 <input type="checkbox"/>	No separate toilets for staff and children, or toilets not appropriate in size for children; toilets dirty or do not flush properly.	Provide separate toilet facilities for children and staff. Clean toilets. Repair toilet flushing system as appropriate.		<input type="checkbox"/>
4.1.7 <input type="checkbox"/>	Surfaces not smooth and durable. Carpets, toys and furniture not cleanable.	Equip room with appropriate material.		<input type="checkbox"/>
<b>4.2 Diaper-changing facilities</b>				
4.2.1 <input type="checkbox"/>	An area specifically set aside for diaper changing not provided within the facility.	Designate appropriate diaper-changing area.		<input type="checkbox"/>
4.2.2 <input type="checkbox"/>	Diaper-changing area not adequately equipped. Hand-washing station, cleaning wipes, detergent, disinfectant and waste receptacle not available.	Equip diaper-changing area with appropriate material.		<input type="checkbox"/>
<b>4.3 Training of staff</b>				
4.3.1 <input type="checkbox"/>	Crew members designated for child care not trained in sanitary procedures or the symptoms and basic control of disease.	Train child-care staff in sanitary procedures and the symptoms and basic control of disease. Document training.		<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>4.4 Cleaning and disinfection</b>				
4.4.1 <input type="checkbox"/>	Basic cleaning plan not maintained or carrying out the cleaning plan not documented.	Provide, observe and maintain cleaning plan.		<input type="checkbox"/>
4.4.2 <input type="checkbox"/>	Written procedures not available for cleaning and disinfection of hands and materials in case of contact with blood, vomit or excrement.	Provide, observe and maintain cleaning plan.		<input type="checkbox"/>
4.4.3 <input type="checkbox"/>	Written procedures for removal of waste not available.	Provide, observe and maintain waste management plan.		<input type="checkbox"/>
4.4.4 <input type="checkbox"/>	Evidence of disease vectors and/or reservoirs found.	Disinfect, derat and apply insecticides, as appropriate.	<input type="checkbox"/>	
<b>4.5 Operation manuals</b>				
4.5.1 <input type="checkbox"/>	<p>Written guidance on control measures not available for when children show symptoms of common infections.</p> <p>Guidance to include control measures such as:</p> <ul style="list-style-type: none"> <li>•handling of body fluids;</li> <li>•record keeping;</li> <li>•notification and communication;</li> <li>•outbreak management and exclusion policies.</li> </ul>	Provide written procedures and policies for responding to common childhood infections.		<input type="checkbox"/>
<b>4.6 Vaccinations</b>				
4.6.1 <input type="checkbox"/>	Vaccination list of child-care crew members not present.	Provide updated vaccination list of crew.		<input type="checkbox"/>

## Area 5 Medical facilities

### Introduction

Medical facilities are important for the onboard surveillance and control of disease. However, they also contribute to the occurrence of public health risks, as unsanitary conditions within medical facilities can cause the spread of communicable diseases. Sick passengers may pose a public health risk on board and ashore.

Therefore, crew members designated to provide onboard medical care play a key role in the prevention, surveillance and control of communicable diseases. Prerequisites for the control of public health risks on board include training of dedicated staff, appropriate operational manuals and protocols, facilities for diagnosis and treatment, and timely notification to the competent authority.

Smaller ships may not have the capacity to fulfil all measures for surveillance, prevention and control in the same way as larger ships with a physician on board.

### International standards and recommendations

#### **ILO, Maritime Labour Convention 2006**

Regulation 4.1, Medical care on board ship and ashore: Standard A 4.1 stipulates that all ships carry a medicine chest, medical equipment and a medical guide. The national requirements shall take into account the type of ship, the number of persons on board and the nature, destination and duration of voyages and relevant national and international recommended medical standards. With ships carrying 100 or more persons and ordinarily engaged in international voyages of more than 3 days duration, a medical doctor who provides medical care shall be carried.

Guidelines B 4.1 and 2 outline the requirements to properly maintain and inspect the medicine chest by a designated crew member. Requirements include ensuring standardized medical training of designated seafarers, providing an up-to-date list of radio stations through which medical advice can be obtained, and carrying an appropriate medical report form.

#### **ILO, IMO, WHO, International medical guide for ships, 3rd edition, 2008 (IMGS)**

The IMGS is noted as a source of information in the non-statutory part of the Maritime Labour Convention 2006. It is a medical text that includes recommendations for the prevention, diagnosis, treatment and epidemic control of communicable diseases, including guidance on disinfection and removal of insects.

Chapter 33, Recommendations for the ship's medicine chest and equipment, includes specifications for the list of medicines and their storage, including record-keeping. Recommendations are given for antivirals, antimalaria medication, antibiotics, antipyretics, medication against diarrhoea, disinfectants for skin and wounds, personal protective equipment, thermometers and other items for the control of communicable diseases.

#### **IMO, Medical first aid guide for use in accidents involving dangerous goods (MFAG) 1982**

Ships carrying dangerous goods are obligated to have additional medicines, specific antidotes and special equipment on board, as prescribed in the MFAG.

## **IMO, International Convention on Standards, Certification and Watchkeeping for Seafarers 1978, as amended 1995 (STCW 95)**

This convention is an international standard concerning the mandatory training of seafarers.

### **Main risks**

Medical facilities need to be designed, equipped and maintained so that person-to-person spread of disease is prevented. All ships subject to the regulations established by the IMO and the ILO are required to follow training standards and carry a medical chest. The MFAG names specific medications and equipment that are mandatory for ships carrying dangerous goods. Beyond these requirements, no formal international instruments specify the contents of the medical chest, the design of medical facilities or operational manuals and protocols. The IMGS includes a suggested list of medications and equipment to be carried. A number of national maritime authorities further specify the contents and design of medical facilities plus the training of crew designated to onboard medical care.

Areas and standards to minimize the risk of spread of disease that concern medical facilities are as follows:

#### 1. Medical facilities designed for accommodation of ill crew and passengers

Facilities must:

- be easily accessible and separated from other activities, particularly from food-storage and food-handling areas, and from spaces for waste;
- facilitate private treatment of ill travellers;
- be clean, well ventilated and well lit;
- provide adequate space for isolation of ill travellers;
- be properly maintained with potable water, and toilet and hand-washing facilities;
- not be used for other purposes.

#### 2. Crew members designated to work in medical facilities

Staff must:

- be trained in basic medical first aid in accordance with STCW 95;
- include credentialed medical staff (physician and nurses) for ships carrying more than 100 people, in accordance with the Maritime Labour Convention 2006;
- provide evidence of attendance at approved training courses observing SCTW 95 criteria;
- demonstrate knowledge and competence by observed practices, such as adequate record keeping.

#### 3. Medications and medical equipment

Supplies must:

- include all medications, personal protective equipment, medical devices and disinfectants sufficient to diagnose, treat and control public health risks according to the ship's size, number of travellers and voyage pattern;
- meet the recommendations and requirements of the IMGS and MFAG as a minimum.

Medications must:

- be given to travellers and crew only by trained and authorized personnel;
- be accompanied by adequate dispensary records.

Medical equipment must:

- be in good operational and hygienic order and operated and maintained according to manufacturers' recommendations.

#### 4. Medical treatment log

A well-organized, legible and up-to-date medical log must list cases of illness, passengers and crew concerned, and any medication dispensed. Log entries should list:

- first date of clinic visit; name, age and sex of patient;
- passenger or crew member designation;
- crew member position or job;
- cabin number;
- date and time of illness onset;
- symptoms;
- details of specimen collection or other action taken, if applicable.

#### 5. Confidentiality of personal medical and health information

Personal medical and other health information concerning passengers and crew, maintained in the above records or otherwise, must be processed and maintained confidentially in accordance with applicable laws and regulations.

#### 6. Operational manuals

Procedures to reduce onboard risks of diseases should:

- relate to the ship's size, number of travellers, mix of patients, voyage pattern and the type and size of medical facilities;
- give special attention to adequate surveillance on board passenger ships (e.g. gastrointestinal disease log) and operation of high-risk facilities, such as haemodialysis or intensive-care units;
- provide adequate policies and procedures on cleaning, sanitation, sharps disposal and waste management.

#### 7. Communication infrastructure

Communication infrastructure and procedures should be in place to contact external support for emergency medical advice services (telemedical assistance service) in case of a health emergency and to alert the competent authority about public health risks on board.

### Document review

Required documents are:

- up-to-date ship's log and/or medical logbook, including treatment list;
- crew member interviews if the medical log is not available during inspection or entries are inadequate; if written information is required, request Maritime Declaration of Health from the State Party;
- training and certification of staff assigned to medical care;
- lists of medicines, vaccines, disinfectants and insecticides;
- number of passengers, mix of patients (passenger ships only), medical equipment in place and procedures performed, depending on ship's voyage pattern and size;
- cleaning, sanitation, maintenance and waste policies and procedures;
- specific disease surveillance logs (e.g. gastrointestinal disease), where applicable;
- operational manuals for high-risk facilities and devices such as an intensive-care unit, blood transfusion facility, operating theatre or haemodialysis facility;
- specimens collected and results if disease occurs on board; if possible, international certificates of vaccination or prophylaxis.

## References

### International conventions

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IMO, *Medical first aid guide for use in accidents involving dangerous goods*.

IMO, International Convention on Standards, Certification and Watchkeeping for Seafarers 1978, as amended in 1995, chapter VI.

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Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>5.1 Construction</b>				
5.1.1 <input type="checkbox"/>	Medical facilities used for non-medical purposes (e.g. living quarters or storage rooms).	Use facilities for medical purposes only if ships carry 15 or more passengers and crew and are engaged in a voyage of more than 3 days.	<input type="checkbox"/>	
		Provide accommodation exclusively for medical use.		<input type="checkbox"/>
5.1.2 <input type="checkbox"/>	Medical facilities not easily accessible and not separated from other activities, food-storage and food-handling areas and waste disposal areas; and/or not suitable for private treatment of ill crew and passengers.	Provide private treatment space in a dedicated and suitable location.	<input type="checkbox"/>	
5.1.3 <input type="checkbox"/>	Medical facilities not well lit and not well ventilated.	Install sufficient lighting for proper medical practices; evaluate sanitary conditions and/or ventilation.	<input type="checkbox"/>	
<b>5.2 Equipment</b>				
5.2.1 <input type="checkbox"/>	Potable water and hand-washing facilities not available.	Install washbasin with hot and cold potable water.	<input type="checkbox"/>	
5.2.2 <input type="checkbox"/>	Paper towels or hand-drying device, liquid soap, waste receptacle, toilet brush or toilet paper missing.	Equip room with all required materials.	<input type="checkbox"/>	
5.2.3 <input type="checkbox"/>	Absence or inadequate sharps or biomedical collectors.	Equip room with United Nations–certified sharps or biomedical collectors (for specifications, see Area 7, Solid and medical waste).	<input type="checkbox"/>	
<b>5.3 Medical chest</b>				
5.3.1 <input type="checkbox"/>	Size, type and storage of medical chest inadequate to diagnose, treat and control public health risks on board.	Supply adequate medications and/or equipment according to IMGs (3rd ed.) or flag-state requirements and MFAG if dangerous goods are on board.	<input type="checkbox"/>	
5.3.2 <input type="checkbox"/>	Evidence of medicines that have passed expiry dates.	Replace all medicines that have passed their expiry dates with fresh medicines.	<input type="checkbox"/>	
5.3.3 <input type="checkbox"/>	Medicines not stored according to manufacturers' requirements (e.g. vaccines not stored in refrigerators).	Store medicines according to manufacturers' requirements.	<input type="checkbox"/>	
5.3.4 <input type="checkbox"/>	Medicines not stored in an organized manner.	Implement storage management of medicines; organize by medicine types, identification codes, etc.		<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>5.4 Cleaning and maintenance</b>				
5.4.1 <input type="checkbox"/>	No evidence of procedures and policies on cleaning, sanitation, sharps disposal or waste management.	Provide written procedures and policies relating to the complexity of medical care on board.		<input type="checkbox"/>
5.4.2 <input type="checkbox"/>	Evidence of disease vectors and/or reservoirs that harbour disease vectors.	Disinfect, derat and apply insecticides immediately.	<input type="checkbox"/>	
5.4.3 <input type="checkbox"/>	Toilet dirty or not flushing properly.	Clean toilets; repair toilet flushing system.		<input type="checkbox"/>
5.4.4 <input type="checkbox"/>	Medical equipment and devices not in good operational and hygienic condition and not operated and maintained according to manufacturers' recommendations.	Operate and maintain equipment and medical devices according to manufacturers' recommendations.		<input type="checkbox"/>
<b>5.5 Training of crew members</b>				
5.5.1 <input type="checkbox"/>	No crew members designated to medical care, medication dispensing and maintenance of medical facilities on board.	Designate crew members for medical care.	<input type="checkbox"/>	
5.5.2 <input type="checkbox"/>	For ships carrying 100 or more persons and ordinarily engaged in international voyages of more than 3 days, no medical doctor present to provide medical care.	Designate medical doctor to provide care, if applicable.	<input type="checkbox"/>	
5.5.3 <input type="checkbox"/>	Crew members designated to work in medical facilities are not trained in basic medical first aid. No evidence of attendance at approved training courses observing SCTW 95 criteria. Designated staff demonstrate lack of knowledge and competence by observed poor practices.	Designate crew members with appropriate training according to level of onboard care provided.	<input type="checkbox"/>	
<b>5.6 Health information</b>				
5.6.1 <input type="checkbox"/>	Medical log not available during inspections. Entries not legible or up to date.	Provide updated medical log listing cases of illness, passengers or crew concerned and medications dispensed.	<input type="checkbox"/>	
5.6.2 <input type="checkbox"/>	No up-to-date medical guide available (according to flag-state regulation or IMGS).	Provide up-to-date medical guide	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
5.6.3 <input type="checkbox"/>	No operations manuals available for the prevention, surveillance and control of public health risks on board (applicable to passenger ships only).	Provide surveillance logs for diseases (e.g. gastrointestinal diseases) and operations manuals for all medical procedures that are available on board.		<input type="checkbox"/>
5.6.4 <input type="checkbox"/>	No evidence of adequate operations manuals for high-risk facilities and procedures (applicable only if such facilities are present).	Provide written procedures and policies for operation of high-risk facilities, such as intensive-care units and haemodialysis facilities.		<input type="checkbox"/>
<b>5.7 Communication infrastructure</b>				
5.7.1 <input type="checkbox"/>	No or inadequate communication infrastructure and procedures in place to contact telemedical assistance service and to alert the competent onboard authority on public health risks.	Equip medical facilities with communication infrastructure and procedures.		<input type="checkbox"/>
5.7.2 <input type="checkbox"/>	List of radio stations for telemedical assistance not available or up to date.	Provide up-to-date list of radio stations.	<input type="checkbox"/>	

## Area 6 Swimming pools and spas

### Introduction

A variety of infectious agents (viruses, bacteria and protozoa) are associated with the recreational use of water, and these can affect the skin, ears, eyes, gastrointestinal tract and respiratory tract.

Risk factors for acquiring an infectious disease from the recreational use of water include:

- the presence of infectious agents;
- suitable conditions for the growth of infectious agents, e.g. temperature of 30–40 °C, a source of nutrients (organic matter from people bathing);
- a way of exposing crew and passengers to the infectious agents (e.g. Legionella bacteria in the aerosol created by water agitated in spa pools);
- the presence of people who could be exposed to the infectious agents (e.g. people passing near a spa pool).

Infectious agents can easily be introduced to pools and spa pools through people bathing, from dirt entering the pool or from the water source.

Spa pools are smaller than swimming pools and have a much higher ratio of bathers to water volume. Thus, the concentration of organic matter in spa pools is often far higher than in swimming pools. Water disinfection is, therefore, a key control measure, but the raised temperature and high organic content of spa pool water can make it difficult to maintain effective disinfection.

Non-microbiological hazards are also associated with the recreational use of water. These include accidental drowning, slipping, tripping and entrapment, as well as chemical, thermal and manual handling injuries.

Identification and assessment of the risks should be carried out to enable the ship operator to decide on measures to prevent or control exposure to infectious agents and other non-microbiological hazards. The ship operator is responsible for:

- assessing the risks associated with operating the swimming pool or spa pool;
- preventing or controlling exposure to hazards associated with the swimming pool or spa pool;
- developing, maintaining and field testing public health measures to control exposure;
- training crew members to use the control measures correctly.

Swimming pools and spa pools must be safe and free from irritants, infectious agents and algae. Daily maintenance of swimming pools and spa pools must:

- remove suspended and colloidal matter and render the water clear, bright and colourless;
- remove organic matter;
- provide sufficient disinfectant to control the growth of infectious agents;
- maintain the pH of the water at an optimum for disinfection;
- maintain a comfortable temperature for bathing.

Water treatment involves two main steps:

- filtration to maintain a physically clean, clear and safe environment;
- chemical disinfection to prevent cross-infection between people bathing and prevent the growth of infectious agents within the water and on surfaces in the swimming pool or spa pool and associated water and air circulation systems.

Effective purification relies on powerful filtration in conjunction with continuous disinfection via a complete and reliable circulation system to collect and disinfect water. To minimize contamination of the pool with organic matter from people bathing, it is essential to advise them to use toilets and shower before using the pool.

### International standards and recommendations

WHO (2006). *Guidelines for safe recreational waters, volume 2—swimming pools and similar recreational water environments*. Geneva, WHO.

### Main risks

The main risks are:

- microbiological (viruses, bacteria and protozoa);
- non-microbiological (accidental drowning, slipping or tripping, entrapment, as well as chemical, thermal and manual handling injuries).

### Document review

Required documents are:

- schematic plan for recreational water facilities, plant and systems;
- written scheme for controlling the risk from exposure to disease-causing microorganisms;
- pool installation, design and construction, maintenance and operation specifications;
- training records for crew responsible for control methods;
- monitoring records;
- test results (e.g. pH, residual chlorine and bromine levels, temperature, microbiological levels);
- regular cleaning procedures;
- emergency cleaning and disinfection procedures.

### References

#### **Guidelines and standards**

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Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>6.1 Management</b>				
6.1.1 <input type="checkbox"/>	Management plan absent, and/or responsible crew members unable to demonstrate knowledge of and/or competency in any or all of the following: <ul style="list-style-type: none"> <li>• correct operation of the pool systems;</li> <li>• checks to be carried out (and their frequency) to ensure that the scheme is effective;</li> <li>• precautions to control the risk of exposure to disease-causing microorganisms.</li> </ul>	Produce and implement a management plan for controlling the risk of exposure to disease-causing microorganisms.	<input type="checkbox"/>	
<b>6.2 Design and construction</b>				
6.2.1 <input type="checkbox"/>	Materials or fittings support the growth of microorganisms or corrode easily.	Replace materials or fittings with corrosion-resistant materials that do not support the growth of microorganisms.		<input type="checkbox"/>
6.2.2 <input type="checkbox"/>	Pipework not accessible for cleaning; balance tanks not accessible for cleaning and disinfection.	Ensure that pipework and balance tanks are accessible for cleaning and disinfection.	<input type="checkbox"/>	
<b>6.3 Equipment</b>				
6.3.1 <input type="checkbox"/>	Ultraviolet (UV) disinfection device installed but not properly maintained and/or turbidity of the water greater than 0.5 nephelometric turbidity units (NTU).	Maintain UV disinfection devices according to manufacturers' instructions.	<input type="checkbox"/>	
		Control turbidity of the water so that it is less than 0.5 NTU.	<input type="checkbox"/>	
<b>6.4 Operation, cleaning and maintenance</b>				
6.4.1 <input type="checkbox"/>	Water treatment programme absent.	Produce and implement a water treatment programme to include the use of chemicals and biocides, where appropriate.		<input type="checkbox"/>
6.4.2 <input type="checkbox"/>	Chemicals and biocides not used to control microbiological activity and/or automatic chemical dosing pumps and equipment not regularly calibrated.	Ensure that automatic chemical dosing pumps and equipment are well maintained and regularly calibrated.	<input type="checkbox"/>	
6.4.3 <input type="checkbox"/>	Responsible crew members unable to demonstrate knowledge of, and/or competency in, the operation and maintenance of the pool systems.	Train responsible crew members in knowledge of, and/or competency in, the operation and maintenance of the pool systems. Assess knowledge and/or competency following training.		<input type="checkbox"/>
6.4.4 <input type="checkbox"/>	Responsible crew members unable to demonstrate knowledge of correct manual chemical dosing procedures.	Train responsible employees in the knowledge of, and/or competency in, the application of the water treatment programme.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
6.4.5 <input type="checkbox"/>	<p>Operational parameters out of acceptable range for spa pools. Acceptable values are as follows:</p> <ul style="list-style-type: none"> <li>• Free chlorine should not exceed 3 mg/l in public and semi-public pools and 5 mg/l in hot tubs.</li> <li>• Bromine should not exceed 4 mg/l in public and semi-public pools and 5 mg/l in hot tubs.</li> <li>• pH range 7.2–7.8 for chlorine disinfectants.</li> <li>• pH range 7.2–8.0 for bromine-based and other non-chlorine processes.</li> <li>• Turbidity &lt; 0.5 NTU.</li> </ul> <p>Microbiological value values out of acceptable range (see WHO Guidelines for safe recreational water environments, volume 2, Table 5.3 Recommended routine sampling frequencies and operational guidelines for microbial testing during normal operation)</p> <p>Responsible employees are unable to demonstrate knowledge of and/or competency in the safe operating limits of the defined parameters.</p>	<p>Close pools and check pH calibration and value, then rectify faults and recheck pH. If pH is still out of limits, empty pool and refill with clean water to reach pH 7.2 and add appropriate level of disinfectant.</p> <p>Check dosing units and calibration are working properly (i.e. they contain adequate disinfectant, the flow rate is appropriate and there are no air locks or blockages in pipework).</p> <p>Train responsible crew members in knowledge of, and/or competency in, the monitoring of safe operating limits. Assess knowledge and/or competency following training.</p> <p>Take microbiological samples of the water and analyse at least heterotrophic plate count, <i>Escherichia coli</i>, <i>Pseudomonas aeruginosa</i>, <i>Legionella</i> spp.</p>	<input type="checkbox"/>	<input type="checkbox"/>
6.4.6 <input type="checkbox"/>	Responsible crew unable to demonstrate knowledge of, and/or competency to carry out, corrective action for agreed out-of-limit situations.	Train responsible crew in knowledge of, and/or competency in carrying out, corrective action for agreed out-of-limit situations. Assess knowledge and/or competency following training.	<input type="checkbox"/>	
6.4.7 <input type="checkbox"/>	Responsible crew unable to demonstrate that checks are made on: <ul style="list-style-type: none"> <li>• cleanliness of the water in the system;</li> <li>• backwash of sand filters;</li> <li>• cleanliness of water line, overflow channels, grills and pool surrounds.</li> </ul>	Train responsible crew in knowledge of the maintenance procedures.	<input type="checkbox"/>	
6.4.8 <input type="checkbox"/>	Responsible crew unable to demonstrate knowledge of the determined control levels of biocides and the rate of release or rate of addition of biocide.	Train responsible crew in knowledge of the determined control levels of biocides and the rate of release or rate of addition of biocide.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
6.4.9 <input type="checkbox"/>	Microbiological tests for indicator organisms not carried out.	Test for indicator microorganisms regularly.	<input type="checkbox"/>	
6.4.10 <input type="checkbox"/>	Seawater flow-through pools operated in port without suitable water treatment.	Close seawater flow-through pools for use whenever ship is in port or in other water bodies that may harbour potential contamination.	<input type="checkbox"/>	
6.4.11 <input type="checkbox"/>	Pool surrounds, overflow channels, exposed pipework, filters and fittings visibly dirty or greasy.	Clean dirty components immediately.	<input type="checkbox"/>	
		Produce and implement a procedure for regular cleaning of the pools.		<input type="checkbox"/>
6.4.12 <input type="checkbox"/>	Responsible crew unable to demonstrate knowledge of, and/or competency in, the regular cleaning procedures of the pool systems.	Train responsible crew in knowledge of the regular cleaning procedures of the pool systems. Assess knowledge and/or competency following training.	<input type="checkbox"/>	
6.4.13 <input type="checkbox"/>	Surfaces in sauna appear dirty and not well maintained.	Clean and disinfect all surfaces that come in contact with people, to avoid spread of diseases (e.g. skin diseases).		<input type="checkbox"/>
6.4.14 <input type="checkbox"/>	Responsible crew unable to demonstrate that good hygiene information is available to pool users.	Provide good hygiene information for pool users, e.g. signage showing "Use toilets and showers" and "Avoid submerging your head in spa pools".	<input type="checkbox"/>	
6.4.15 <input type="checkbox"/>	Evidence of disease vectors found.	Apply disease vector control measures and disinfect.	<input type="checkbox"/>	
<b>6.5 Emergency procedures</b>				
6.5.1 <input type="checkbox"/>	No faecal accident response procedure defined and/or responsible crew are unable to demonstrate knowledge of, and/or competency in, emergency cleaning and disinfection procedures.	Produce and implement a procedure for emergency cleaning and disinfection. Train responsible employees in knowledge of emergency cleaning and disinfection procedures. Assess knowledge and/or competency following training.		<input type="checkbox"/>



