COURSE MANUAL

HEALTH AND SAFETY AND ENVIRONMENTAL PROTECTION

OPERATIONAL LEVEL

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FOREWORD

To assist education and training entities to meet the requirements of Standards for competences for inland navigation personnel - Operational level - OL 7 – **Health and safety and environmental protection**, required by Directive (EU) 2017/2397 on the recognition of professional qualifications in inland navigation, and Delegated Directive (EU) 2020/12 supplementing Directive (EU) 2017/2397 as regards the standards of competences and corresponding knowledge and skills, for the practical examinations, for the approval of simulators and for medical fitness, the transnational Course Manual on **HEALTH AND SAFETY AND ENVIRONMENTAL PROTECTION for Operational level personnel**, was developed.

This Course Manual will be a useful transnational training tool for conducting the Train the trainer session and is intended to assist education and training providers and their teaching staff in organising and introducing new education & training programmes, or in enhancing, updating and supplementing existing didactical materials with the ultimate end results of raising quality and effectiveness of the education & training programmes.

Since education & training systems as well as the cultural background of inland navigation topics differ considerably from one country to another, the Course Manual on HEALTH AND SAFETY AND ENVIRONMENTAL PROTECTION - OL has been designed so as to support the preparation, organisation and planning of effective teaching and training and to be used as a part of the quality assurance of the education and training institutes.

Technical content and levels of knowledge and abilities are in line with the applicable Delegated Directive (EU) 2020/12 supplementing Directive (EU) 2017/2397 as regards the standards of competences and corresponding knowledge and skills, for the practical examinations, for the approval of simulators and for medical fitness, being an essential tool for Boatmen, to adhere to safe working rules, understand the importance of health and safety rules and the importance of protecting the environment.

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1. GENERAL INFORMATION

1.1 Course curriculum - general requirements

1.	**Aim**	Provide training to assist in the implementation of Directive (EU) 2017/2397and ES-QIN - Standards of competence - HEALTH AND SAFETY AND ENVIRONMENTAL PROTECTION, for crew members at Operational Level
2.	**Objective**	Provide training and practical guidance for trainees in order to be able to adhere to safe working rules, understand the importance of health and safety rules and the importance of the environment.
3.	**Entry standards**	See Directive (EU) 2017/2397 - Annex 1
4.	**Course certificate**	On successful completion of the course, a document may be issued, stating that the holder graduated this learning module
5.	**Course intake limitation**	Admittance may be limited by the capacity of the educational infrastructure used for this learning module.
6.	**Staff requirements**	The trainer should meet the requirements of Directive (EU) 2017/2397, Art. 18.
7.	**Training facilities, equipment and teaching aids**	**Training facilities and equipment** For the theoretical part of the course, ordinary class room facilities and an overhead projector are sufficient. In addition, a demonstration table would be advantageous, as would an available Internet connection. For the practical part of the course, the following structure and equipment are required: **Safety of work:** Protective eyewear; Protective suits; Hearing protective devices; Safety helmets; Dust masks and respirators; Protective gloves; Safety shoes; Safety belt; Explosion meter with accessories; Oxygen meter with accessories; Flue gas analyser with accessories; Breathing apparatus. **Medical first aid:** 1 life-size dummy for practical resuscitation training; 1 stretcher; Various splints, braces, etc.; 1 automatic defibrillator for training; Dressings, bandages. **Personal survival techniques** The practical lessons require access to water, i.e. a swimming pool. The required equipment: Lifejackets; Inflatable lifejackets; Lifebuoys; 1 Rigid liferaft with a complete set of accessories; 1 six-person inflatable liferaft; Immersion suits. **Fire fighting** For the practical part of the course, a training campus equipped with a special building for smoke and fire drill or a similar facility is required. The required equipment: steel fire trays; 2 fire hydrants with 2 outlets each, or a similar water supply from open water and fire pump;

		a large supply of carbonaceous and hydrocarbon fuels (wood, diesel and lubricating oils, etc.) for the fire trays; dummy, for search and rescue procedures; fire hoses; branch pipes; fire nozzles (standard, diffuser and jet spray); foam generator; stand pipes, with keys and bars to operate the hydrant supply; water, foam, carbon dioxide and dry powder extinguishers; sets of protective clothing, overalls, gloves, fire-boots, helmets and rainproof clothing; 12 breathing apparatus; smoke generator; smoke helmets with air pump; stretcher; sets of fire protective clothing; helmets with visor and neck protector; Intelligent training system for fire fighting. **Environmental protection** Floating debris boom; Absorbent pads; Oil absorbent granules; Glass sample jar; Mailing tube; Explosion meter with accessories; Oxygen meter with accessories; Flue gas analyser with accessories. **Teaching aids** Instructor manual Reference documents Textbooks
8.	**Learning outcomes**	At the end of the course the trainee shall be able to: • Work according to instructions and rules for safety at work and prevention of accidents; • Use personal protective equipment to prevent accidents; • Take required precautions before entering enclosed spaces; • Act in case of emergencies according to applicable instructions and procedures; • Perform medical first aid; • Use and maintain personal protective equipment and shipboard life- saving equipment; • Provide assistance in the case of rescue