## Area 7 Solid and medical waste

### Introduction

Depending on the type and route of a ship, large amounts of waste are produced on board. This waste can be separated into food waste, paper and cardboard, cans and tins, glass, plastics, oily materials and potentially infectious medical waste.

The international definition of garbage is all kinds of food, domestic and operational waste, excluding fresh fish and parts of fish, generated during normal operation of the ship, as defined in Annex V of the IMO International Convention for the Prevention of Pollution from Ships (MARPOL 73/78).

While MARPOL regulations are targeted to environmental protection, unsafe management and disposal of ship waste can also lead to adverse health consequences. MARPOL Annex V details the proper retention, selective collection, storage and disposal of wastes on board, on shore and overboard (where shore areas will not be affected). MARPOL Annex V includes measures to prevent the creation of health hazards.

It is necessary to meet international standards and recommendations to help avoid pollution of the seas and creation of individual and public health risks.

The recommendations in this checklist follow the physical waste stream of production–transport–processing–storage–disposal.

### International standards and recommendations

**IMO, International Convention for the Prevention of Pollution from Ships 1973, as modified by the protocol of 1978 relating thereto (MARPOL 73/78) as amended.**

Annex V: Prevention of pollution by garbage from ships.

Garbage type	Outside special areas	In special areas
Plastics, including synthetic ropes, fishing nets and plastic bags	Disposal prohibited	Disposal prohibited
Floating dunnage, lining and packing material	Disposal prohibited less than 25 nautical miles from nearest land	Disposal prohibited
Paper, rags, glass, metal, bottles, crockery and similar refuse	Disposal prohibited less than 12 miles from nearest land	Disposal prohibited
Paper, rags, glass, etc., comminuted or ground <sup>a</sup>	Disposal prohibited less than 3 miles from nearest land	Disposal prohibited
Food waste, comminuted or ground <sup>a</sup>	Disposal prohibited less than 3 miles from nearest land	Disposal prohibited less than 12 miles from nearest land
Food waste, not comminuted or ground	Disposal prohibited less than 12 miles from nearest land	Disposal prohibited less than 12 miles from nearest land
Mixed refuse	Varies by component <sup>b</sup>	Varies by component <sup>b</sup>

<sup>a</sup> Must pass through a screen with a mesh size no larger than 25 mm.

<sup>b</sup> When substances with different disposal or discharge requirements are mixed, the more stringent disposal requirement applies.

Codex Alimentarius Commission (2003). CAC/RCP1-1969 (Rev.4-2003) Recommended international code of practice—general principles of food hygiene; incorporates hazard analysis and critical control point (HACCP) system and guidelines for its application.

WHO (2004). Rolling revision of the Guidelines for drinking-water quality and Guide to ship sanitation (Draft), 10/2004. Geneva, WHO.

WHO (1999). Safe management of wastes from health-care activities. Geneva, WHO.

IMO (2000). Guidelines for ensuring the adequacy of port waste reception facilities. London, IMO.

IMO Resolution MEPC.70(38): Guidelines for the development of garbage management plans. London, IMO.

IMO Resolution MEPC.76(40): Standard specification for shipboard incinerators. London, IMO.

IMO Convention on Facilitation of International Maritime Traffic 1965, as amended, 2006 edition. Annex 5: Certificates and documents required to be carried on board ships.

### Main risks

Food wastes attract disease vectors, including rodents, flies and cockroaches. All waste can contain physical, hazardous microbial or chemical agents; for example, sharp objects such as needles may harbour infectious agents. Harmful chemicals can be deposited in waste and pose a risk for waste-handling staff.

Humans can become exposed directly, both on board and at port, by contact with waste that is not managed in a safe manner. Exposure can also occur through the environmental transfer of disease-causing organisms or harmful substances that have not been disposed of safely. However, waste can be managed and disposed of in ways that prevent harm. Procedures to facilitate the safe processing, storage and discharge of garbage should be implemented in a garbage management plan.

### Document review

Required documents:

- a garbage management plan for every ship of 400 tons gross tonnage and above, and every ship certified to carry 15 persons or more; this document should contain all information requested in the Marine Environment Protection Committee Guidelines for the development of garbage management plans;
- a garbage record book for every ship of 400 tons gross tonnage and above, and every ship certified to carry 15 persons or more; this document should contain information on amounts of different waste types produced on board, plus information including discharge and incineration processes;
- International safety management manual;
- maintenance instructions for waste processing units (e.g. incinerator);
- construction plans of sewage system to check drains in waste areas.

### References

#### International conventions

IMO, Maritime Labour Convention 2006.

#### Guidelines and standards

WHO (1999). *Safe management of wastes from health-care activities*. Geneva, WHO.

WHO (2011). *Guide to ship sanitation*. Geneva, WHO.

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>7.1 Garbage record book</b>				
Required for all ships >400 tons gross tonnage or with ≥15 persons on board				
7.1.1 <input type="checkbox"/>	No garbage record book available, or garbage record book does not contain all disposal and incineration operations.	All garbage record books must be available for a minimum of 2 years. Notify Port State Control.	<input type="checkbox"/>	
	The date, time, position of ship, description of the garbage and estimated amount incinerated or discharged are not logged and/or signed.	Garbage record books must be up to date. Provide missing information to Port State Control and competent authority.	<input type="checkbox"/>	
<b>7.2 Garbage management plan</b>				
Required for all ships of >400 tons gross tonnage or with ≥15 persons on board				
7.2.1 <input type="checkbox"/>	No garbage management plan available, or not all procedures for collecting, storing, processing and disposing of garbage are covered in the plan.	Develop garbage management plan according to IMO guidelines.	<input type="checkbox"/>	
		Implement all procedures for collecting, storing, processing and disposing of garbage in the plan.	<input type="checkbox"/>	
		Nominate a designated person to be in charge of carrying out the garbage management plan.	<input type="checkbox"/>	
		Translate garbage management plan into the working language of the crew.	<input type="checkbox"/>	
<b>7.3 Management</b>				
7.3.1 <input type="checkbox"/>	Lack of training materials and/or evidence of lack of knowledge about garbage procedures and discharge regulations.	Train crew in procedures and regulations relating to garbage collecting, processing, sorting and disposal.		<input type="checkbox"/>
		Support crew with training materials about garbage separation, processing, storage and discharge.		<input type="checkbox"/>
		Display signage in English, French or Spanish language, notifying passengers and crew of the disposal requirements according to MARPOL Annex V.	<input type="checkbox"/>	
<b>7.4 Places of waste production</b>				
7.4.1 <input type="checkbox"/>	Waste containers for food refuse: <ul style="list-style-type: none"> <li>• are not available;</li> <li>• are dirty;</li> <li>• are not tightly covered;</li> <li>• are not watertight;</li> <li>• emit a strong odour;</li> <li>• attract rodents or other vermin.</li> </ul> Places for food waste include galley, pantry and restaurants.	Install waste container that is watertight, non-absorbent and easily cleanable; can be disinfected; and has a tightly fitting cover.	<input type="checkbox"/>	
		Scrub, wash and disinfect containers thoroughly after each emptying.	<input type="checkbox"/>	
		Control pests in the area.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
7.4.2 <input type="checkbox"/>	Garbage containers for other garbage types are: • not watertight; • absorbent; • difficult to clean; • not equipped with tight covers.	Equip area with appropriate containers.	<input type="checkbox"/>	
		Define an adequate waste container storage area.		<input type="checkbox"/>
7.4.3 <input type="checkbox"/>	Existing containers are: • dirty; • broken; • attracting rodents or vermin; • places where disease vectors feed or breed, either inside or outside waste containers.	Clean, disinsect and disinfect dirty containers at an area away from any food areas.	<input type="checkbox"/>	
		Clean, disinsect and disinfect affected area.	<input type="checkbox"/>	
		Replace broken containers.	<input type="checkbox"/>	
7.4.4 <input type="checkbox"/>	Waste containers not tightly covered between operations (e.g. opened containers may be necessary during food operations).	Cover waste containers in food preparation or serving areas during operations whenever possible.		<input type="checkbox"/>
		Supply food areas with waste containers that can be opened without use of hands (e.g. with a foot pedal).		<input type="checkbox"/>
7.4.5 <input type="checkbox"/>	Grease separated from galley wastes not handled correctly.	Install a grease interceptor between galley wastewater drains and wastewater system.	<input type="checkbox"/>	
		Collect and dispose of grease in a legal way (e.g. authorized port waste reception facility, incineration or overboard discharge on the high seas).	<input type="checkbox"/>	
		Clean grease trap.		<input type="checkbox"/>
7.4.6 <input type="checkbox"/>	Evidence of vectors and/or reservoirs found.	Disinfect the reservoirs and apply vector control measures.	<input type="checkbox"/>	
<b>7.5 Medical waste</b>				
7.5.1 <input type="checkbox"/>	Accumulation of medical wastes at the point of production (e.g. medical facility).	Remove correctly packaged waste from the point of production to a dedicated secure storage place.	<input type="checkbox"/>	
		Dispose of medical waste as soon as possible in an appropriate land-based facility.	<input type="checkbox"/>	
		Reduce storage time as much as possible.		<input type="checkbox"/>
		Include medical waste handling in the garbage management plan.	<input type="checkbox"/>	
		Store potentially infectious waste in yellow plastic bags or containers that are labelled with the words "HIGHLY INFECTIOUS" and with the international infectious substances (biohazard) symbol.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
7.5.2 <input type="checkbox"/>	Medical waste not disposed of in coloured and labelled plastic bags or containers, or not separately stored. Hazardous health-care waste not separated from non-hazardous waste.	Store non-infectious waste from health-care facilities in black plastic bags.		<input type="checkbox"/>
		Store medical wastes separately from other wastes at a dedicated place.	<input type="checkbox"/>	
		Supply fresh collection bags or containers.		<input type="checkbox"/>
		Provide appropriate containers or bag holders in dispensary or medical facility.		<input type="checkbox"/>
		Post waste separation and identification instructions at each waste collecting point.		<input type="checkbox"/>
		Remove containers and bags when they are three-quarters full.		<input type="checkbox"/>
		Close waste bags tightly (e.g. with cable straps).		<input type="checkbox"/>
7.5.3 <input type="checkbox"/>	Liquid medical wastes not discharged into the sewage (black-water) system; dispensary or medical facility drains not connected to the black-water system.	Connect piping for medical liquid waste and wastewater from medical areas, including bathtubs, showers and hand-wash basins, to the sewage system.	<input type="checkbox"/>	
7.5.4 <input type="checkbox"/>	Sharps waste (e.g. needles, blades) not stored in appropriate containers; waste other than sharps found in the container; container or containers are full.	Dispose of sharps waste into suitable plastic containers.	<input type="checkbox"/>	
		Provide sharps containers that are made of metal or puncture-proof plastic, fitted with covers, rigid, impermeable and tamper proof. Containers need to be yellow, and labelled with the word "SHARPS" and the international infectious substance (biohazard) symbol.	<input type="checkbox"/>	
		Provide appropriate container holders to avoid injuries if ship is rolling.		<input type="checkbox"/>
		Dispose of all containers that are three-quarters full into a labelled, yellow infectious medical waste bag before removal from the dispensary.	<input type="checkbox"/>	
7.5.5 <input type="checkbox"/>	Pharmaceutical waste not stored or disposed of correctly.	Store pharmaceutical waste (e.g. out-of-date medicines) ideally in brown plastic bags and return it to a land-based disposal facility.		<input type="checkbox"/>
		Prohibit incineration at low temperatures or discharge of pharmaceuticals into the sewage system.		<input type="checkbox"/>
7.5.6 <input type="checkbox"/>	No designated secure storage place for safe storage and/or treatment of medical wastes.	Designate a storage place for medical waste and secure it against unauthorized access.	<input type="checkbox"/>	
7.5.7 <input type="checkbox"/>	Plastics or wet materials found prepared to be incinerated.	Allow only paper- or cloth-based material to be incinerated.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
7.5.8 <input type="checkbox"/>	Crew members handling potentially infectious health-care wastes not vaccinated against hepatitis B.	Vaccinate crew members in charge of handling these waste types against hepatitis B.	<input type="checkbox"/>	<input type="checkbox"/>
7.5.9 <input type="checkbox"/>	Evidence of vectors and/or reservoirs found.	Disinfect, derat and apply insecticides immediately.	<input type="checkbox"/>	<input type="checkbox"/>
<b>7.6 Hazardous chemical waste</b>				
7.6.1 <input type="checkbox"/>	No designated space for storage of hazardous chemical waste; area not secure against unauthorized access; area dirty, insufficiently lit or insufficiently ventilated.	Designate a space for storage of hazardous waste.	<input type="checkbox"/>	<input type="checkbox"/>
		Improve lighting in storage area.	<input type="checkbox"/>	<input type="checkbox"/>
		Improve ventilation in storage area.	<input type="checkbox"/>	<input type="checkbox"/>
		Clean storage place.	<input type="checkbox"/>	<input type="checkbox"/>
7.6.2 <input type="checkbox"/>	Hazardous chemical wastes of different composition accumulating or not stored separately.	Secure storage area against unauthorized access.	<input type="checkbox"/>	<input type="checkbox"/>
		Store different chemicals separately to avoid chemical reactions.	<input type="checkbox"/>	<input type="checkbox"/>
		Dispose of waste to approved organizations or agencies authorized to manage hazardous waste.	<input type="checkbox"/>	<input type="checkbox"/>
7.6.3 <input type="checkbox"/>	Evidence of vectors and/or reservoirs found.	Obtain information about suitable waste reception facilities in ports to minimize accumulation of hazardous waste.	<input type="checkbox"/>	<input type="checkbox"/>
		Disinfect, derat and apply insecticides immediately.	<input type="checkbox"/>	<input type="checkbox"/>
<b>7.7 Transport</b>				
7.7.1 <input type="checkbox"/>	Interiors of garbage lifts and chutes or other waste transport systems: • are not adequately constructed; • show dirt or grease accumulation; • have a strong odour; • are damaged or corroded.	Clean and disinfect waste transport facilities.	<input type="checkbox"/>	<input type="checkbox"/>
		Install removable, cleanable, non-absorbent and non-corroding cover with suitable integral cove of at least 10 mm along all sides for bottom of lifts.	<input type="checkbox"/>	<input type="checkbox"/>
		Improve construction to allow waste transport systems to be easy to clean and disinfect.	<input type="checkbox"/>	<input type="checkbox"/>
		Replace interiors of garbage lifts and chutes with stainless steel.	<input type="checkbox"/>	<input type="checkbox"/>
		Provide garbage chutes with automatic cleaning systems.	<input type="checkbox"/>	<input type="checkbox"/>
		Clean and disinfect all chutes and lifts regularly.	<input type="checkbox"/>	<input type="checkbox"/>
7.7.2 <input type="checkbox"/>	No drain provided at the bottom of lift shafts; drain not connected to the sewage system; or bottom of lift shaft dirty.	Install drains at bottom of lift shafts.	<input type="checkbox"/>	<input type="checkbox"/>
		Connect drains to sewage system.	<input type="checkbox"/>	<input type="checkbox"/>
		Clean and disinfect bottom of lift shaft.	<input type="checkbox"/>	<input type="checkbox"/>
7.7.3 <input type="checkbox"/>	Evidence of vectors and/or reservoirs found.	Disinfect, derat and apply insecticides immediately.	<input type="checkbox"/>	<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>7.8 Garbage processing</b>				
7.8.1 <input type="checkbox"/>	Sorting tables not constructed from impervious, non-absorbent material (preferably stainless steel), do not have covered corners and rounded edges, or are broken or dirty.	Clean and disinfect sorting tables carefully after each use.		<input type="checkbox"/>
		Install sorting tables made of suitable material (preferably stainless steel), with coved corners and rounded edges. If deck coaming is provided, it should be at least 8 cm high and coved. Tables should be drained to the sewage system.		<input type="checkbox"/>
7.8.2 <input type="checkbox"/>	Room where garbage is processed does not meet the same criteria as garbage storage rooms.	Provide garbage processing rooms with same equipment as garbage storage rooms, including ventilation, lighting, potable water hose and drains.		<input type="checkbox"/>
7.8.3 <input type="checkbox"/>	No hand-washing facilities available close to waste processing areas. Hand-washing facilities not adequately equipped.	Provide hand-washing facilities with running hot and cold potable water.		<input type="checkbox"/>
		Equip hand-washing facility with disposable towels, liquid soap, hand disinfection liquid, waste receptacle and signage showing "Wash and disinfect your hands".		<input type="checkbox"/>
		Install a hose connection and sufficient drains to avoid pooling of water.		<input type="checkbox"/>
7.8.4 <input type="checkbox"/>	No personal protective equipment (PPE) available; PPE not in good operational condition; and/or crew members show no competency in the use of PPE.	Equip staff in charge of waste handling with safety goggles or face shield, face mask, rubber gloves, working gloves, safety boots or shoes, and a protective suit. Train the staff.	<input type="checkbox"/>	
7.8.5 <input type="checkbox"/>	Pieces of comminuted garbage that are collected for overboard disposal are too large.	Comminute garbage until it passes a mesh size of 25 mm before disposal.	<input type="checkbox"/>	
7.8.6 <input type="checkbox"/>	Commuter and/or compactors in dirty condition, emit a strong smell or attract rodents and other vermin.	Clean, disinfect and derat garbage processing facilities.	<input type="checkbox"/>	
7.8.7 <input type="checkbox"/>	Place used to clean garbage containers promotes cross-contamination and/or is in poor sanitary condition.	Designate a place to clean garbage containers far away from any food areas (e.g. in properly equipped and maintained garbage storage room).		<input type="checkbox"/>
7.8.8 <input type="checkbox"/>	Evidence of vectors and/or reservoirs found.	Disinfect, derat and apply insecticides immediately.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>7.9 Storage</b>				
7.9.1 <input type="checkbox"/>	Storage place does not meet the following requirements: <ul style="list-style-type: none"> <li>• adequate size;</li> <li>• protected from the sun;</li> <li>• inaccessible to animals, insects and birds;</li> <li>• easy to clean and disinfect;</li> <li>• durable, non-absorbent, hard floor;</li> <li>• drainage to sewage system;</li> <li>• water supply for cleaning purposes;</li> <li>• water hose for cleaning;</li> <li>• easily accessible for staff in charge;</li> <li>• secured against unauthorized access;</li> <li>• good lighting (220 lux) and ventilation;</li> <li>• not situated in the proximity of fresh food stores or food preparation areas</li> </ul>	Ensure garbage rooms are large enough to hold unprocessed waste for longest period expected between offloading of waste.	<input type="checkbox"/>	
		Develop a cleaning schedule for regular cleaning and disinfection.		<input type="checkbox"/>
		Install sun protection or change location of storage area to avoid heat from sun and other sources.	<input type="checkbox"/>	
		Protect storage room from intrusion of animals and insects.	<input type="checkbox"/>	
		Tightly cover containers stored on deck.	<input type="checkbox"/>	
		Install drainage and connect drainage to sewage system.	<input type="checkbox"/>	
		Provide running water and hose for cleaning purposes.		<input type="checkbox"/>
		Secure garbage room or containers against unauthorized access.	<input type="checkbox"/>	
		Improve ventilation and lighting.		<input type="checkbox"/>
		Ensure garbage area is distant from food area.		<input type="checkbox"/>
7.9.2 <input type="checkbox"/>	No hand-washing facilities available close to waste holding areas. Hand-washing facilities not adequately equipped.	Provide hand-washing facilities with running hot and cold potable water.		<input type="checkbox"/>
		Equip hand-washing facilities with disposable towels, liquid soap, hand disinfection liquid, waste receptacle and signage stating "Wash and disinfect your hands".		<input type="checkbox"/>
		Install a hose connection and sufficient drains to avoid pooling of water.		<input type="checkbox"/>
7.9.3 <input type="checkbox"/>	No locker for cleaning materials available; broken or dirty equipment.	Provide storage locker with cleaning utensils away from food.		<input type="checkbox"/>
		Provide proper cleaning equipment.	<input type="checkbox"/>	
7.9.4 <input type="checkbox"/>	No adequate supply of cleaning equipment, PPE and waste bags or containers located close to the storage area.	Supply cleaning equipment.		<input type="checkbox"/>
		Supply PPE, including safety goggles or face shield, rubber work gloves, face mask, safety shoes or boots, and protective suit.		<input type="checkbox"/>
		Supply suitable waste bags and/or containers close to storage area.		<input type="checkbox"/>
7.9.5 <input type="checkbox"/>	Inadequate supply of waste containers. No separation of garbage types or not enough suitable receptacles	Supply containers of adequate capacity for paper, plastics, tins, food waste and dry waste.	<input type="checkbox"/>	
		Label waste containers according to content.	<input type="checkbox"/>	
		Store different garbage types separately.	<input type="checkbox"/>	
		Store dry and food wastes in tightly covered containers protected against the weather and from intrusion of rodents and other vermin.	<input type="checkbox"/>	



Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
7.9.6 <input type="checkbox"/>	Containers dirty or attracting disease vectors.	Thoroughly clean, disinfect and apply insecticides to the containers after each emptying if necessary.		<input type="checkbox"/>
7.9.7 <input type="checkbox"/>	No refrigerated space available where necessary for wet refuse.	Provide a sealed refrigerated space for storing wet garbage; the space needs to meet the same criteria used for cold food storage.		<input type="checkbox"/>
7.9.8 <input type="checkbox"/>	Garbage room full of garbage.	Dispose of garbage at port reception facility.		<input type="checkbox"/>
		Gather information about suitable port waste reception facilities in the next ports.		<input type="checkbox"/>
7.9.9 <input type="checkbox"/>	Vectors or reservoirs found.	Disinfect, derat and apply insecticides immediately.	<input type="checkbox"/>	
<b>7.10 Incinerator</b>				
7.10.1 <input type="checkbox"/>	Ash, plastic materials or other substances that may contain heavy metals or other poisonous substances discharged to the sea.	Train crew in correct disposal of incinerator ash.		<input type="checkbox"/>
		Inform competent authority for MARPOL violations.	<input type="checkbox"/>	
7.10.2 <input type="checkbox"/>	Evidence of leakage of gases and/or particles from combustion chamber.	Check exhaust system and gas-tightness of incinerator plant.		<input type="checkbox"/>
7.10.3 <input type="checkbox"/>	Incinerator has no prominent signage to warn against unauthorized opening of doors during operation and against overloading incinerator with garbage.	Install appropriate signage stating "Do not open during operation" and "Do not overload incinerator".		<input type="checkbox"/>
7.10.4 <input type="checkbox"/>	Incinerator full of ash or slag.	Clean combustion chamber and dispose of ash or slag at a port reception facility.		<input type="checkbox"/>
7.10.5 <input type="checkbox"/>	Incinerator room is dirty or garbage is accumulating.	Clean incinerator room.	<input type="checkbox"/>	
		Store garbage in an appropriate storage room.		<input type="checkbox"/>
7.10.6 <input type="checkbox"/>	Vectors or reservoirs found.	Disinfect, derat and apply insecticides immediately.	<input type="checkbox"/>	
<b>7.11 Discharge</b>				
7.11.1 <input type="checkbox"/>	Garbage has been disposed of overboard in a special area, or any other evidence of prohibited waste deposit into water.	Inform competent authority (e.g. Port State Control).	<input type="checkbox"/>	
		Capture and retain waste on board.		<input type="checkbox"/>
7.11.2 <input type="checkbox"/>	Master or crew not familiar with procedures for managing garbage on board.	Display signage in English, French or Spanish, notifying passengers and crew of garbage disposal requirements in accordance with MARPOL Annex V.		<input type="checkbox"/>

# Area 8 Engine room

## Introduction

The engine room and nearby compartments can contain hazardous microbial, chemical and physical agents. Infectious agents and harmful chemicals can be transferred from the engine room into waste through connections to black water (as defined in the glossary), grey water (as defined in the glossary), ballast water, effluent from oil–water separators, cooling water, boiler and steam generator blowdown, industrial wastewater and other hazardous waste.

People can become exposed directly through contact with onboard waste and facilities that are not managed in a safe manner. Exposure can also occur through the environmental transfer of disease-causing organisms or harmful substances due to unsafe environmental management, operational failure and lack of crew training.

## International standards and recommendations

### **IMO, Guidelines for engine room layout, design and arrangement (MSC 68/Circ 834)**

1. Chapter 6.3, Ergonomics:

6.3.7. The layout, design and arrangement of machinery and work areas in engine rooms should be such that the engine room can be conveniently cleaned.

6.3.9. A supply of consumables, such as light bulbs, flashlights, batteries, aural protection, protective goggles, disposable work clothes, gloves, rags, cups, logbooks, pens and pencils, should be maintained in the engine room for the use of personnel working in the engine room.

2. Chapter 6.4, Minimizing risk through layout and design:

6.4.6. Engine rooms should be provided with means for collecting and disposing of oil, paper, rags and other wastes and with supplies for cleaning to minimize the potential for fire and personnel injury.

### **IMO, International Convention for the Prevention of Pollution from Ships 1973, as modified by the protocol of 1978 relating thereto (MARPOL)**

Annex VI sets limits on emissions of nitrogen oxides (NO<sub>x</sub>) from diesel engines.

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 (revised MARPOL Annex VI): Progressive reductions in nitrogen oxide (NO<sub>x</sub>) emissions from marine engines were also agreed, with the most stringent controls on so-called “Tier III” engines, i.e. those installed on ships constructed on or after 1 January 2016, operating in emission control areas.

### **ILO Convention No. 133 on Accommodation of Crews 1970**

1. Article 9: Ships of 1,600 tons or over shall be provided:

(b) a water closet and a wash basin having hot and cold running fresh water, within easy access of the machinery space if not fitted near the engine room control centre.

2. In ships of 1,600 tons or over, other than ships in which private sleeping rooms and private or semi-private bathrooms are provided for all engine department personnel, facilities for changing clothes shall be provided, which shall be:

(a) located outside the machinery space but with easy access to it; and

(b) fitted with individual clothes lockers as well as with tubs and/or shower baths and wash basin having hot and cold running fresh water.

### Main risks

The main risks include contamination by vectors and effects of the engine-room environment on the occupational health of crew members, including:

- external exposure to oil and inhalation of oil vapour and mist created by poorly ventilated and located equipment;
- high temperature of enclosed control rooms with insufficient cooling facilities;
- insufficient lighting.

### Document review

None applicable.

### References

#### **International conventions**

IMO (1978). *Guidelines for engine room layout, design and arrangement* (MSC 68/Circ 834). London, IMO. Chapter 6.3, Ergonomics; Chapter 6.4, Minimizing risk through layout and design. IMO, International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 relating thereto (MARPOL), Annex VI.

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>8.1 Construction</b>				
8.1.1 <input type="checkbox"/>	Construction design not favourable for cleaning.	Design and arrange machinery and work areas so that the engine room can be conveniently cleaned.		<input type="checkbox"/>
<b>8.2 Management</b>				
8.2.1 <input type="checkbox"/>	Evidence of vectors found.	Apply vector control measures and eliminate vector reservoir.	<input type="checkbox"/>	
8.2.2 <input type="checkbox"/>	Ducts extend from the weather deck directly to the engine room without protection from vectors.	Vector-proof both ends of the service outlet of cold-air or hot-air systems serving more than one compartment.		<input type="checkbox"/>
<b>8.3 Equipments and facilities</b> All ships of 1,600 tons or more				
8.3.1 <input type="checkbox"/>	Hand-washing station not within easy access.	Install a washbasin with hot and cold potable water within easy access of machinery.	<input type="checkbox"/>	
8.3.2 <input type="checkbox"/>	Washing station and clothes-changing room for engine department personnel absent.	Provide facilities for changing clothes that are: <ul style="list-style-type: none"> <li>• located outside the machinery space but within easy access;</li> <li>• fitted with individual clothes lockers as well as showers or baths and washbasins with hot and cold running potable water.</li> </ul>	<input type="checkbox"/>	
<b>8.4 Ventilation</b>				
8.4.1 <input type="checkbox"/>	Ventilation units are out of order.	Repair or replace ventilation units.		<input type="checkbox"/>

# Area 9 Potable water

## Introduction

Clean drinking-water is essential for health; therefore, nearly every nation in the world has their own set of regulations to assure clean drinking-water for its population. Countries that have not defined their own drinking-water regulations often refer to the WHO Guidelines for drinking-water quality (GDWQ), Vol. 1, 3rd ed. Geneva: WHO.

Ships may be equipped with two or three different water systems: potable water, non-potable water used for other operational procedures and water for firefighting. Whenever practicable, only one water system should be installed to supply potable water for drinking, personal hygiene, culinary purposes, dishwashing, and hospital and laundry purposes. Non-potable water, if used on the ship, needs to be loaded and distributed through a completely different piping system, which should be colour coded according to existing international standards.

## Definition of drinking-water

The terms “drinking-water” or “potable water” are used to define any water for human consumption. This includes not only water for drinking or cooking, but also water for brushing teeth, showers, washing hands, washing clothes and so on. Even on large, modern merchant vessels, showers and washbasins that have so-called fresh water are actually drawing it directly from desalination plants; therefore, it does not meet drinking-water quality criteria. Untreated “fresh water” may also harbour many health risks for the consumer and public health. Therefore, ships equipped with “freshwater systems” cannot use water that is unfit for any human consumption.

## International standards and recommendations

### **ILO, Accommodation of Crews (Supplementary Provisions) Convention 1970 (No. 133)**

The ILO Convention no. 133 has been ratified by a large number of Member States. It defines the minimum standards for crew accommodation on commercial ships above 1,000 gross tonnes. This convention states that people on board need to have permanent access to cold potable water. Additionally, showers or bathtubs, and washbasins must have running hot and cold “fresh water”. The definition of this term is problematic, as described above.

The ILO Convention no. 133 will be included in the ILO Maritime Labour Convention 2006, which defines the same requirements, but is still in process of ratification.

### ***WHO Guidelines for drinking-water quality***

This document gives information about microbial, physical and chemical aspects of drinking-water quality, and is often used as a reference by different national drinking-water legislation.

### **International Organization of Standardization (ISO)**

ISO has published several important international standards that describe technical aspects for safe potable water constructions.

## Main risks

Improperly managed water on ships is an established route for infectious disease transmission. Furthermore, water may be a source of index cases of disease, which might then be transmitted

via other routes. Most waterborne outbreaks involve ingestion of water that was contaminated with pathogens derived from human or animal excreta. Contamination is associated with spoiled bunkered water, cross-connections between potable and non-potable water, improper loading procedures, poor design and construction of potable water storage tanks, and inadequate disinfection. Space is often limited on board ships, and therefore potable water systems are likely to be physically close to excessive heat, or close to hazardous substances such as sewage or waste streams. Avoiding cross-contamination is one of the major challenges of keeping water safe on ships.

Bunkering is a high-risk procedure. Unsafe handling and using inappropriate materials (e.g. firefighting hoses) may lead to contamination. Hazardous water can be supplied from shore and, if the ship has no barrier systems, the water may contaminate the ship's potable water. Contamination of the shore (supply) system is also possible if there are no backflow preventers installed between the shore and the ship. It is crucial to know where risks exist, and it is necessary to implement good handling practice concerning potable water hoses and the whole bunkering procedure.

The GDWQ define the recommended minimum quality criteria of potable water. Some of the most common criteria are listed below. The parameters in bold can be used as on-site parameters to monitor a ship's water safety.

### **Appearance and colour**

The appearance and taste of drinking-water should be acceptable to the consumer. Water should have no detectable odour. Ideally, drinking-water should have no visible colour.

### **pH**

For effective disinfection with chlorine, the pH should be less than 8.0. The optimum pH depends on the water and the materials used in the potable water distribution system, but it is usually in the range 6.5–8.0 and can extend up to 9.5. The pH is important when checking water treatment efficiency and corrosive potential of mains and pipes in the drinking-water distribution system.

### **Temperature**

Water temperature should always be either below 25 °C or above 50 °C. In temperatures of 25–50 °C, a high risk of bacterial growth (especially *Legionella* spp.) exists, and water safety testing should be performed.

### **Conductivity**

Electrical conductivity is not discussed in the GDWQ. It is an important operational parameter to assess the efficacy of the desalinated water remineralisation process. Typical values (in  $\mu\text{S}/\text{cm}$ ) for desalinated water are very low. A contamination of distillate or seawater can be easily detected because seawater has a high conductivity (e.g. 50 000  $\mu\text{S}/\text{cm}$ ).

### **Chlorine**

Free chlorine and total chlorine should be measured during or after the disinfection treatment, or more often as required. Effective disinfection should have a free chlorine ( $\text{Cl}_2$ ) concentra-

tion of between 0.5 mg/l and 1.0 mg/l at the point of consumption. Different national standards in chlorination levels should be considered, because they can differ. For example, the United States Vessel Sanitation Program states that the acceptable minimum level of free chlorine at the distant point while water should be in consumption condition is 0.2 mg/l, whereas in Europe the maximum allowed concentration is around 0.6 mg/l.

### **Lead**

Lead concentration should not exceed 10 µg/l. The use of lead pipes, fittings or solder can result in elevated lead levels in drinking-water, which cause adverse neurological effects. This is especially true in systems with aggressive or acidic waters. Wherever practicable, lead pipework should be replaced.

### **Cadmium**

Cadmium concentration should not exceed 3 µg/l.

### **Iron**

Iron levels should not exceed 200 µg/l. At levels above 300 µg/l, iron stains laundry and plumbing fixtures. There is usually no noticeable taste at iron concentrations lower than 300 µg/l, although turbidity and colour may develop.

### **Copper**

Copper should not exceed a concentration of 2000 µg/l. Copper can stain laundry at concentrations above 1000 µg/l and, at levels above 5000 µg/l, copper can cause the water to have an orange tinge and a bitter taste. Corrosion in the piping is a typical cause of copper contamination in water.

### **Nickel**

Nickel contamination can happen when nickel is leached from new nickel/chromium-plated taps. Low concentrations may also arise from stainless steel pipes and fittings. Nickel leaching drops off over time. Increasing the water pH to control corrosion of other materials should help to reduce nickel leaching. Nickel concentrations should not exceed 20 µg/l.

### **Zinc**

The main corrosion problem with brasses is dezincification, which is the selective dissolution of zinc from duplex brass, leaving behind copper as a porous mass of low mechanical strength. Zinc (as zinc sulfate) imparts an undesirable astringent taste to water at a concentration of about 4000 µg/l. Water containing zinc at concentrations in excess of 3000–5000 µg/l may appear opalescent and develop a greasy film when boiled. The GDWQ do not define a health-based guideline value, but concentrations above 3000 µg/l may not be acceptable to consumers.

### **Hardness**

Hardness, measured in concentration of calcium carbonate (CaCO<sub>3</sub>), should be between 100 mg/l (1 mmol/l) and 200 mg/l (2 mmol/l) to avoid corrosion and scaling, respectively.

### **Turbidity**

Median turbidity should ideally be below 0.1 nephelometric turbidity units (NTU) for effective disinfection. Typical values for potable water are between 0.05 NTU and 0.5 NTU. The appearance of water with a turbidity of less than 5 NTU is usually acceptable to all

consumers. High turbidity can cause material collected on the surfaces of pipes to slough off within the water distribution system.

## **Microorganisms**

### **Total coliforms**

Coliforms are a broad class of bacteria, and include those that can survive and grow in water. Hence, they are not useful as an index of specific faecal pathogens, but they can be used as an indicator of treatment effectiveness, and to assess the cleanliness and integrity of distribution systems, and the potential presence of biofilms. The guideline value is zero (0) coliforms per 100 ml of water.

### ***Escherichia coli***

*E. coli* is a type of coliform, and is considered the most suitable index of faecal contamination monitoring, including surveillance of drinking-water quality. The guideline value is zero (0) *E. coli* per 100 ml of water.

### ***Intestinal enterococci***

The *intestinal enterococci* group can be used as an index of faecal pollution. Most species do not multiply in water environments. Important advantages of this group are that they tend to survive longer in water environments than *E. coli* or thermotolerant coliforms, and are more resistant to drying and chlorination. Guideline value is zero(0) per 100 ml of water.

### ***Clostridium perfringens***

Most of these bacteria are of faecal origin and produce spores that are exceptionally resistant to unfavourable conditions in water environments, including ultraviolet irradiation, temperature and pH extremes, and disinfection processes, such as chlorination. Like *E. coli*, *C. perfringens* does not multiply in most water environments and is a highly specific indicator of faecal pollution. *C. perfringens* should not be present in drinking-water.

### **Heterotrophic plate count**

Heterotrophic plate counts (HPCs) detect a wide spectrum of heterotrophic microorganisms, including bacteria and fungi. The test is based on the ability of the organisms to grow on rich growth media, without inhibitory or selective agents, over a specified incubation period and at defined temperatures (usually at 22 °C and 36 °C).

HPC is a useful parameter for the operational management of the ship's potable water system and water treatment efficacy. To properly compare HPC results, it is crucial to take more than one sample in the system. At a minimum, one sample should be taken from the tank (by use of an installed sampling tap) and another sample should be taken at the tap farthest away from the tank (usually at the bridge deck). Comparison of both (or more) samples allows interpretation of biological processes inside the distribution system and gives information about treatment efficacy. To be able to survey development of microbial growth in the particular system, it is necessary to always take the samples from the same sampling points. There are no guideline values, but the actual numbers from HPC are not as important as changes in numbers at particular locations. In distribution systems, increasing numbers from HPC can indicate a deterioration in cleanliness, possible stagnation and the potential development of biofilms.



## ***Pseudomonas aeruginosa***

*P. aeruginosa* is a common environmental organism and can be found in faeces, soil, water and sewage. It can multiply in water environments and also on the surface of suitable organic materials that are in contact with water. *P. aeruginosa* is a recognized cause of hospital-acquired infections with potentially serious complications. It has been isolated from a range of moist environments, such as sinks, water baths, hot-water systems, showers and spa pools. The main infection route is through susceptible tissue—notably wounds and mucous membranes—and contaminated water or surgical instruments. Therefore, at a minimum, it should be analysed in water samples taken from sick bays or hospitals, where stagnant water often poses an additional health risk.

## **Legionella**

*Legionella* bacteria are the cause of legionellosis, including Legionnaires' disease. The bacteria are ubiquitous in the environment and can grow at temperatures found in piped distribution systems. The route of infection is by inhalation of droplets or aerosols; however, exposure from piped water systems is preventable through the implementation of basic water quality management measures. This includes maintaining water temperature outside the range at which *Legionella* proliferates (25–50 °C) and maintaining disinfectant residuals throughout the piped distribution system. Whenever water temperatures are found in the critical range of 25–50 °C, *Legionella* testing should be performed to assess the health risk for consumers.

### **Sampling procedure**

Water sampling is necessary whenever technical or operational problems may exist, or when national law requires a water analysis.

The water sampling must be done by qualified personnel so that the sampling method does not influence the test results (i.e. does not contaminate the sample). Special sampling bottles and special procedures (as defined in ISO 19458) must be used.

Sample testing needs to be done using suitable methods by accredited laboratories. An internationally accepted laboratory quality standard is defined in ISO 17025. This document provides examples for parameters that are useful in certain circumstances.

An example for a reasonable microbiological sampling scheme is given below. It should be considered that the quantity of samples depends on the size of the water installation.

- Sample A: One sample should be taken from the potable water tank. This sample represents the water quality at the beginning of the ship's potable water system. Sampling should be performed as described in ISO 19458 ("purpose a"). Ship operators should be advised to install water sampling taps at the tank so that samples can be taken properly.
- Sample B: The next sample should be taken from the tap farthest from the potable water tank. It represents the influence of the distribution system. Sampling should be performed according to ISO 19458 ("purpose b").
- Sample C: If there is evidence of stagnation or other contamination in medical areas, an additional sample should be taken according ISO 19458 ("purpose c"). This sample represents the water quality for the consumer because sampling taps are not disinfected before sampling. It would be reasonable to test for *P. aeruginosa* at this sampling point.
- Sample D: Whenever cold water temperature is above 25 °C or hot water temperature is below 50 °C (or both), additional testing for *Legionella* is recommended. In this case, at least one cold and one hot water sample should be taken. It can be useful to test more sampling points (e.g. at the calorifier) to get even more information.

## Document review

- Constructional drawings of potable water system.
- Drinking-water analysis reports.
- Medical logbook or gastrointestinal record book (or both).
- Water safety plan.
- Maintenance instructions of treatment devices.

## References

### International conventions

ILO, Accommodation of Crews (Supplementary Provisions) Convention 1970 (no. 133).

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Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>9.1 Documents</b>				
9.1.1 <input type="checkbox"/>	No water quality analysis report available, last analysis report shows contamination or not all required parameters have been analysed.	Samples have to be taken to assess actual status of potable water. Refer to WHO <i>Guide to ship sanitation</i> , Table 2.2, Examples of parameters frequently tested in potable water and typical values.	<input type="checkbox"/>	
9.1.2 <input type="checkbox"/>	Medical log raises suspicion of possible waterborne diseases (e.g. diarrhoea).	Samples have to be taken to assess actual status of potable water.	<input type="checkbox"/>	
9.1.3 <input type="checkbox"/>	No water safety plan available, water safety plan not adequate or no other potable water policies available to ensure safe potable water on board.	Implement a water safety plan, including all critical procedures influencing potable water quality (e.g. bunker procedure, ship water system).	<input type="checkbox"/>	
		Samples have to be taken to assess actual status of potable water.	<input type="checkbox"/>	
<b>9.2 Management</b>				
9.2.1 <input type="checkbox"/>	Staff members not trained on safe management of the potable water system or show lack of knowledge about risks of several components.	Provide training to staff responsible for maintaining the potable water system.		<input type="checkbox"/>
9.2.2 <input type="checkbox"/>	No routine checks performed to estimate the proper function of the potable water system.	Check backflow prevention devices.	<input type="checkbox"/>	
<b>9.3 General construction on board</b>				
9.3.1 <input type="checkbox"/>	Washbasins, showers and other taps requiring water for human consumption are connected to "fresh water"	If several water systems are used, allow only fresh water to be delivered to slop sinks, laundry facilities, water closets. If non-potable water bibcock connections are used for deck flushing and cleaning purposes the tap should be labeled and secured against accidental use.	<input type="checkbox"/>	
		Connect drinking-water used in all taps, showers, and washbasins that may supply water for human consumption to a potable water supply only.	<input type="checkbox"/>	
9.3.2 <input type="checkbox"/>	Materials and pressurized components used not heat resistant.	Use only materials that are resistant to 90 °C (taps to 70 °C) so that thermal disinfection can be done.	<input type="checkbox"/>	
9.3.3 <input type="checkbox"/>	Materials used not suitable for use in potable water systems.  Metals and plastics not certified for use in potable water systems and may harm water quality.	Use only materials that will not contaminate the potable water with corrosive products or other substances that harm water quality. Plastics and metals in contact with potable water should be approved by the national authorities for this purpose.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>9.4 Water boats and water barges</b>				
9.4.1 <input type="checkbox"/>	Boat not properly equipped with independent potable water tanks; suitable, clean water hoses and hose fittings; or pumps and independent pipe systems to provide potable water only to the ships. Poor sanitary condition of water boat or equipment.	Install independent potable water tanks according to approved technical standards.	<input type="checkbox"/>	<input type="checkbox"/>
		Equip boat or barge with suitable, clean potable water hoses that are blue (in colour) and labelled with the words "Potable water". Materials used need to meet the requirements of national health authorities.	<input type="checkbox"/>	<input type="checkbox"/>
		Clean and disinfect existing potable water hoses, fittings and equipment.	<input type="checkbox"/>	<input type="checkbox"/>
		Store all required equipment in a closed, clean, self-draining locker that is labelled with the words "Potable water hose/equipment".	<input type="checkbox"/>	<input type="checkbox"/>
		Clean and disinfect the whole storage and distribution system that is used to provide potable water to other ships.	<input type="checkbox"/>	<input type="checkbox"/>
		Remove any cross-connections to non-potable water piping or components.	<input type="checkbox"/>	<input type="checkbox"/>
9.4.2 <input type="checkbox"/>	No facilities for disinfection available, and no way to manually disinfect potable water tanks.	Equip boat or barge with suitable disinfection devices to be able to deliver chlorinated potable water to the consumer.	<input type="checkbox"/>	<input type="checkbox"/>
9.4.3 <input type="checkbox"/>	Lack of knowledge about good hygiene practices.	Train staff and develop a water safety plan to educate them about particular risks of the system.	<input type="checkbox"/>	<input type="checkbox"/>
9.4.4 <input type="checkbox"/>	No actual water quality report available or report older than 3 months (this will depend on national regulations).	Order professional laboratory staff or an authorized health authority to take and analyse water samples.	<input type="checkbox"/>	<input type="checkbox"/>
9.4.5 <input type="checkbox"/>	Installation of potable water system and equipment not approved by the authorized health authority.	Call an authorized health authority to perform an audit to approve the potable water installation on board.	<input type="checkbox"/>	<input type="checkbox"/>
<b>9.5 Bunkering procedure</b>				
9.5.1 <input type="checkbox"/>	Water from shore obviously does not meet the GDWQ	Discard contaminated water and disinfect the potable water system.	<input type="checkbox"/>	<input type="checkbox"/>
		Bunker potable water or drinking-water from a shore supply that is potable and safe.	<input type="checkbox"/>	<input type="checkbox"/>
		Verify that the potable water source meets the GDWQ before bunkering water from shore.	<input type="checkbox"/>	<input type="checkbox"/>
9.5.2 <input type="checkbox"/>	No port water quality report available.	Request port water quality report before bunkering water.	<input type="checkbox"/>	<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
9.5.3 <input type="checkbox"/>	No testing equipment available on board.	Equip ship with basic testing equipment (e.g. turbidity, pH, disinfection residuals).	<input type="checkbox"/>	<input type="checkbox"/>
9.5.4 <input type="checkbox"/>	Shore supplier using inappropriate, broken or dirty materials (hoses, fittings, etc.).	Stop bunkering immediately and discard bunkered water.	<input type="checkbox"/>	<input type="checkbox"/>
		Use only own materials (e.g. hoses, fittings) that are appropriate, clean and well maintained.	<input type="checkbox"/>	<input type="checkbox"/>
9.5.5 <input type="checkbox"/>	No backflow prevention to avoid contamination of the shore supply is installed in the ship, or backflow prevention is not adequately maintained or inspected.	Install backflow preventer on board to avoid any backflow from ship to the shore supply.	<input type="checkbox"/>	<input type="checkbox"/>
9.5.6 <input type="checkbox"/>	Potable water-filling connection not constructed properly to avoid connection of non-potable water hoses, not coloured blue, not tightly sealed with a cap or not secured with a corrosion-proof key lock.	Install connection flange (big ships according to ISO 5620; flange with five bolts) where only potable water hoses can be connected to avoid accidental connection to hoses carrying sewage or other non-potable liquids.	<input type="checkbox"/>	<input type="checkbox"/>
		Secure flange with a sealed cap and a corrosion-proof key lock to prevent contamination and unauthorized access.	<input type="checkbox"/>	<input type="checkbox"/>
9.5.7 <input type="checkbox"/>	Potable water filling line does not exist for every tank.  Filling line is dirty, is not installed adequately, has cross-connections to other non-potable water systems, is passing through any non-potable liquid or is not labelled.	Clean and disinfect filling line.	<input type="checkbox"/>	<input type="checkbox"/>
		Mark filling line with blue colour and the words "Potable water filling".	<input type="checkbox"/>	<input type="checkbox"/>
		Start the filling line either in a gooseneck position downwards (ideal) or horizontally.	<input type="checkbox"/>	<input type="checkbox"/>
		Place the end of the filling line at least 45 cm above the deck.	<input type="checkbox"/>	<input type="checkbox"/>
		If potable water filling line is used to fill non-potable water tanks, install an air gap before installing any non-potable water tanks.	<input type="checkbox"/>	<input type="checkbox"/>
		Remove cross-connections and piping that lead through tanks carrying any non-potable liquid.	<input type="checkbox"/>	<input type="checkbox"/>
9.5.8 <input type="checkbox"/>	Filling hoses not made of suitable materials, not labelled, used for other purposes other than potable water filling, dirty, not capped, or in poor or unsanitary condition.	Equip bunker station with suitable potable water hoses, clearly marked with the words "Potable water". Normal firefighting hoses are not appropriate.	<input type="checkbox"/>	<input type="checkbox"/>
		Use potable water hoses exclusively for this purpose.	<input type="checkbox"/>	<input type="checkbox"/>
		Provide suitable hoses, approved by the authorized national administration, of at least 15 m in length and equipped with unique fittings to avoid connection to other hoses (connect to the filling line according to ISO 5620).	<input type="checkbox"/>	<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
		Flush hoses with potable water, drain hose and raise both ends before filling with 100 mg/l of chlorine solution for 1 hour. Then drain and flush thoroughly before use or storage (with ends capped).	<input type="checkbox"/>	
		Order suitable disinfection (e.g. chlorine) to disinfect hoses.	<input type="checkbox"/>	
		If hoses are being blown out by compressed air, acquire a liquid trap, filter or similar device to prevent contamination via the compressed air system.	<input type="checkbox"/>	
		Avoid dragging ends on the ground and dipping uncapped ends into harbour water. Train staff in good hygiene practices.	<input type="checkbox"/>	
9.5.9 <input type="checkbox"/>	Potable water hose lockers do not exist, are inadequately constructed or not labelled, or are in dirty or poor condition.	Install potable water hose lockers that are made of non-corrosive, non-toxic and smooth materials; can be closed; are self draining and easily cleaned; and are labelled with words such as "Potable water hose and fitting storage".		<input type="checkbox"/>
		Potable water hose locker has to be installed at least 45 cm above the deck to avoid contamination with non-potable liquids.		<input type="checkbox"/>
		Label potable water hose lockers with the words "Potable water hose locker".		<input type="checkbox"/>
		Maintain, clean and disinfect lockers.		<input type="checkbox"/>
		Keep locker closed while not in use to avoid any contamination.	<input type="checkbox"/>	
		Do not store equipment and utensils that are not required for potable water handling in potable water hose lockers.	<input type="checkbox"/>	
9.5.10 <input type="checkbox"/>	During bunkering, hoses are placed directly on the ground or through harbour water.	Elevate the hoses so they are above ground. Do not touch the harbour water with the hose (to prevent cross-contamination).	<input type="checkbox"/>	
<b>9. 6 Water production</b>				
9.6.1 <input type="checkbox"/>	Sea chest for freshwater intake located on the same side, and at the same section or aft of the sanitary overboard discharge.	Place the sanitary overboard discharge and the fresh water intake on opposite sides.		<input type="checkbox"/>
		If it is on the same side, place the sanitary discharge as far above the freshwater intake as possible.		<input type="checkbox"/>
		Never produce potable water while sanitary overboard water is being discharged.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
9.6.2 <input type="checkbox"/>	Water has been produced in unsafe areas such as in ports, on rivers or on anchorage.	Take samples from the tank and, at the minimum, perform a microbiological analysis (e.g. test for E. coli, coliforms, enterococci, C. perfringens, HPC) to evaluate level of risk.	<input type="checkbox"/>	
		Perform disinfection of piping and components between evaporator and tank.		<input type="checkbox"/>
		Inform responsible staff that water production in unsafe areas is forbidden.	<input type="checkbox"/>	
9.6.3 <input type="checkbox"/>	Evaporator process temperature below 80 °C and no disinfection device installed to treat the distillate.	Control temperature.	<input type="checkbox"/>	
		Install disinfection device (e.g. automatic chlorination) behind evaporator and control temperature.	<input type="checkbox"/>	
9.6.4 <input type="checkbox"/>	Evaporator has no opening and cannot be maintained or inspected.	Equip ship only with components that can be maintained and inspected.		<input type="checkbox"/>
9.6.5 <input type="checkbox"/>	Information about evaporator missing; no manufacturer contact details or maintenance instructions available.	Obtain and post the most important instructions, including technical specifications, close to the evaporator.	<input type="checkbox"/>	
9.6.6 <input type="checkbox"/>	Salinity sensor not installed or working. "Automatic discharge to waste if distillate salty" not installed or working.	Repair or install a low-range salinity sensor with alarm function, and an automatic switch-off or discharge.		<input type="checkbox"/>
9.6.7 <input type="checkbox"/>	No sampling tap at the distillate outlet.	Install a heat-resistant metal sampling tap so distillate sampling can be done.		<input type="checkbox"/>
9.6.8 <input type="checkbox"/>	Reverse osmosis: staff members show a lack of knowledge about health risks of membrane breaches and device maintenance.	Conduct training for staff who are responsible for the potable water system.		<input type="checkbox"/>
<b>9. 7 Treatment components</b>				
9.7.1 <input type="checkbox"/>	Piping installed that allows bypassing of treatment components (e.g. disinfection devices, filters, rehardening systems).	Remove all bypasses.	<input type="checkbox"/>	
9.7.2 <input type="checkbox"/>	Remineralization process not working or not existing behind evaporators or reverse-osmosis devices. Insufficiently treated distillate or permeate delivered to the consumer.	Install remineralization devices to control corrosivity of the water.		<input type="checkbox"/>
		Inform consumer about the water quality (e.g. hardness, pH).		<input type="checkbox"/>
9.7.3 <input type="checkbox"/>	Remineralization devices not cleaned, maintained or refilled regularly. Maintenance procedures unknown	Train staff on maintenance of remineralization devices.		<input type="checkbox"/>
		Empty, clean, disinfect and refill the remineralization device according to manufacturer's instructions.		<input type="checkbox"/>
		Label device with information about manufacturer and technical specifications.	<input type="checkbox"/>	



Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
9.7.4 <input type="checkbox"/>	Filters dirty or maintenance procedures unknown.	Backwash or replace filter medium according to the manufacturer's instructions.	<input type="checkbox"/>	<input type="checkbox"/>
<b>9. 8 Disinfection</b>				
9.8.1 <input type="checkbox"/>	No disinfection device installed to treat produced water downstream of the desalination device.	Install automatic disinfection device (preferably chlorination) behind the seawater desalination devices (evaporator or reverse-osmosis device) according to approved technical standards. The water must be at least 30 minutes in the tank to disinfect properly.	<input type="checkbox"/>	<input type="checkbox"/>
9.8.2 <input type="checkbox"/>	Disinfection of bunkered water not possible.  No technical ability to add disinfection measures during bunkering procedure.	Install automatic disinfection devices (preferably chlorination in the bunker line) to treat bunkered water according to approved technical standards.	<input type="checkbox"/>	<input type="checkbox"/>
9.8.3 <input type="checkbox"/>	Manual chlorination performed without sufficient knowledge.	Install an automatic chlorination device.  Order a professional company to perform chlorination of the water. Respect the guideline values of national health authorities.	<input type="checkbox"/>	<input type="checkbox"/>
9.8.4 <input type="checkbox"/>	Continuous halogenation performed, but no continuous recording of the halogen concentration installed.	Record disinfection residue at the farthest point in the system where significant water flow exists (e.g. bridge deck).  Check chlorine concentration (free and total) and pH of the water before and after each bunkering, and at regular intervals during normal operation.	<input type="checkbox"/>	<input type="checkbox"/>
9.8.5 <input type="checkbox"/>	There is no chlorine in the system during chlorination.	Free chlorine level should be between 0.5 mg/l and 1.0 mg/l during disinfection (consider national standards) and at the point of delivery, the minimum should be 0,2 mg/l.	<input type="checkbox"/>	<input type="checkbox"/>
9.8.6 <input type="checkbox"/>	Asampling cock is missing downstream of the disinfection unit.	Install sampling cock 3 metres downstream of the disinfection injection device.	<input type="checkbox"/>	<input type="checkbox"/>
9.8.7 <input type="checkbox"/>	Quantity of stored disinfection chemicals insufficient to treat the water volume over the whole duration of travel.	Store enough disinfection chemicals to be able to perform continuous water disinfection.	<input type="checkbox"/>	<input type="checkbox"/>
9.8.8 <input type="checkbox"/>	Chlorine and pH testing kits not available.	Equip ship with a testing kit for free and total chlorine (range 0–5 mg/l) and pH (range 6–10).	<input type="checkbox"/>	<input type="checkbox"/>
9.8.9 <input type="checkbox"/>	Potable water system needs a superchlorination, due to contamination, or system repair or maintenance.	Perform professional superchlorination with 50 mg/l over 24 hours. Water is unfit for consumption in the meantime.	<input type="checkbox"/>	<input type="checkbox"/>
9.8.10 <input type="checkbox"/>	UV system not well maintained.	Clean and disinfect the UV lamp according to the manufacturer's instructions.	<input type="checkbox"/>	<input type="checkbox"/>
	Lack of knowledge concerning operation and maintenance.	Arrange to have the necessary spare parts (e.g. UV lamp) on board.	<input type="checkbox"/>	<input type="checkbox"/>
	Bypass piping installed.  System not approved by the national authority.  No spare parts available on board.	Remove any bypass construction around disinfection devices.	<input type="checkbox"/>	<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
		During the next inspection, provide a written approval for the system, or install a new device that is approved by the national authority.	<input type="checkbox"/>	
		Label device with manufacturer's information and technical specifications.	<input type="checkbox"/>	
<b>9. 9 Tanks</b>				
9.9.1 <input type="checkbox"/>	Potable water tanks not identifiable or volume not labelled.	Clearly identify potable water tanks (e.g. with the words "Potable water" in large print).	<input type="checkbox"/>	
		Label tanks with the volume.	<input type="checkbox"/>	
9.9.2 <input type="checkbox"/>	<p>Tank location does not meet the following requirements:</p> <ul style="list-style-type: none"> <li>• The tank is located in areas without exposure to heat, dirt, vectors or other contamination.</li> <li>• The tank is protected from any contamination from outside the tank.</li> <li>• The tank is independent of the ship hull or the bottom of the tank is at least 60 cm above the maximum load water line.</li> <li>• The cofferdam is at least 45 cm above and between tanks that are not for potable water storage, and between potable water tanks and the hull.</li> </ul> <p>If a deck is the top of a potable water tank, no access or opening to the tank is allowed via the deck.</p>	Potable water tanks should be located in areas where they will be at no risk for contamination and are protected against contamination from other sources.	<input type="checkbox"/>	
		Protect the water from heating (to between 25 °C and 50 °C) to prevent microorganism growth.	<input type="checkbox"/>	
9.9.3 <input type="checkbox"/>	Drainage lines or piping carrying non-potable liquids (e.g. sewage or fuel) are leading through the potable water tank.	Remove piping that is passing through potable water tanks or construct an acceptable tunnel.	<input type="checkbox"/>	
9.9.4 <input type="checkbox"/>	Lines carrying sewage or other highly contaminated liquids are passing directly over maintenance openings of potable water tanks.	Remove maintenance openings or piping to avoid accidental cross-contamination by leaking pipes.	<input type="checkbox"/>	
9.9.5 <input type="checkbox"/>	Cross-connections: there are inadequate lines to divert potable water by valves or interchangeable pipe fittings to other systems (e.g. connection to firefighting system).	Remove any cross-connections between potable and non-potable water tanks and pipes.	<input type="checkbox"/>	
		Where removal of cross-connection is not possible, approved backflow-prevention devices need to be installed.		<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
9.9.6 <input type="checkbox"/>	Sewage system components, soil-waste drains or solid-waste facilities are installed directly above potable water tanks or tank maintenance openings so that there is a risk of contamination by dirt or spillage. Toilets and bathroom spaces extend over any part of a deck that forms the top of a tank used for potable water or wash water.	Remove toilet or solid-waste facilities that are located directly above potable water tanks or maintenance openings.		<input type="checkbox"/>
9.9.7 <input type="checkbox"/>	Tank capacity does not ensure an independent water supply of at least 2 days without bunkering or production of new water.	Install potable water tanks of sufficient size.		<input type="checkbox"/>
9.9.8 <input type="checkbox"/>	Potable water tanks share a common wall with the hull or other non-potable holding tanks.	Construct potable water tanks so that they do not share a common wall with the hull or other non-potable holding tanks. A cofferdam of at least 45 cm should be between them.		<input type="checkbox"/>
9.9.9 <input type="checkbox"/>	Tanks do not have a maintenance opening for inspection.	Install a maintenance opening that gives access for cleaning, repair and inspection, preferably located on the side of the tank(s).	<input type="checkbox"/>	
		Maintenance openings at the top of a tank need to have a coaming or curb that is raised at least 1.25 cm above the top of the tank.		<input type="checkbox"/>
		All access to potable water tanks need to be kept tightly closed when not being used.	<input type="checkbox"/>	
9.9.10 <input type="checkbox"/>	Potable water tanks not constructed or coated for potable water contact.	Store potable water only in tanks constructed for this purpose, and protect against any contamination from outside or within the tank (e.g. corrosion, or inappropriate or faulty tank coating).		<input type="checkbox"/>
	Tank coating is rendering water unfit for human consumption.	Use potable water tanks that are constructed of metal or another suitable material safe for contact with water.	<input type="checkbox"/>	
		Use potable water tanks and pipes that are constructed and coated with safe and durable material.		<input type="checkbox"/>
		Supply written documentation that tank coating is approved for potable water tanks and that all manufacturers' recommendations have been followed, or take samples for chemical analysis (or both).		<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
9.9.11 <input type="checkbox"/>	Tank ventilation or overflow (or both) does not exist, is connected to non-potable water tanks, or does not prevent entry of contaminants or vectors.	Terminate the vent or overflow with the open end pointing down, either inside the vessel (above bilge level) or at least 45 cm above a weather deck in a sheltered place.	<input type="checkbox"/>	
		Screen vents and overflow pipes with corrosion-resistant mesh of mesh count 16 × 16 or finer.	<input type="checkbox"/>	
		Use vents or overflow that is at least the same diameter as the filling line.		<input type="checkbox"/>
		Remove any direct connections between ducts from potable water tanks and non-potable liquid tanks.	<input type="checkbox"/>	
9.9.12 <input type="checkbox"/>	Tank not completely drainable, or drain insufficient in diameter, location or construction.	Install a sufficient drain to allow complete drainage of the tank.		<input type="checkbox"/>
		Ensure the distance between the end-of-drain line and the highest point of the bilge is more than 45 cm.	<input type="checkbox"/>	
9.9.13 <input type="checkbox"/>	Tank level indicators posing a risk of contamination.	Do not use dip sticks or sounding lines for sounding of tank levels.	<input type="checkbox"/>	
		Equip tanks with level indicators like water-gauge glass, petcocks, enclosed float gauges or water-operated pressure gauges.		<input type="checkbox"/>
9.9.14 <input type="checkbox"/>	No sample cocks installed at the tanks.	Install heat-resistant sample cocks at each tank to allow water-quality testing. The sample cocks need to point downwards, and be identified by numbers.	<input type="checkbox"/>	
9.9.15 <input type="checkbox"/>	No regular cleaning of the tanks has been performed, or sediments have been found at the bottom of the tank.	Inspect, clean, flush and disinfect the tank every 6 months. Document the measure in the logbook.	<input type="checkbox"/>	
9.9.16 <input type="checkbox"/>	After entering tanks for repairs or maintenance, no cleaning measures have been performed.	Perform post-repair disinfection.	<input type="checkbox"/>	
		Enter tanks wearing only clean, single-use overalls, clean rubber boots (used for this purpose only), a face mask and rubber gloves to reduce risk of contamination.		<input type="checkbox"/>
<b>9.10 Potable water pumps</b>				
9.10.1 <input type="checkbox"/>	Potable water pumps used for liquids other than potable water.	Do not use potable water pumps for any liquid other than potable water.	<input type="checkbox"/>	
		Install potable water pumps that are approved for this purpose.	<input type="checkbox"/>	
	Pumps not able to establish a permanent positive pressure in the system.  No standby pump available for emergencies.	Install a potable water pressure tank if no permanent pressure is available in the distribution system.	<input type="checkbox"/>	
		Equip the system with an emergency pump that always allows access to drinking-water.		<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
9.10.2 <input type="checkbox"/>	Hand pumps not installed in a way that prevents contamination of the potable water.	Install hand pumps in a way that prevents contamination.		<input type="checkbox"/>
<b>9.11 Potable water-pressure tank</b>				
9.11.1 <input type="checkbox"/>	Potable water-pressure tank (hydrophor tank) cross-connected to non-potable water systems with a compressed air line without using an appropriate fail-safe device.	Install an independent compressor.		<input type="checkbox"/>
		Install a press-on valve with a liquid trap of suitable size in the supply line.	<input type="checkbox"/>	
9.11.2 <input type="checkbox"/>	Manufacturer's maintenance instructions missing or not respected.	Label tank with specifications and manufacturer's information.	<input type="checkbox"/>	
		Perform regular maintenance according to manufacturer's instructions (e.g. cleaning and disinfection).	<input type="checkbox"/>	
9.11.3 <input type="checkbox"/>	No sampling cock installed at the water-pressure tank.	Install a suitable sampling cock at the water-pressure tank to take water samples for analysis.		<input type="checkbox"/>
<b>9.12 Calorifier and hot-water system</b>				
9.12.1 <input type="checkbox"/>	Size of the calorifier is inappropriate (based on the calculated hot-water consumption).	Install larger calorifier to support all people on board sufficiently.	<input type="checkbox"/>	
		Install smaller calorifier or install a decentralized hot-water supply to avoid unnecessary complications (suitable for smaller boats).	<input type="checkbox"/>	
9.12.2 <input type="checkbox"/>	Calorifier or hot-water piping's material is not suitable and is making water unfit for human consumption (e.g. due to corrosion or leaching of chemicals). Calorifier not insulated.	Install components that do not harm the water quality.	<input type="checkbox"/>	
		Install thermal insulation around the calorifier.	<input type="checkbox"/>	
9.12.3 <input type="checkbox"/>	No maintenance opening, or a lack of maintenance knowledge.	Install maintenance opening, if possible.		<input type="checkbox"/>
		Renew calorifier.		<input type="checkbox"/>
		Clean, decalcificate and disinfect the calorifier.		<input type="checkbox"/>
9.12.4 <input type="checkbox"/>	Temperatures in an inappropriate range or thermometers missing.	Set temperature in the calorifier outlet to 65 °C.	<input type="checkbox"/>	
		Set temperature in the return line (circulation systems only) above 55 °C.	<input type="checkbox"/>	
		Equip calorifiers with thermometers to check temperatures in the outflow, boiler and return lines.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
9.12.5 <input type="checkbox"/>	Hot-water circulation pumps not permanently running or not approved for drinking-water systems.	Run the hot-water circulation pump permanently to avoid stagnation and cooling down of the water in the piping.	<input type="checkbox"/>	
		Use only pumps that are approved for drinking-water.	<input type="checkbox"/>	
9.12.6 <input type="checkbox"/>	Hot and cold water piping laid side-by-side without thermal insulation.	Insulate cold-water and hot-water piping to avoid growth of microorganisms (e.g. Legionella).		<input type="checkbox"/>
<b>9.13 Plumbing</b>				
9.13.1 <input type="checkbox"/>	Piping made of inappropriate material (e.g. lead- or cadmium-lined pipes).	Replace all pipes, fittings and joints that are lead or cadmium lined, or otherwise not appropriate for potable water contact, with adequate piping.	<input type="checkbox"/>	
9.13.2 <input type="checkbox"/>	Piping not clearly identified as potable water piping (e.g. it does not have blue stripes every 5 m along the pipe).	Paint all potable water piping with colour code according to ISO 14726.	<input type="checkbox"/>	
9.13.3 <input type="checkbox"/>	Piping contains unnecessary dead legs where water stagnates.	Remove dead legs, and unnecessary taps and faucets.		<input type="checkbox"/>
		Regularly flush dead legs according to a flushing schedule.	<input type="checkbox"/>	
9.13.4 <input type="checkbox"/>	Potable water piping is passing through or connected to sewage tanks, sewage piping or other tanks containing non-potable liquids.	Remove direct connections between potable water and non-potable water systems.  Install air gaps or other appropriate backflow prevention to avoid cross-contamination.	<input type="checkbox"/>	
	Potable water piping is leading through the bilge.	Rearrange piping wherever potable water lines are leading through non-potable liquids (e.g. bilge).		<input type="checkbox"/>
9.13.5 <input type="checkbox"/>	Backflow preventers missing where potable water system is connected to non-potable water systems under pressure. Most important connections to check are: <ul style="list-style-type: none"> <li>• supply lines to swimming pools, whirlpools, hot tubs, bathtubs, showers and similar facilities;</li> <li>• photography laboratory developing machines;</li> <li>• beauty- and barber-shop rinse hoses;</li> <li>• garbage grinders;</li> </ul>	Install appropriate backflow prevention. Choose type of backflow prevention (e.g. air gap, vacuum breaker) according to the particular risk.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
9.13.5 <input type="checkbox"/>	<ul style="list-style-type: none"> <li>• hospital and laundry equipment;</li> <li>• air-conditioning expansion tanks;</li> <li>• boiler-feed water tanks;</li> <li>• fire systems;</li> <li>• toilets and bidets;</li> <li>• freshwater or saltwater ballast systems;</li> <li>• bilge or other wastewater locations;</li> <li>• international shore connection.</li> </ul>		<input type="checkbox"/>	
9.13.6 <input type="checkbox"/>	Backflow preventers not adequately maintained; no inspections or testings have been performed or documented.	Perform testing of installed backflow-prevention devices at least once per year. Record the results so that the testing logs can be shown to the ships inspector.	<input type="checkbox"/>	
9.13.7 <input type="checkbox"/>	Materials used in the piping systems not heat resistant up to 90 °C.	Use only materials that are heat resistant up to 90 °C so that thermal disinfection can be done.		<input type="checkbox"/>
<b>9.14 Taps, faucets and showerheads</b>				
9.14.1 <input type="checkbox"/>	Faucet filters or other types of terminal filters are used to improve water quality, but not replaced or maintained regularly.	Do not use terminal filters regularly without maintenance and renewal.		<input type="checkbox"/>
		Ensure that used filter devices meet the criteria of the national health administration or the local health authority.		<input type="checkbox"/>
9.14.2 <input type="checkbox"/>	Water outlets not labelled	Label potable water outlets with the words "Potable water".	<input type="checkbox"/>	
		Label non-potable water outlets with the words "Unfit for human consumption or use!"	<input type="checkbox"/>	
9.14.3 <input type="checkbox"/>	Fixtures and fittings corroded or dirty (or both).	Ensure that fixtures and fittings are made of a material resistant to the corrosive effects of salt water and saline atmosphere; they should have rounded internal corners to facilitate cleaning.	<input type="checkbox"/>	
9.14.4 <input type="checkbox"/>	Showerheads or aerators (or both) dirty or otherwise in poor condition.	Clean and disinfect aerators and showerheads.	<input type="checkbox"/>	
		Replace aerators and showerheads that are in poor condition.		<input type="checkbox"/>
9.14.5 <input type="checkbox"/>	Hot-water temperature at any tap below 50 °C.	Increase hot-water temperature in the calorifier to avoid growth of Legionella.	<input type="checkbox"/>	
		Perform a hot-water flush (i.e. all taps and showerheads turned on consecutively at a temperature of 70 °C for more than 3 minutes).		<input type="checkbox"/>
		Sample the water to assess the risk of Legionella contamination.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
9.14.6 <input type="checkbox"/>	Cold-water temperature at any tap above 25 °C.	Insulate the cold-water system, and avoid any exposure to excessive heat or other potable water components.	<input type="checkbox"/>	<input type="checkbox"/>
		Sample the water to assess the risk of <i>Legionella</i> contamination.	<input type="checkbox"/>	<input type="checkbox"/>
<b>9.15 Hand-washing facilities</b>				
9.15.1 <input type="checkbox"/>	Washbasin or other places where water for human consumption is offered does not have potable water.	Deliver potable water to all washbasins, bathtubs, showers and other places where water is used for human consumption.	<input type="checkbox"/>	<input type="checkbox"/>
<b>9.16 Drinking-water fountains</b>				
9.16.1 <input type="checkbox"/>	Water-jet orifices not slanted or orifice not protected by cover.  Insufficient flow to ensure the mouth does not come in contact with the fountain.  Flow of stream cannot be controlled by user.  Evidence of mould or slime build-up.	Protect orifice with a cover.	<input type="checkbox"/>	<input type="checkbox"/>
		Increase flow to avoid mouth contact with the fountain.	<input type="checkbox"/>	<input type="checkbox"/>
		Clean and disinfect the whole fountain (including inner parts).	<input type="checkbox"/>	<input type="checkbox"/>
		Disconnect the drinking-water fountain from the potable water system while cleaning and disinfecting, then reconnect.	<input type="checkbox"/>	<input type="checkbox"/>
<b>9.17 Water-service containers</b>				
9.17.1 <input type="checkbox"/>	Coolers that permit direct contact between ice, water and coolers (in which water bottles are inserted neck downwards into the cooling chamber) are used.	Do not use these devices.	<input type="checkbox"/>	<input type="checkbox"/>
<b>9.18 Ice machines</b>				
9.18.1 <input type="checkbox"/>	Non-potable water used to make ice cubes or other ice for drinking purposes.  Ice machine or ice-bin interior dirty or poorly maintained.	Do not make ice for human consumption from non-potable water.	<input type="checkbox"/>	<input type="checkbox"/>
		Clean and disinfect ice machine.	<input type="checkbox"/>	<input type="checkbox"/>
<b>9. 19 Criteria for taking water samples (only some possible reasons)</b>				
9.19.1 <input type="checkbox"/>	Water has been produced in unsafe water bodies (e.g. rivers, lakes, anchorage).	Test for microorganism contamination (especially <i>E. coli</i> , coliforms, enterococci, HPC, <i>C. perfringens</i> ).	<input type="checkbox"/>	<input type="checkbox"/>
9.19.2 <input type="checkbox"/>	Water has been bunkered from unsafe sources (e.g. using dirty hoses).	Test for microorganism contamination (especially <i>E. coli</i> , coliforms, enterococci, HPC, <i>C. perfringens</i> , <i>P. aeruginosa</i> ).	<input type="checkbox"/>	<input type="checkbox"/>



Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
9.19.3 <input type="checkbox"/>	No halogen or chlorine residue measured when testing.	Test for microorganism contamination (especially <i>E. coli</i> , coliforms, enterocci, HPC).	<input type="checkbox"/>	
9.19.4 <input type="checkbox"/>	Potable water installation does not meet the international or national technical standards.	Sample for microorganism and chemical contamination based on risk stratification and national health regulations.	<input type="checkbox"/>	
9.19.5 <input type="checkbox"/>	Water temperatures out of range (cold water >25 °C or hot water <50 °C).	Test for microorganism contamination (especially <i>Legionella</i> spp.).	<input type="checkbox"/>	
9.19.6 <input type="checkbox"/>	Stagnant water found, or poorly maintained aerators and showerheads (especially in medical areas).	Test for microorganism contamination (especially <i>P. aeruginosa</i> , HPC).	<input type="checkbox"/>	
9.19.7 <input type="checkbox"/>	Chemical odour or taste.	Test for chemical contamination (e.g. tank coating, fuel).	<input type="checkbox"/>	
9.19.8 <input type="checkbox"/>	Coloured water.	Test for chemical contamination (e.g. pipe corrosion).	<input type="checkbox"/>	

# Area 10 Sewage

## Introduction

Large amounts of wastewater can accumulate on ships, depending on the number of people on board, type of ship and duration of voyage. This wastewater can be separated into grey water (wash water, shower, etc.) and black water. "Sewage" and "black water" are often used interchangeably.

According to the internationally accepted definition in the IMO International Convention for the Prevention of Pollution from Ships 1973 (modified by the protocol of 1978 relating thereto [MARPOL 73/78]), sewage is defined as:

- drainage and other wastes from any form of toilets, urinals and WC flushing system;
- drainage from medical premises (e.g. dispensary, sickbay) via washbasins, wash tubs and scuppers located in such premises;
- drainage from spaces containing living animals (e.g. livestock carriers); or
- other wastewaters (e.g. grey water from showers) when mixed with the drainages defined above.

Sewage is one type of wastewater, and is a major actual or potential source of potable water pollution with infectious agents. Pollution can also come from many chemical characteristics, including high concentrations of ammonium, nitrate and phosphorus; high conductivity (due to high dissolved solids); and high alkalinity, with pH typically ranging between 7 and 8. Trihalomethanes are also likely to be present as a result of past disinfection.

## Main risks

Unsafe management and disposal of sewage can readily lead to adverse health consequences. Black water may harbour many different harmful substances, such as chemicals, pharmaceuticals and biological agents. It is well known that pathogenic amoebae, bacteria, viruses, worms, fungi and parasites survive in untreated black water. The main risk is disease spread by contaminated and insufficiently treated sewage that has been discharged into the surrounding water. Cross-contamination of potable water, accidents (e.g. leakage or overflow) and acquired infections during maintenance work are some of the additional health risks.

The most common method of treating sewage is to flush sewage from toilets through a piping system into a holding tank where it is comminuted, decanted and broken down by naturally occurring bacteria in an aerobic process. It is then disinfected before it is discharged into the open sea. It is important to consider that an excessive use of cleaners and disinfectant in the sewage system may destroy the natural bacteria in the treatment plant. The aerobic process needs oxygen; therefore, aerators blow air into the biological compartment. Toxic gases can be produced during this process.

## International standards and recommendations

The IMO's International Convention for the Prevention of Pollution from Ships 1973 (modified by the protocol of 1978 relating thereto [MARPOL 73/78]), Annex IV: Prevention of pollution by sewage from ships, entered into force on 27 September 2003. It was revised on 1 April 2004 and the revision entered into force on 1 August 2005.

Since September 2008, MARPOL 73/78 Annex IV and the Marine Environment Protection Committee's (MEPC's) amendment MEPC.115(51) state that all ships engaged in international

voyages and of a size >400 gross tonnage, or certified to carry >15 persons, need to be equipped with at least one of the following sewage systems:

- sewage holding tank with sufficient capacity and visual level indicator;
- sewage comminuting and disinfecting system, including storage tank;
- sewage treatment plant that is approved according to MEPC.2(VI), Recommendation on international effluent standards and guidelines for performance tests for sewage treatment plants.

Passenger ships deal with large amounts of wastewater and are often operating in protected areas. Therefore, onboard cruise ship treatment plants often use the principles of membrane filtration or reverse osmosis (or both).

In MARPOL 73/78 Annex IV, different regulations concerning handling of sewage are defined. IMO's MEPC has defined additional amendments with more detailed information:

- MEPC.2(VI), Actual criteria for testing of sewage treatment plants;
- MEPC.115(51), Revision of the regulations in MARPOL Annex IV;
- MEPC.157(55), Standards for the rate of discharge of untreated sewage;
- MEPC.159(55), Criteria for sewage treatment plants built after January 2010

### Document review

- Technical drawings of sewage system.
- IMO International Sewage Pollution Prevention (ISPP) certificate.
- International Safety Management (ISM) manual.
- Sewage management plan (if available).
- Maintenance instructions of sewage treatment plant (if installed).

### References

#### **International conventions**

ILO, Maritime Labour Convention 2006.

IMO, International Convention for the Prevention of Pollution from Ships 1973. (modified by the protocol of 1978 relating thereto [MARPOL 73/78]).

#### **Scientific literature**

Rooney RM et al. (2004). A review of outbreaks of foodborne disease associated with passenger ships: evidence for risk management. *Public Health Reports*, 119:427–434.

#### **Guidelines and standards**

ISO 14726-2:2008. *Ships and marine technology—Identification colours for the content of piping systems—Part 2: Additional colours for different media and/or functions*. Geneva, ISO, 2009.

WHO (2011). *Guide to ship sanitation*, 3rd ed. Geneva, WHO.

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>10.1 Document review</b>				
10.1.1 <input type="checkbox"/>	ISPP certificate is more than 5 years old, does not exist, or is issued in neither English nor French.	Conduct renewal survey of the whole sewage system and obtain a new ISPP certificate. Inform the competent authority (e.g. Port State Control).	<input type="checkbox"/>	
10.1.2 <input type="checkbox"/>	Regulations for familiarization of the sewage treatment plant operation for ship personnel do not exist.	Incorporate instructions for operation and maintenance of the sewage system into ISM manual.		<input type="checkbox"/>
10.1.3 <input type="checkbox"/>	No technical drawings available.	Prepare technical drawings for the next inspection.		<input type="checkbox"/>
10.1.4 <input type="checkbox"/>	No operation and maintenance instruction manual available.	Provide maintenance instructions for the next inspection.	<input type="checkbox"/>	
10.1.5 <input type="checkbox"/>	Sewage not included in the waste management plan, or no waste management plan exists.	Develop a waste management plan that includes procedures for the handling of sewage.		<input type="checkbox"/>
<b>10.2 Sewage from the galley or pantries</b>				
10.2.1 <input type="checkbox"/>	Sink drain (for food preparation or dishwashing) directly connected to the wastewater system.	Install sufficient backflow prevention (e.g. air gaps).		<input type="checkbox"/>
		Install signs that advise strict cleaning of the sink before any food is prepared there.		<input type="checkbox"/>
10.2.2 <input type="checkbox"/>	Drain pipes of ice machines, dishwashing machines or food refuse grinders directly connected to wastewater system, and not equipped with appropriate backflow prevention.	Install sufficient backflow prevention (e.g. air gaps) at dishwashing machine.		<input type="checkbox"/>
		Install sufficient backflow prevention (e.g. air gaps) at ice machines.		<input type="checkbox"/>
		Install air gaps or mechanical backflow preventers at garbage grinders and food-waste systems.		<input type="checkbox"/>
10.2.3 <input type="checkbox"/>	No grease interceptors installed between galley wastewater system and sewage system; or grease interceptors are overflowing, dirty or otherwise insufficiently maintained.	Install grease interceptors between the galley wastewater system and the sewage system.		<input type="checkbox"/>
		Clean grease interceptors regularly and dispose of collected grease.		<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>10.3 Sewage from medical areas</b>				
10.3.1 <input type="checkbox"/>	Technical drawing or physical inspection of the sewage system shows that liquids from medical areas (e.g. drains, showers, bathtubs, washing bowls, toilets) are not drained into the sewage system.	Change the construction so that all sewage from medical areas goes into the sewage system.	<input type="checkbox"/>	
<b>10.4 Sewage from public and common bathrooms, hand-wash stations and toilets</b>				
10.4.1 <input type="checkbox"/>	Insufficient deck drains connected to the sewage system.	Install sufficient deck drainage that is connected to the sewage system.		<input type="checkbox"/>
10.4.2 <input type="checkbox"/>	Sewage and bathwater are clogged, or there is visible or reported backflow.	Clean and unclog the drains and pipes.		<input type="checkbox"/>
		Install piping of adequate size.		<input type="checkbox"/>
10.4.3 <input type="checkbox"/>	Toilet or flushing system not working properly.	Repair toilet or flushing system (or both).	<input type="checkbox"/>	
10.4.4 <input type="checkbox"/>	Technical drawing or physical inspection of the sewage system shows that bathrooms or toilets are located on a deck that forms the top of potable water tanks.	Close affected bathroom(s) or toilet(s). Disconnect all piping (sewage and potable water) close to main pipes to avoid harmful stagnation.		<input type="checkbox"/>
<b>10.5 Cargo holds</b>				
10.5.1 <input type="checkbox"/>	Cargo-hold drainage or refrigerated cargo spaces are directly connected to the sewage system.	Connect these drains to a common drainage system that is separate from any sewage system.		<input type="checkbox"/>
<b>10.6 Animal excrement</b>				
10.6.1 <input type="checkbox"/>	No drains of sufficient size installed and connected to a holding tank or a treatment system.	Install suitable drainage to avoid any pooling or spilling of animal excrement.		<input type="checkbox"/>
		Install a holding tank with the appropriate capacity to store sewage until ship can safely discharge the sewage.		<input type="checkbox"/>
<b>10.7 Piping system</b>				
10.7.1 <input type="checkbox"/>	Colour coding missing at the piping (e.g. in black–blue–black every 5 m).	Suitable colour coding has to be painted onto the piping at least every 5 m (e.g. black–blue–black according to ISO 14726:2008).	<input type="checkbox"/>	
10.7.2 <input type="checkbox"/>	Pipes not well maintained; they are clogged, of inadequate size or leaking	Clean and maintain the piping.		<input type="checkbox"/>
		Repair leakage immediately.	<input type="checkbox"/>	
		Install piping of adequate size.		<input type="checkbox"/>
10.7.3 <input type="checkbox"/>	Cross-connections to other systems containing liquid are found, or sewage pipes are leading through potable water tanks or are connected to potable water piping.	Remove all cross-connections.	<input type="checkbox"/>	
		Remove all piping in the tanks that do not contain potable water.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
10.7.4 <input type="checkbox"/>	Drain lines carrying sewage and grey water are passing directly over: <ul style="list-style-type: none"> <li>• galleys, buffets or bars;</li> <li>• food preparation or serving areas;</li> <li>• food equipment or utensil washing areas;</li> <li>• food storage areas.</li> </ul>	Change piping arrangement; drain lines should not pass over critical areas.	<input type="checkbox"/>	<input type="checkbox"/>
<b>10.8 Sewage holding tank</b> (mandatory for all ships >400 tons gross tonnage or with ≥15 persons on board)				
10.8.1 <input type="checkbox"/>	No sewage holding tank available.	Install sewage holding tank in isolated position (cofferdam and coaming), and of sufficient size and material. Equip with a level indicator, high level alert, cleaning access and an overflow system.	<input type="checkbox"/>	<input type="checkbox"/>
10.8.2	<i>Identification and capacity</i> Tank is not identified, or the tank capacity: <ul style="list-style-type: none"> <li>• is unlabelled;</li> <li>• is insufficient;</li> <li>• does not correspond to the ISPP certificate</li> </ul>	Place a sign on the tank and label with the words "Sewage-holding tank".	<input type="checkbox"/>	<input type="checkbox"/>
		Label tank clearly with the correct tank capacity in m <sup>3</sup> .	<input type="checkbox"/>	<input type="checkbox"/>
		Install holding tank with sufficient capacity (at least 114 liter per person per day, or according to the Helsinki Commission [HELCOM] Recommendation 10/11).	<input type="checkbox"/>	<input type="checkbox"/>
		Renew ISPP certificate. Inform the authorized authority (e.g. Port State Control).	<input type="checkbox"/>	<input type="checkbox"/>
10.8.3	<i>Leakage and overflow</i> Tank not in an isolated position (no cofferdam) or sharing a common wall with potable water tanks.	Install tank in an isolated position that does not share a common wall with potable water tanks. Surround tank with a cofferdam.	<input type="checkbox"/>	<input type="checkbox"/>
		Install coaming around tank to avoid spread of spillage.	<input type="checkbox"/>	<input type="checkbox"/>
	Tank not secured against overflow or leakage by coaming.	Install easily visible level indicator on the outside of the tank.	<input type="checkbox"/>	<input type="checkbox"/>
		Install a high-level alert.	<input type="checkbox"/>	<input type="checkbox"/>
	Tank has no visual level indicator, or no high-level alert installed (or both).	Clean and disinfect the contaminated area.	<input type="checkbox"/>	<input type="checkbox"/>
		Install tank with sufficient capacity (if the reason for overflow is insufficient tank capacity).	<input type="checkbox"/>	<input type="checkbox"/>
		Repair leaks.	<input type="checkbox"/>	<input type="checkbox"/>
10.8.4	No or inadequate ventilation of the tanks.	Install a vent on the tank.	<input type="checkbox"/>	<input type="checkbox"/>
		Lead emissions to the outside of the ship, away from any air intakes.	<input type="checkbox"/>	<input type="checkbox"/>

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>10.9 Comminuting and disinfection plant (if installed)</b>				
10.9.1 <input type="checkbox"/>	Comminuting and disinfection system has no type approval, is more than 5 years old, or is not displaying the test results of the sample taken after disinfection, or the ISPP certificate is not available.	Install type-approved system.	<input type="checkbox"/>	
		Renew ISPP certificate. Inform authorized authority.	<input type="checkbox"/>	
		Take samples to determine the efficiency of the disinfection unit.	<input type="checkbox"/>	
10.9.2 <input type="checkbox"/>	<i>Identification and capacity:</i> Plant not identifiable. Tank capacity: • is not labelled; • is insufficient to hold comminuted and disinfected sewage while the ship is less than 3 nautical miles away from nearest land; or • does not correspond to the ISPP certificate.	Install an additional holding tank to store disinfected and comminuted effluent of the treatment plant.	<input type="checkbox"/>	
		Make tank clearly identifiable with sign, and label with the words "Comminuting and disinfection plant".	<input type="checkbox"/>	
		Label tank clearly with the correct tank capacity in m <sup>3</sup> .	<input type="checkbox"/>	
10.9.3 <input type="checkbox"/>	Not enough disinfectant to operate the system during the next voyage.	Store enough disinfectant to operate the treatment system for at least two complete voyages.	<input type="checkbox"/>	
10.9.4 <input type="checkbox"/>	Ship personnel have insufficient knowledge about operation and maintenance of the comminuting and disinfection plant.	Train technical staff in the operation and maintenance of the sewage system.	<input type="checkbox"/>	
		Train staff in the operation and maintenance of the sewage system according to the ISM manual.	<input type="checkbox"/>	
<b>10.10 Sewage treatment plant (if installed)</b>				
10.10.1 <input type="checkbox"/>	Sewage treatment plant has no type approval, is more than 5 years old or is not displaying test results, or the ISPP certificate is not available.	Install type-approved system.	<input type="checkbox"/>	
		Inform authorized authority to renew the ISPP certificate.	<input type="checkbox"/>	
10.10.2 <input type="checkbox"/>	Treatment plant in inoperable condition or bypassed.	Turn on sewage treatment plant.	<input type="checkbox"/>	
		Store all sewage in a suitable holding tank, or discharge sewage to an official port reception facility.	<input type="checkbox"/>	
		Repair or maintain sewage treatment plant before discharging treated sewage into waterbodies or the open sea.	<input type="checkbox"/>	

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
10.10.3	<p>Treatment plant appears to be in an unsatisfactory condition; for example:</p> <ul style="list-style-type: none"> <li>• it is switched off or bypassed;</li> <li>• the aerators for the biological compartment are not working;</li> <li>• there is too much sludge in the compartments;</li> <li>• there is no disinfectant available;</li> <li>• the treated effluent shows visible pieces;</li> <li>• there is a strong, conspicuous smell or explicit colour (note: a slightly brown or yellow colour is harmless);</li> <li>• the drain valve for the biofilter or settling tank is open or broken.</li> </ul>	Turn on sewage treatment plant; treat all sewage before discharge.	<input type="checkbox"/>	
		Perform maintenance works according to manufacturer's instructions to obtain required effluent standard.	<input type="checkbox"/>	
		Do not discharge effluent closer than 12 nautical miles to the coastline until all problems are fixed.	<input type="checkbox"/>	
		Repair the aerators.	<input type="checkbox"/>	
		Refill with suitable disinfectant according to manufacturer's instructions.	<input type="checkbox"/>	
		Take samples for microorganism analysis according to MEPC regulation.	<input type="checkbox"/>	
		Remove excess sludge from the tanks and discharge it to an official port reception facility.	<input type="checkbox"/>	
		Clean, inspect and repair the tanks according to the manufacturer's instructions, when required (e.g. every 6 months).		<input type="checkbox"/>
10.10.4	No sampling point available or it is not suitable for sampling.	Install metal sampling point at treated effluent outlet.	<input type="checkbox"/>	
10.10.5	No or inadequate ventilation of the tanks.	Install a vent on the tank.		<input type="checkbox"/>
		Direct emissions to the outside of the ship, away from any air intakes.	<input type="checkbox"/>	
<b>10.11 Discharge</b>				
10.11.1 <input type="checkbox"/>	Untreated sewage has been discharged into the port basin, the river or another protected area.	Stop discharging immediately and report the incident to the port authority	<input type="checkbox"/>	
10.11.2 <input type="checkbox"/>	Overboard valve open or broken.	Close or repair valve immediately.	<input type="checkbox"/>	
10.11.3 <input type="checkbox"/>	Pipes that may discharge untreated sewage, residues from sewage treatment and sewage from holding tanks directly into the port basin are not closed.	Close all pipe valves immediately.	<input type="checkbox"/>	
10.11.4 <input type="checkbox"/>	Excess sludge from tanks or treatment plants is not appropriately stored for eventual disposal to land-based facilities or open sea.	Store excess sludge in appropriate tanks until eventual discharge to port-reception facilities or open sea.		<input type="checkbox"/>



Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
10.11.5	MARPOL 73/78 discharge rules not known, or national discharge rules for the actual port or surrounding waters not known.	Train appropriate personnel in MARPOL 73/78 regulations or national port regulations, and implement these procedures into the ISM manual.		<input type="checkbox"/>
10.11.6	Pipeline suitable for the discharge of sewage to a reception facility is missing; the discharge shore connection does not meet requirements of MARPOL 73/78 Annex IV; or a quick-closing coupling is used but has not been agreed to by the administration.	Install suitable pipeline to allow sanitary discharge of sewage to port reception facilities.	<input type="checkbox"/>	
		Install discharge connections with standard flange(s) according to MARPOL 73/78 Annex IV.	<input type="checkbox"/>	
<b>10.12 Discharge hoses</b>				
10.12.1 <input type="checkbox"/>	Sewage discharge hoses not available; hoses not made of durable, impervious material with a smooth interior surface; or not labelled as sewage discharge hoses.	Order suitable sewage discharge hoses, made of durable, impervious material, with a smooth interior surface.		<input type="checkbox"/>
		Label sewage discharge hoses with the words "For waste discharge only" to avoid accidental cross-contamination.		<input type="checkbox"/>
10.12.2 <input type="checkbox"/>	Hoses are in dirty condition; they appear not to be cleaned and disinfected.  Hoses are not stored in a designated convenient place, or are stored together with potable water equipment.	Clean, flush and disinfect sewage discharge hoses after each use.		<input type="checkbox"/>
		Store sewage discharge hoses at a dedicated place, labelled with the words "Waste discharge hose".		<input type="checkbox"/>
		Clean and disinfect the storage place.		<input type="checkbox"/>
		Do not store any potable water hose or equipment together with sewage discharge hoses.	<input type="checkbox"/>	
<b>10.13 Bilge</b>				
10.13.1 <input type="checkbox"/>	Sewage, rodent excrement, food particles, putrescible matter or toxic substances found in the bilge.	Discharge the bilge water to a port-reception facility. Clean the bilge.		<input type="checkbox"/>
		Check all parts of the sewage system for leakage and overflow.	<input type="checkbox"/>	
		Perform deratting measures if rodent excrement is found.	<input type="checkbox"/>	
10.13.2 <input type="checkbox"/>	Grey water regularly discharged into the bilge.	Collect grey water in the holding tank, lead it into the disinfection compartment of the sewage treatment plant or discharge it overboard according to local and international regulations.	<input type="checkbox"/>	

# Area 11 Ballast water

## Introduction

Studies carried out in several countries have demonstrated that many species of bacteria, plants and animals are able to survive as “stowaways” in the ballast water and sediments carried by ships, even over long ocean voyages. Discharge of the ballast water and sediments in port waters can result in the establishment of harmful aquatic organisms and pathogenic agents that may pose a threat to human life, the environment and ecosystem balance.

Ships transporting large amounts of cargo (e.g. bulk ships or container ships) need to control their balance during cargo operations. Therefore, large amounts of ballast water are pumped into or out of the ship. For example, if a ship arrives in a port with empty cargo holds, the ship is “in ballast”, which means that several hundred tonnes of ballast water are in the ballast-water tanks in order to stabilise the ship while crossing the ocean. During loading operations, the ballast water has to be pumped into the port basin to keep the ship stable.

## International standards and recommendations

The IMO’s International Convention for the Control and Management of Ships’ Ballast Water and Sediments was adopted on 13 February 2004. The convention entered into force 12 months after ratification by 30 states, representing 35% of the world’s merchant-shipping tonnage (Article 18, Entry into force).

The specific requirements for ballast-water management are contained in Regulation B-3, Ballast water management for ships:

- Ships constructed before 2009 with a ballast-water capacity of between 1,500 and 5,000 m<sup>3</sup> must conduct ballast-water management that at least meet the ballast-water exchange standards or the ballast-water performance standards until 2014, after which it shall at least meet the ballast-water performance standard.
- Ships constructed before 2009 with a ballast water capacity of <1,500 m<sup>3</sup> or >5,000 m<sup>3</sup> must conduct ballast-water management that at least meets the ballast-water exchange standards or the ballast-water performance standards until 2016, after which time it shall at least meet the ballast-water performance standard.
- Ships constructed in or after 2009 with a ballast-water capacity of < 5,000 /m<sup>3</sup> must conduct ballast-water management that at least meets the ballast-water performance standard.
- Ships constructed in or after 2009, but before 2012, with a ballast-water capacity of ≥ 5,000 /m<sup>3</sup> shall conduct ballast-water management that at least meets the standard described in regulation D-1 or D-2 until 2016, and at least the ballast-water performance standard after 2016.
- Ships constructed in or after 2012 with a ballast-water capacity of ≥ 5,000 /m<sup>3</sup> shall conduct ballast-water management that at least meets the ballast-water performance standard.

Specific indicators for the ballast-water exchange standard and ballast-water performance standard are found in Annex D, Standards for ballast-water management, of the IMO International Convention for the Control and Management of Ships’ Ballast Water and Sediments, and are described below.

Regulation D-1, Ballast water exchange standard:

Ships performing ballast-water exchange shall do so with an efficiency of 95% volumetric exchange of ballast water. For ships exchanging ballast water by the pumping-through method,

three times the volume of each ballast water tank must be pumped through to meet the described standard. Pumping through less than three times the volume may be accepted, provided the ship can demonstrate that at least 95% volumetric exchange is met.

Regulation D-2, Ballast water performance standard:

Ships conducting ballast-water management shall discharge:

- <10 viable organisms/m<sup>3</sup> ≥50 µm in dimension;
- <10 viable organisms/ml <50 µm in dimension and ≥10 µm in dimension.

Also, discharge of the indicator microbes shall not exceed the specified concentrations.

The indicator microbes, as a human health standard, include, but are not limited to:

- toxicogenic *Vibrio cholerae* (O1 and O139) with <1 colony forming unit (cfu)/100 ml or <1 cfu/g (wet weight) of zooplankton samples;
- *Escherichia coli* <250 cfu/100 ml; and
- intestinal enterococci <100 cfu/100 ml.

Ballast-water management systems must be approved by the administration and accord with the IMO guidelines (Regulation D-3, Approval requirements for ballast water management systems). These include systems that make use of chemicals or biocides; make use of organisms or biological mechanisms; or alter the chemical or physical characteristics of the ballast water.

IMO guidelines for uniform implementation of the ballast water management convention:

Guidelines for sediments reception facilities (G1)

Guidelines for ballast water sampling (G2)

Guidelines for ballast water management equivalent compliance (G3)

Guidelines for ballast water management and development of ballast water management plans (G4)

Guidelines for ballast water reception facilities (G5)

Guidelines for ballast water exchange (G6)

Guidelines for risk assessment under Regulation A-4 (G7)

Guidelines for approval of ballast water management systems (G8)

Procedure for approval of BWM systems that make use of active substances (G9)

Guidelines for approval and oversight of prototype ballast water treatment technology programmes (G10)

Guidelines for ballast water exchange design and construction standards (G11)

Guidelines on design and construction to facilitate sediment control on ships (G12)

Guidelines for additional measures regarding ballast water management including emergency situations (G13)

Guidelines on designation of areas for ballast water exchange (G14)

### Main risks

The problem of invasive species is largely due to the expanded trade and traffic volume over the past few decades. The effects in many areas of the world have been devastating. Quantitative data show that the rate of bio-invasions is increasing at an alarming rate, sometimes exponentially, and new areas are being invaded all the time. Seaborne trade continues to increase, and the problem may not yet have reached its peak.

Specific examples include the introduction of the European zebra mussel (*Dreissena polymorpha*) into the Great Lakes between Canada and the United States, resulting in billions of dollars being spent on pollution control and cleaning the underwater structures and water pipes; and the introduction of the American comb jelly (*Mnemiopsis leidyi*) to the Black and Azov seas, causing the near extinction of anchovy and sprat fisheries.

There are also public health risks; some cholera epidemics appear to be directly associated with ballast water in South America, the Gulf of Mexico and other areas.

## Sampling

The standards of the IMO Guidelines MEPC 58/23 Annex 3, Draft guidelines for ballast water sampling (G2), can be used as a major reference for sampling ballast water, if necessary, for the assessment of existing public health risks.

The objectives of these guidelines are to provide the States Parties authorities, including Port State Control officers, with practical and technical guidance on ballast-water sampling and analysis for the purpose of determining whether the ship has complied with the ballast water management convention according to article 9, Inspection of ships, and with Regulations D-1 or D-2.

For this purpose, samples should be taken from the discharge line, as near to the point of discharge as practicable, during ballast-water discharge, whenever possible. In cases where the ballast system design does not enable sampling from the discharge line, other sampling arrangements may be necessary. Sampling via maintenance openings, sounding pipes or air pipes is not the preferred approach for assessing compliance with Regulation D-2.

Any sampling protocol for compliance testing under the ballast water management convention should observe the following principles to help ensure consistency of approach between parties and to provide certainty to the shipping industry:

- The sampling protocol should be in line with these guidelines.
- The sampling protocol should result in samples that are representative of the whole discharge of ballast water from any single tank or any combination of tanks being discharged.
- The sampling protocol should consider the potential for a suspended sediment load in the discharge to affect sample results.
- The sampling protocol should provide for samples to be taken at appropriate discharge points.
- The quantity and quality of samples taken should be sufficient to demonstrate whether the ballast water being discharged meets the relevant standard.
- Sampling should be undertaken in a safe and practical manner.
- Samples should be a manageable size.
- Samples should be taken, sealed and stored to ensure that they can be used to test for compliance with the convention.
- Samples should be fully analysed within the test method's holding-time limits by an accredited laboratory.
- Samples should be transported, handled and stored with consideration of the chain of custody.

Before testing for compliance with Regulation D-2, it is recommended that, as a first step, a representative sample of ballast-water discharge be taken to establish whether a ship is potentially compliant or non-compliant. Such a test could help the State Party identify immediate mitigation measures, within its existing powers, to avoid any additional impact from a possible non-compliant ballast-water discharge from the ship.

In emergency or epidemic situations, port states may use alternative sampling methods that may need to be introduced at short notice. Ships entering ports under their jurisdiction need to be told about these sampling methods. In such situations, they may not necessarily notify WHO, but such notification could be beneficial for other parties.

## Document review

- Construction drawings of ballast-water reporting system.
- IMO's ballast water reporting form.
- International safety management manual.
- Maintenance instructions for ballast-water treatment plant.

## References

### **International conventions**

IMO (2007), International Convention for the Control and Management of Ships' Ballast Water and Sediments.

Resolution MEPC. 152(55) *Guidelines for sediments reception facilities* (G1). London, IMO, 2005.

Resolution MEPC.123(53) *Guidelines for ballast water management equivalent compliance* (G3). London, IMO, 2005.

Resolution MEPC.124(53) *Guidelines for ballast water exchange* (G6). London, IMO, 2005.  
Resolution MEPC.127(53) *Guidelines for ballast water management and development of ballast water management plans* (G4). London, IMO, 2005.

Resolution MEPC.140(54) *Guidelines for approval and oversight of prototype ballast water treatment technology programmes* (G10). London, IMO, 2006.

Resolution MEPC.149(55) *Guidelines for ballast water exchange design and construction standards* (G11). London, IMO, 2006.

Resolution MEPC.150(55) *Guidelines on design and construction to facilitate sediment control on ships* (G12). London, IMO, 2006.

Resolution MEPC.151(55) *Guidelines on designation of areas for ballast water exchange* (G14). London, IMO, 2006.

Resolution MEPC.153(55) *Guidelines for ballast water reception facilities* (G5). London, IMO, 2006.

Resolution MEPC.161(56) *Guidelines for additional measures regarding ballast water management including emergency situations* (G13). London, IMO, 2007.

Resolution MEPC.162(56) *Guidelines for risk assessment under Regulation A-4 of the BWM Convention* (G7). London, IMO, 2007.

Resolution MEPC.169(57) *Procedure for approval of ballast water management systems that make use of active substances*. London, IMO, 2008.

Resolution MEPC.173(58) *Guidelines for ballast water sampling* (G2). London, IMO, 2008.

Resolution MEPC.174(58) *Guidelines for approval of ballast water management systems* (G8). London, IMO, 2008.

Resolution MEPC.175(58) *Information reporting on type approved ballast water management systems*. London, IMO, 2008.

Resolution MEPC.188(60) *Installation of ballast water management systems on new ships in accordance with the application dates contained in the Ballast Water Management Convention (BWM Convention)*. London, IMO, 2010.

### **Scientific literature**

McCarthy SA, Khambaty FM (1994). International dissemination of epidemic *Vibrio cholerae* by cargo ship ballast and other non-potable waters. *Applications in Environmental Microbiology*, 60:2597–2601.

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>11.1 Management</b>				
11.1.1 <input type="checkbox"/>	IMO ballast-water record book not available.	Provide a complete ballast-water record book.	<input type="checkbox"/>	
11.1.2 <input type="checkbox"/>	Ballast-water management plan (BWMP) not available.	Develop the BWMP according to IMO guidelines.		<input type="checkbox"/>
		Implement all procedures as defined in the BWMP.		<input type="checkbox"/>
11.1.3 <input type="checkbox"/>	Ballast-water treatment plants installed but no technical information available.	Provide technical information on the ballast-water treatment for next inspection.		<input type="checkbox"/>
<b>11.2 Ballast-water exchange and treatment</b>				
11.2.1 <input type="checkbox"/>	No ballast-water exchange in the open sea has been performed, no onboard treatment system is available or no onboard treatment is performed.	Close all discharge valves immediately.	<input type="checkbox"/>	
		Notify the proper authority (e.g. harbour police or Port State Control).	<input type="checkbox"/>	
		Discharge, if necessary, under the supervision of the proper authority.	<input type="checkbox"/>	
11.2.2 <input type="checkbox"/>	Salinity test indicates that water has not been exchanged in the open sea.	Inform the proper authority to collect samples for assessing the risk of harmful aquatic organisms and pathogens in the water.	<input type="checkbox"/>	
11.2.3 <input type="checkbox"/>	Treatment plant not approved by IMO.	Close discharge lines and valves.		<input type="checkbox"/>
		Discharge, if necessary, under supervision of the proper authority.		<input type="checkbox"/>
		Notify proper authority (e.g. the harbour police or Port State Control).		<input type="checkbox"/>
<b>11.3 Discharge</b>				
11.3.1 <input type="checkbox"/>	Untreated or unexchanged ballast water has been or is discharged into the port basin, the river or another protected area.	Stop discharge operation immediately and notify proper authority (e.g. the harbour police or Port State Control).	<input type="checkbox"/>	

## Area 12 Cargo holds

### Introduction

Factors contributing to onboard public health risks include the design, construction, management and operation of the cargo holds. Some public health risks can be carried from one country to another via contaminated or infested cargo loaded into holds, onboard contamination or vector infestation of cargo, and inadequate or insufficient onboard preventive and control measures.

Holds should be empty for inspection. According to IMO Resolution A.864(20) and the Manual on loading and unloading of solid bulk cargoes for terminal representatives (BLU Code), 2008 edition, special precautions should be taken before entering enclosed spaces aboard ships. There could be a risk of an unsafe atmosphere in ships' holds, particularly where the cargo has been fumigated in passage, and/or has oxygen-depleting characteristics, or flammable or toxic vapours. Hold inspections should be carried out as soon as unloading of a hold is completed and it is safe to enter.

### International standards and recommendations

#### **IMO Recommendations for entering enclosed spaces aboard ships [resolution A.864(20)]**

##### 3 Assessment

3.2 The procedures to be followed for testing the atmosphere in the space and for entry should be decided on the basis of the preliminary assessment. These will depend on whether the risk assessment shows that:

1. there is minimal risk to the health or life of personnel entering the space;
2. there is no immediate risk to health or life, but a risk could arise during the course of work in the space; and
3. a risk to health or life is identified.

Where the preliminary assessment indicates minimal risk to health or life, or potential for risk to arise during the course of work in the space, the precautions described in 4, 5, 6 and 7 should be followed as appropriate.

Where the preliminary assessment identifies risk to life or health, and if entry is necessary, the additional precautions specified in section 8 should also be followed.

##### 9.5 Fumigation

When a ship is fumigated, the detailed recommendations contained in the recommended use of pesticides in ships should be followed. Spaces adjacent to fumigated spaces should be treated as if fumigated.

#### **IMO I267:2008, Manual on loading and unloading of solid bulk cargoes for terminal representatives (BLU Code), 2008 edition**

This manual comprises regulations to prevent pollution from household garbage and other solid waste. The annex defines the different types of waste that are to be regarded as garbage, the distance from land where they are allowed to be discharged and in what way.

#### **International Convention for the Prevention of Pollution from Ships 1973 (modified by the protocol of 1978 relating thereto [MARPOL 73/78])**

According to this convention, the following types of waste are regarded as garbage from cargo holds: dunnage, broken pallets, lashings, ropes and covers.

***IMO SOLAS XII/6.5.1—Protection of cargo holds from loading/dischARGE equipment and SOLAS XII/6.5.3—Failure of cargo hold structural members and panels***

**Main risks**

Main public health risks on board include the design, construction, management and operation of the cargo holds. Some public health risks can be carried from one country to another via contaminated or infested cargo loaded into holds, onboard contamination or vector infestation of cargo, and inadequate or insufficient onboard preventive and control measures.

**Document review**

- Management plans.
- Operational procedures.
- Confined-space entry procedures and records.
- Lock-out and tag-out procedures.
- Material Safety Data Sheets.
- Construction drawings (including drainage).
- Ventilation system drawings.
- Vector control records.
- Cleaning schedule.

**References**

**International conventions**

IMO, International Convention for the Safety of Life at Sea (SOLAS), Regulation XII/6.5.1. London, IMO, 1974.

IMO, 1267:2008 *Manual on loading and unloading of solid bulk cargoes for terminal representatives*. London, IMO, 2008.

IMO, *Recommendations for entering enclosed spaces aboard ships*. London, IMO, 1997.



Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>12.1 Operational procedures</b>				
12.1.1 <input type="checkbox"/>	Absent or ineffective operational procedures for controlling public health risks according to the characteristics and forms of cargo on board.	Lay out operational procedures to proactively control public health risks to staff, travellers and communities that could be affected by ships and cargoes arriving in port.		<input type="checkbox"/>
		Develop appropriate management plans.		<input type="checkbox"/>
<b>12.2 Construction, design and layout</b>				
12.2.1 <input type="checkbox"/>	Construction, design and layout predispose to probable failure of public health risk controls.	Perform measures to correct construction, design and layout to make them suitable for intended purpose.		<input type="checkbox"/>
12.2.2 <input type="checkbox"/>	Ingress of contaminated materials, liquids, gases, foreign material or vectors found.	Perform disinfection, disinsection or deratting if contamination is evident.	<input type="checkbox"/>	
		Separate cargo suspected or showing signs of contamination or deterioration.		<input type="checkbox"/>
<b>12.3 Cleaning and maintenance</b>				
12.3.1 <input type="checkbox"/>	Construction materials and design do not facilitate cleaning, and/or construction design aids harbouring of vectors.	Correct design deficiencies, and reconstruct using materials that facilitate cleaning and decontamination.		<input type="checkbox"/>
		Discard or isolate contaminated items.	<input type="checkbox"/>	
12.3.2 <input type="checkbox"/>	Evidence of vectors and/or reservoirs found.	Perform immediate disinfection, disinsection or deratting.	<input type="checkbox"/>	
<b>12.4 Equipment for controlling environmental conditions</b>				
12.4.1 <input type="checkbox"/>	Absent, inadequate or ineffective equipment necessary for controlling environmental conditions according to type of cargo.	Correct equipment deficiencies and write procedures to ensure effective operational practices.		<input type="checkbox"/>
<b>12.5 Drainage</b>				
12.5.1 <input type="checkbox"/>	Drains not independent of each other and of all other drainage systems.	Correct deficiencies and ensure that drains are independent of each other and of all other drainage systems.	<input type="checkbox"/>	
12.5.2 <input type="checkbox"/>	Drains connected to a drain that receives human sewage or medical waste.	Separate drain from any drainage system carrying human or medical waste.	<input type="checkbox"/>	
12.5.3 <input type="checkbox"/>	Drain lines do not discharge to open drain wells.	Drain lines to discharge to open drain wells with an air gap.	<input type="checkbox"/>	
<b>12.6 Ventilation</b>				
12.6.1 <input type="checkbox"/>	Service outlet of the cold-air or hot-air system (or both) serves more than one compartment.	Install separate ducts for ventilation, air-conditioning and heating systems.		<input type="checkbox"/>
		Separate the service outlets for each compartment.		<input type="checkbox"/>
12.6.2 <input type="checkbox"/>	Evidence of vectors and/or reservoirs found.	Vector-proof the ducts extending from the weather deck directly to the cargo holds, engine room and boiler rooms, with no horizontal extensions, at either end.		<input type="checkbox"/>
		Perform immediate disinfection, disinsection or deratting.	<input type="checkbox"/>	

# Area 13 Other systems and areas

## Introduction

There are other systems and areas that also present health concerns. Vectors pose a major risk to the health of passengers and crew members. On board, mosquitoes, rats, mice, cockroaches, flies, lice and rat fleas are all capable of transmitting disease. Also, rodents are well established at port areas and are considered vectors for many diseases, such as plague, murine typhus, salmonellosis, trichinosis, leptospirosis and rat-bite fever. Monitoring and control of vectors and reservoirs is necessary to maintain health on ships.

Standing water caused by heavy rainfall or overflow can act as breeding sites for mosquitoes. This can then increase the potential for exposure to vector-borne diseases such as dengue fever, malaria and West Nile fever.

Washing machines and laundry facilities are indispensable to ships, according to C92 Accommodation of Crews Convention (Revised) 1949. This document contains detailed minimum standards for the location, construction, arrangement and equipment of such facilities, including sanitary facilities.

Drainage from laundries is categorized as grey water, under Annex V of the International Convention for the Prevention of Pollution from Ships 1973 (modified by the protocol of 1978 relating thereto [MARPOL 73/78]). Under the previous Garbage Pollution Prevention Regulations, liquefied galley wastes were not considered to be waste, and there were therefore no restrictions on their discharge as long as they did not contain a pollutant as described in the MARPOL 73/78 regulations. Although grey water generally poses less harm than, for example, black water, grey water can on occasion contain some harmful constituents, such as detergent residues and chlorine from bleach in laundry discharges.

## International standards and recommendations

### **International Health Regulations (IHR) (2005)**

Article 24, Conveyance operators:

States Parties shall take practicable measures consistent with these regulations to ensure that conveyance operators:

- (a) comply with the health measures recommended by WHO and adopted by the State Party;
- (b) inform travellers of the health measures recommended by WHO and adopted by the State Party for application on board; and
- (c) permanently keep conveyances for which they are responsible free from sources of infection or contamination, including vectors and reservoirs. The application of measures to control sources of infection or contamination may be required if evidence is found.

Annex 1B, To provide as far as practicable a programme and trained personnel for the control of vectors and reservoirs in and near points of entry.

Annex 5, Specific measures for vector-borne diseases.

### **ILO Maritime Labour Convention 2006**

Regulation 3.1, Accommodation and recreational facilities.

Standard A3.1, Accommodation and recreational facilities.

13. Appropriately situated and furnished laundry facilities shall be available.

Regulation 3.1, Accommodation and recreational facilities

Guideline B3.1.7, Sanitary accommodation

4. The laundry facilities provided for seafarers' use should include:

(a) washing machines;

(b) drying machines or adequately heated and ventilated drying rooms; and

(c) irons and ironing boards or their equivalent.

## **ILO C92 Accommodation of Crews Convention (Revised) 1949**

### **Article 13:**

12. In all ships, facilities for washing and drying clothes shall be provided on a scale appropriate to the size of the crew and the normal duration of the voyage.

13. The facilities for washing clothes shall include suitable sinks, which may be installed in wash rooms, if separate laundry accommodation is not reasonably practicable, with an adequate supply of cold fresh water and hot fresh water or means of heating water.

14. The facilities for drying clothes shall be provided in a compartment separate from sleeping rooms and mess rooms, adequately ventilated and heated and equipped with lines or other fittings for hanging clothes.

### **Main risks**

Many diseases are transmitted to humans via vectors such as rats, mosquitoes, mice, cockroaches, flies, lice and rat fleas. If not properly controlled, these vectors could board ships, and then breed and be carried overseas. This would represent serious health risks to the crew and passengers. Moreover, persons and vectors on board can, in turn, spread disease to ports in other countries.

For example, standing water on board the ship or on its lifeboats provide a habitat for mosquitoes to lay eggs. Adult mosquitoes will emerge from the standing water, and these adults will lay additional eggs during their life-cycle. If standing water persists for long periods, or is replenished by repeated heavy rain or overflow, increased mosquito production may continue for several weeks or months. If not effectively controlled, mosquitoes could be carried by ship and spread infectious disease via international travel.

Other risks include exposure to blood or other potentially infectious materials through contaminated objects that were improperly handled during housekeeping; for instance, the housekeeping staff contact contaminated laundry because they were not wearing appropriate personal protective equipment (PPE). Finally, the presence of hazardous chemicals used in the laundry process, dust from clothes and powder detergents, and poor ventilation of the workplace all present health risks.

### **Document review**

Integrated vector management plan.

### **References**

#### **International conventions**

ILO, Maritime Labour Convention 2006.

#### **Scientific literature**

Anselmo M et al. (1996). Port malaria caused by *Plasmodium falciparum*: a case report. *Le Infezioni in Medicina*, 4:45–47.

Delmont J et al. (1994). Harbour-acquired *Plasmodium falciparum* malaria. *Lancet*, 344:330–331.

- Delmont J et al. (1995). Apropos of 2 cases of severe malaria contracted in the port of Marseille. *Bulletin de la Societe de Pathologie Exotique*, 88:170–173.
- Draganescu N et al. (1977). Epidemic outbreak caused by West Nile virus in the crew of a Romanian cargo ship passing the Suez Canal and the Red Sea on route to Yokohama. *Virologie*, 28:259–262.
- Fijan S, Sostar-Turk S, Cencic A (2005). Implementing hygiene monitoring systems in hospital laundries in order to reduce microbial contamination of hospital textiles. *Journal of Hospital Infection*, 61(1):30–38.
- Peleman R et al. (2000). Indigenous malaria in a suburb of Ghent, Belgium. *Journal of Travel Medicine*, 7:48–49.
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- Rubin L, Nunberg D, Rishpon S (2005). Malaria in a seaport worker in Haifa. *Journal of Travel Medicine*, 12:350–352.
- Schultz MG et al. (1967). An outbreak of malaria on shipboard. *American Journal of Tropical Medicine and Hygiene*, 16:576–579.
- Shoda M et al. (2001). Malaria infections in crews of Japanese ships. *International Maritime Health*, 52:9–18.

Code of Areas	Inspection results: evidence found, sample results, documents reviewed	Control measures and corrective actions	Required	Recommended
<b>13.1 Overall vector management system</b>				
13.1.1 <input type="checkbox"/>	No rat-proof guard.	Place rodent-proof guard to prevent rodents from boarding ships via the mooring lines.	<input type="checkbox"/>	
13.1.2 <input type="checkbox"/>	No integrated vector management plan.	Develop an integrated vector management plan.	<input type="checkbox"/>	
13.1.3 <input type="checkbox"/>	No vector control inspection records and logs available (including pesticide application).	Conduct routine surveillance on vectors and reservoirs; for example, deploy and check rodent traps and other devices.	<input type="checkbox"/>	
		Develop vector control inspection records and logs, including pesticide application logs.	<input type="checkbox"/>	
<b>13.2 Standing water</b>				
13.2.1 <input type="checkbox"/>	Evidence of standing water in different areas of the ship's open spaces (e.g. lifeboat covers, bilges, scuppers, awnings, gutters, air-treatment plants) that can hold insect larvae.  Evidence of depressions or culverts that can collect standing water.	Implement operational procedures to control public health risks to crew and passengers, and communities that could be affected by ships and cargoes arriving in ports.		<input type="checkbox"/>
13.2.2 <input type="checkbox"/>	Evidence of live vectors or their larvae in standing water inside lifeboats.	Eliminate standing water and apply vector control measures.	<input type="checkbox"/>	
<b>13.3 Construction of washing machines and laundry</b>				
13.3.1 <input type="checkbox"/>	Construction materials and design make cleaning difficult.	Redesign and reconstruct materials so that they facilitate cleaning and decontamination.		<input type="checkbox"/>
13.3.2 <input type="checkbox"/>	Improper installation of soil and waste drainage systems.	Ensure soil and waste drainage system is of adequate dimensions, and constructed to minimize the risk of obstruction and facilitate cleaning.		<input type="checkbox"/>
13.3.3 <input type="checkbox"/>	Doors and windows not conducive for proper ventilation.	Correct door and window design.		<input type="checkbox"/>
13.3.4 <input type="checkbox"/>	Floors not conducive for cleaning.	Reconstruct floors using durable material that is easily cleaned and impervious to dampness, and properly drains.		<input type="checkbox"/>
<b>13.4 Housekeeping cleaning and maintenance</b>				
13.4.1 <input type="checkbox"/>	Evidence of housekeeping crew members cleaning cabins of ill passengers or crew while not wearing PPE.	Ensure that the housekeeping crew members take precautions, including using disposable PPE that is changed after cleaning each ill person's cabin.	<input type="checkbox"/>	
13.4.2 <input type="checkbox"/>	Insufficient supply of detergents.	Supply housekeeping and laundry with sufficient quantity of washing powder or similar products.		<input type="checkbox"/>
13.4.3 <input type="checkbox"/>	Evidence of leaks, overflow or cross-connection in the drainage system.	Maintain drainage system so that it does not leak or back up.	<input type="checkbox"/>	
13.4.4 <input type="checkbox"/>	Evidence of housekeeping crew members using the same wiping cloth to clean cabins of ill passengers and crew, as well as cabins of well passengers or crew; or to first clean cabins of ill passengers and crew.	Change wiping cloth following cleaning of cabins of ill passengers and crew.	<input type="checkbox"/>	
		Clean cabins of well passengers and crew before ill passengers and crew.	<input type="checkbox"/>	

## Annex 3 Model Ship Sanitation Control Exemption Certificate/Ship Sanitation Control Certificate

Port of ..... Date: .....

This Certificate records the inspection and 1) exemption from control or 2) control measures applied  
Name of ship or inland navigation vessel ..... Flag ..... Registration/IMO No. ....

At the time of inspection the holds were unladen/laden with ..... tonnes of ..... cargo  
Name and address of inspecting officer .....

Areas, systems, and services inspected	Evidence found <sup>1</sup>	Sample results <sup>2</sup>	Documents reviewed
Galley			Medical log
Pantry			Ship's log
Stores			Other
Holds/cargo			
Quarters:			
- crew			
- officers			
- passengers			
- deck			
Potable water			
Sewage			
Ballast tanks			
Solid and medical waste			
Standing water			
Engine room			
Medical facilities			
Other areas specified - see attached			
None areas not applicable, by marking N/A.			

No evidence found. Ship/vessel is exempted from control measures.

Name and designation of issuing officer: .....

Signature and seal .....

Date .....

<sup>1</sup> (a) Evidence of infection or contamination, including: vectors; rodents or other species that could carry human disease, microbiological, chemical and other risks to human health; signs of inadequate sanitary measures. (b) Information concerning any human cases (to be included in the Maritime Declaration of Health).

<sup>2</sup> Results from samples taken on board. Analysis to be provided to ship's master by most expedient means and, if re-inspection is required, to the next appropriate port of call coinciding with the re-inspection date specified in this certificate.

Sanitation Control Exemption Certificates and Sanitation Control Certificates are valid for a maximum of six months, but the validity period may be extended by one month if inspection cannot be carried out at the port and there is no evidence of infection or contamination.

Control measures applied	Re-inspection date	Comments regarding conditions found

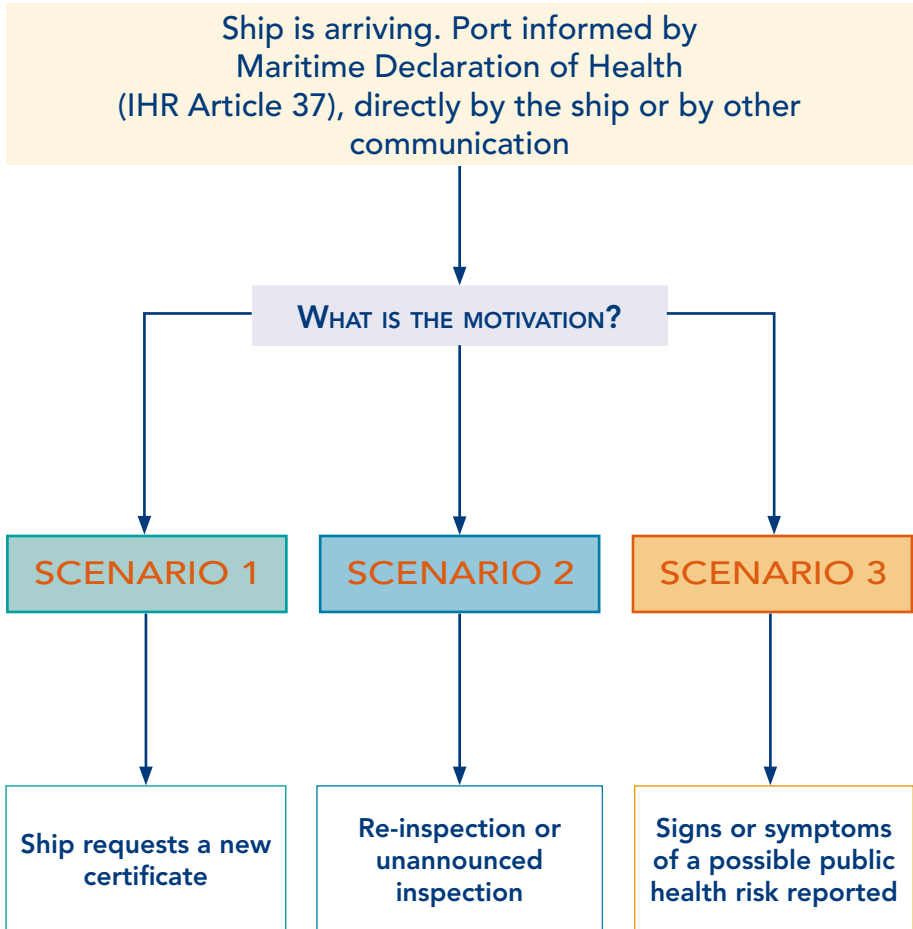
Control measures indicated were applied on the date below.

# Attachment to model Ship Sanitation Control Exemption Certificate/Ship Sanitation Control Certificate

Areas/facilities/systems inspected	Evidence found	Sample results	Documents reviewed	Control measures applied	Re-inspection date	Comments regarding conditions found
<b>Food</b>						
• Source						
• Storage						
• Preparation						
• Service						
<b>Water</b>						
• Source						
• Storage						
• Distribution						
<b>Waste</b>						
• Holding						
• Treatment						
• Disposal						
<b>Swimming pools/spas</b>						
• Equipment						
• Operation						
<b>Medical facilities</b>						
• Equipment and medical devices						
• Operation						
• Medicines						
<b>Other areas inspected</b>						

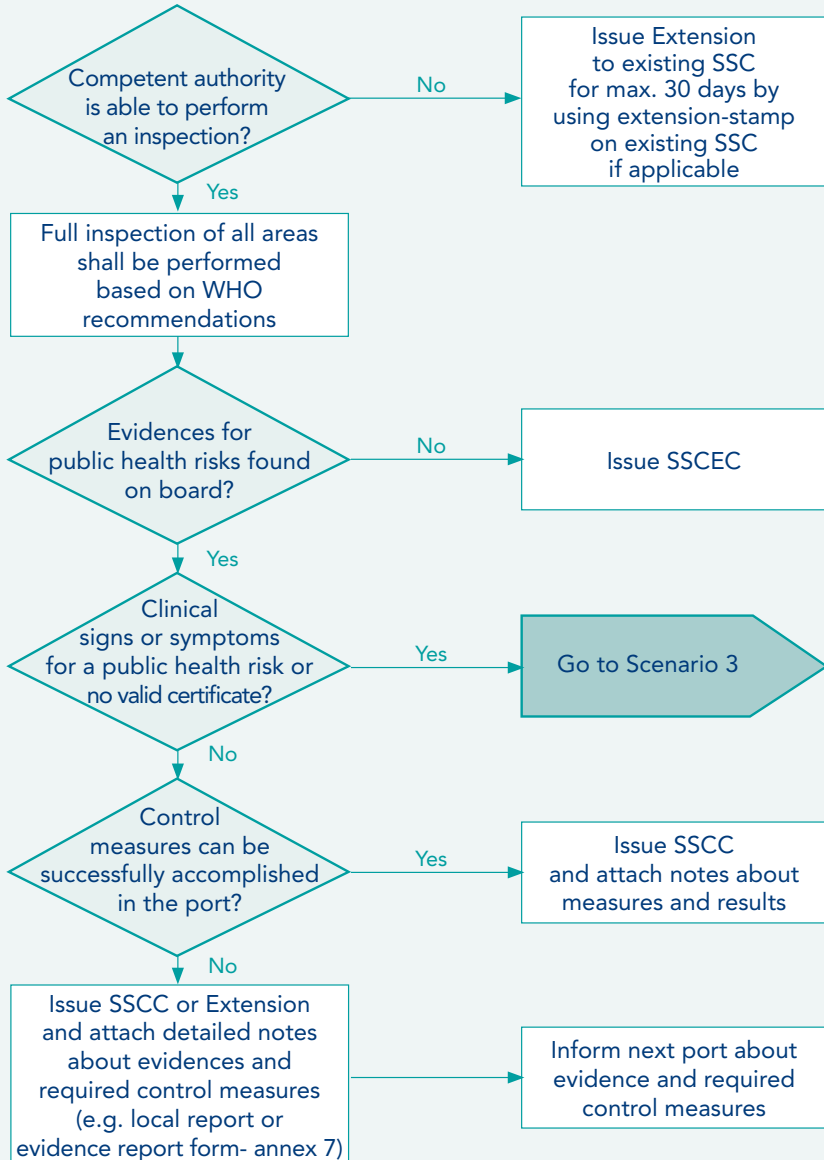
Indicate when the areas listed are not applicable by marking N/A.

Annex 2 Algorithm for issuance of ship sanitation certificates, handling of re-inspections and affected conveyances

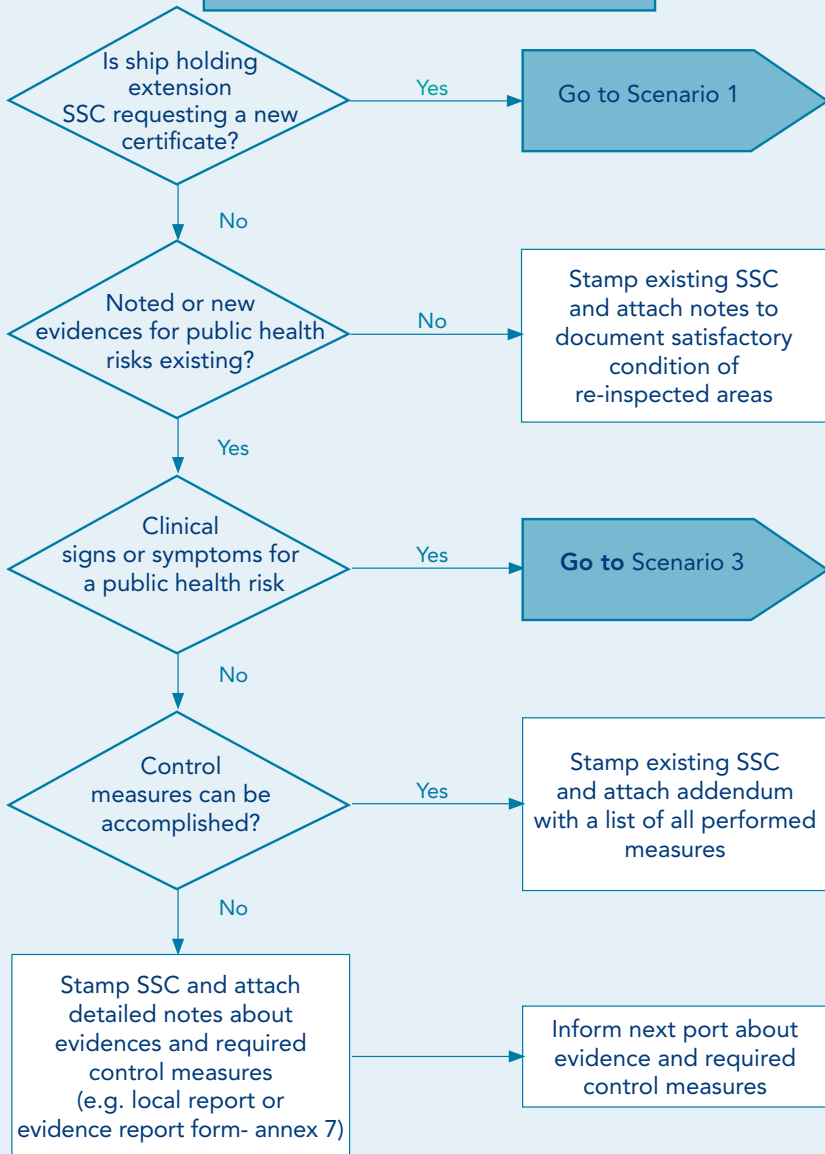




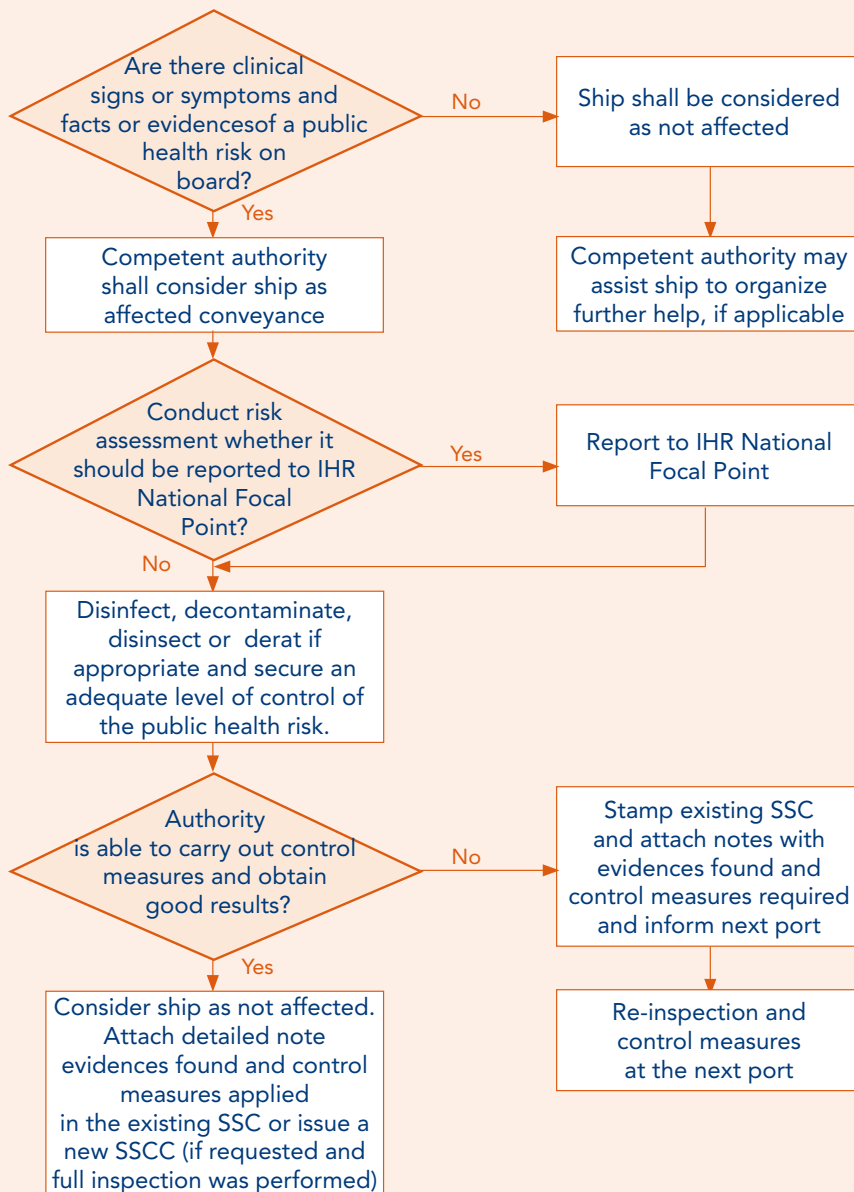
**SCENARIO 1:**  
Ship requests a new certificate  
IHR Article 39



**SCENARIO 2:**  
Re-inspection or unannounced inspection



**SCENARIO 3:**  
Signs or symptoms of a possible public health risk reported  
IHR Article 27



## Annex 3 Sequence of inspection areas

This annex proposes a sequence of inspection areas to be implemented in the ship's procedures manual. It follows the rationale that clean areas should be inspected first, followed by technical areas. This sequence enables the inspectors to avoid cross-contamination.

In some critical areas like galleys, inspectors should demonstrate good hygiene practice by wearing clean disposable clothing (e.g. aprons, gloves, hair covering).

**Table A3.1**  
**Proposed sequence of inspection areas**

Region	Area	Rationale
<b>Inside accommodation</b>	Quarters	Start at the top of the accommodation
	Galley, pantry and service areas	Potentially more clean than pantry
	Pantry	Potentially more clean than stores
	Stores	Close to galley and pantry
	Child-care facilities	Usually more dirty than food areas
	Medical facilities	After food areas to avoid cross-contamination
	Swimming pools, spas and saunas	Sometimes inside, sometimes on deck
	Other areas and systems	Washing, laundry usually cleaner than waste
	Waste (solid and medical)	Most dirty area in accommodation, sometimes on deck
<b>Inside engine room</b>	Engine room	Overview
	Potable water	Most parts in the engine room
	Sewage	Most parts in the engine room
	Ballast tanks	Access from the engine room, through the pipe duct, from open deck or cargo compartments
<b>Outside</b>	Cargo holds	Outside
	Standing water	On deck

## Annex 4 Personal protective equipment for inspectors and crew

The following table is a list of personal protective equipment (PPE) that should be available to ship staff and inspectors. For inspectors, the table indicates if they should wear the PPE during a normal inspection, or during an outbreak investigation.

**Table A4.1**  
**Personal protective equipment available to crew and inspectors**

Personal protective equipment item	Inspector during normal inspection	Inspector in case of outbreak investigation
Safety helmet	X	X
Hair net	X	
Safety goggles or face shield	X	
Ear protection	X	
Face mask		X (FFP3 standard)
Working gloves (e.g. leather gloves)	X	
Rubber examination gloves	X	X
Kitchen apron	X	
Watertight apron	X	
Disposable overalls		X
Hand disinfection liquid	X	X
Signal vest or signal jacket	X	
Inflatable life vest	X	
Safety shoes with non-slip and anti-sparkle soles	X	
Insect repellent in some areas	X	

# Annex 5 Technical equipment useful to perform a ship inspection

The following table lists technical equipment that could be available to ship inspectors to help them inspect ships. It also indicates if the inspectors should use the equipment during a normal inspection, or if it is more suitable for use during an outbreak investigation.

**Table A5.1**  
**Technical equipment useful for ship inspectors**

Technical equipment	Inspector during normal inspection	Inspector in case of outbreak investigation	Function
Flashlight (ideally explosion proof)	X	X	Explosion-proof design can be useful in some areas.
Calibrated food-probe thermometer (contact or infrared)	X	X	To measure food temperatures. Infrared thermometers are useful to avoid direct contact.
Vermin indicator spray	X	X	To cast out cockroaches from sealed spaces.
White cloth	X	X	To find vermin (e.g. fleas).
Double-faced adhesive tape	X	X	To detect crawling insects.
Seals and stamps	X	X	To authenticate certificates.
Pens, clipboard and notepad	X	X	To facilitate paperwork.
Dictionary	X	X	To facilitate communication between ship operator and inspector.
Screwdriver kit	X	X	To open devices for inspection where necessary.
First-aid kit	X	X	For personal safety.
Laptop and mobile printer	X	X	Can be useful to print certificates or define line lists directly from a database or other software.
Foldable ruler or measuring tape	X		To measure the size of air gaps, other dimensions and so on.
Smoke pen or other smoke-generating devices	X	X	To test exhaust hoods and ventilation systems.
Ultraviolet (UV) flashlight	X	X	To detect urine contamination by human and rodents.

Technical equipment	Inspector during normal inspection	Inspector in case of outbreak investigation	Function
Water-testing kit that includes: <ul style="list-style-type: none"> <li>• pH meter</li> <li>• thermometer</li> <li>• conductivity sensor</li> <li>• chlorine-testing kit</li> <li>• hardness-testing kit</li> <li>• turbidity-testing kit</li> </ul>	X	X	To estimate risk of possible contamination of the on-board potable water system and to be able to survey disinfection measures.
Water sampling kit that includes: <ul style="list-style-type: none"> <li>• gripper and hex wrench</li> <li>• gas burner</li> <li>• ethanol spray (70%)</li> <li>• disposable paper towels.</li> </ul>	X	X	To take water samples at a high enough quality to be analysed.
Sterile glass bottles containing sodium thiosulfate	X	X	For microbiological water analysis.
Protein-detecting swab	X		To check appropriate cleaning of surfaces (e.g. in galley).
Sample containers for: <ul style="list-style-type: none"> <li>• stool and urine samples</li> <li>• blood samples</li> <li>• swabs</li> <li>• food samples</li> </ul>		X	To collect samples of different possible sources of contamination (e.g. water, food, human, surfaces, equipment).
Camera (ideally digital)	X	X	To capture evidence.

Due to safety reasons and to facilitate entering onto the ship, the equipment on this list should be stored in a backpack or other suitable portable container(s).

## Annex 6 Model documents for ship inspection

This section provides a list of documents that need to be available during a ship inspection. This list should be sent by the issuing authorities before the ship arrives at the port to facilitate preparation for the ship inspection.

**Table A6.1**  
**List of model certificates and documents required for ship sanitation inspections**

Category	Name	Note
A IHR-related documents	Maritime Declaration of Health	IHR Annex 8
	Ship sanitation control certificate	IHR Annex 3
	Ship sanitation control exemption certificate	
	Extension of the ship sanitation certificate	
	International Certificate of Vaccination or Prophylaxis	IHR Annex 6
B Other documents, as listed on the IMO Convention on Facilitation of International Maritime Traffic 1965 (as amended, 2006 edition), might be requested for assessment of public health risks	General declaration	<a href="http://www.imo.org/Facilitation/mainframe.asp?topic_id=396">http://www.imo.org/Facilitation/mainframe.asp?topic_id=396</a>
	Cargo declaration	<a href="http://www.imo.org/Facilitation/mainframe.asp?topic_id=396">http://www.imo.org/Facilitation/mainframe.asp?topic_id=396</a>
	Ships Stores Declaration	<a href="http://www.imo.org/Facilitation/mainframe.asp?topic_id=396">http://www.imo.org/Facilitation/mainframe.asp?topic_id=396</a>
	Crew list	<a href="http://www.imo.org/Facilitation/mainframe.asp?topic_id=396">http://www.imo.org/Facilitation/mainframe.asp?topic_id=396</a>
	Passenger list	<a href="http://www.imo.org/Facilitation/mainframe.asp?topic_id=396">http://www.imo.org/Facilitation/mainframe.asp?topic_id=396</a>
	Dangerous goods manifest	<a href="http://www.imo.org/Facilitation/mainframe.asp?topic_id=396">http://www.imo.org/Facilitation/mainframe.asp?topic_id=396</a>
	International Sewage Pollution Prevention Certificate	
	Garbage management plan	Every ship that is $\geq 400$ gross tonnage and every ship that is certified to carry $> 15$ persons shall carry a garbage management plan, which the crew must follow: <a href="http://www.imo.org/Facilitation/mainframe.asp?topic_id=396">http://www.imo.org/Facilitation/mainframe.asp?topic_id=396</a>
	Garbage record book	Same as above <a href="http://www.imo.org/Facilitation/mainframe.asp?topic_id=396">http://www.imo.org/Facilitation/mainframe.asp?topic_id=396</a>
	Crews effects declaration	<a href="http://www.imo.org/Facilitation/mainframe.asp?topic_id=396">http://www.imo.org/Facilitation/mainframe.asp?topic_id=396</a>
Document required under the Universal Postal Convention (for mail)	In the absence of such a document, the postal objects (number and weight) must be shown on the cargo declaration	
Others		
C Other management plans concerning onboard hygiene	Water safety plan (or water management plan)	
	Potable water analysis report	
	Waste management plan	
	Management plan for food safety (including food temperature record)	



Continuation of the annex 6

Category	Name	Note
C Other management plans concerning onboard hygiene	Management plan for vector control	
	Medical log	
	IMO ballast water reporting form	
	Ballast Water Manage- ment Certificate	<a href="http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-control-and-management-of-ships'-ballast-water-and-sediments-(bwm).aspx">http://www.imo.org/about/conventions/listofconventions/ pages/international-convention-for-the-control-and-ma- nagement-of-ships'-ballast-water-and-sediments-(bwm).aspx</a>
	Ballast-water record book	<a href="http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-control-and-management-of-ships'-ballast-water-and-sediments-(bwm).aspx">http://www.imo.org/about/conventions/listofconventions/ pages/international-convention-for-the-control-and-ma- nagement-of-ships'-ballast-water-and-sediments-(bwm).aspx</a>
	Other	

# Annex 7 Evidence Report Form

Table A7.1 is a sample of an Evidence Report Form. This form lists the evidence found, samples and documents reviewed, and control measures or corrective actions to be performed after a ship inspection, and supports the ship sanitation certificate (SSC). When attached to the SSC, each page of this attachment needs to be signed, stamped and dated by the issuing authority. If this form is used as an attachment to a pre-existing SSC, this attachment must be noted in the SSC (e.g. by using a stamp).

**Table A7.1  
Sample Evidence Report Form**

Evidence Report Form						
This form supports the ship sanitation certificate (SSC), and provides a list of evidence found and control measures to be performed.						
When attached to the SSC, each page of this attachment needs to be signed, stamped and dated by the competent authority. If this document is used as an attachment to a pre-existing SSC, this attachment must be noted in the SSC (e.g. by using a stamp).						
Ship's name and IMO no. or registration:			Name and signature of responsible onboard ship officer:			
Name of issuing authority:			Actual inspection date (dd/mm/yyyy):			
Date of referred SSC (dd/mm/yyyy):			SSC issued in the port of:			
<b>Indicate areas that have not been inspected:</b>						
<input type="checkbox"/> Quarters		<input type="checkbox"/> Galley, pantry, service area	<input type="checkbox"/> Stores	<input type="checkbox"/> Child-care facilities		
<input type="checkbox"/> Medical care facilities		<input type="checkbox"/> Swimming pools/spas	<input type="checkbox"/> Solid and medical waste	<input type="checkbox"/> Engine room		
<input type="checkbox"/> Potable water		<input type="checkbox"/> Sewage	<input type="checkbox"/> Ballast water	<input type="checkbox"/> Cargo holds		
<input type="checkbox"/> Other (e.g. laundry and washing machine)						
<b>Detected health events on board</b>			<input type="checkbox"/> yes	<input type="checkbox"/> No		
<b>Evidence code</b>	Evidence found (brief description according to WHO checklist; draw a line under each item of evidence to ensure items are clearly separated)	Measure to be applied		<b>Required</b>	<b>Recommended</b>	Measure successfully performed (stamp and signature of re-inspecting authority)
Name of issuing inspector:		Signature of issuing inspector:	Stamp of issuing authority:		Page.....	of.....

IMO, International Maritime Organization; SSC, ship sanitation certificate; WHO, World Health Organization.

## Annex 8 Instructions for completing the Evidence Report Form

1. At the top of the form, the following information should be documented:
  - ship name and International Marine Organization (IMO) or registration number
  - name and signature of the responsible ship officer
  - name of issuing authority
  - date of actual inspection
  - date of the ship sanitation certificate (SSC) that the Evidence Report Form refers to
  - port where the SSC was issued.
2. The areas that have not been inspected are indicated by the checklist.
3. Further information in the form:

1 <sup>st</sup> column, Evidence code	Code of evidence as described in the checklist
2 <sup>nd</sup> column, Evidence found	Brief description of the evidence found based on the checklist
3 <sup>rd</sup> column, Measures to be applied	Description of the control measure(s) that should be applied (use simple words as in checklist)
4 <sup>th</sup> column, Required	Note an "X" here if the measure should be a "requirement"
5 <sup>th</sup> column, Recommended	Note an "X" here if the measure should be a "recommendation"
6 <sup>th</sup> column, Measures successfully performed	This column is reserved for the re-inspecting authority. Only successfully performed measures should be stamped and signed by the re-inspecting issuing authority. If no stamp or signature is applied, the success of the measure should be verified in a new inspection. To differentiate between each piece of evidence and the corresponding measures, horizontal lines should be drawn to separate different evidence.

At the bottom of each page of the form, the name and signature of the inspecting officer, the stamp of the issuing authority, the page number and any comments should be noted.

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This Handbook for Inspection of Ships and Issuance of Ship Sanitation Certificates provides guidance for preparing and performing ship inspection, completing the certificates and applying public health measures within the framework of International Health Regulations (2005). It is intended to be used as reference material for port health officers, regulators, ship operators and other competent authorities in charge of implementing the health measures onboard ships.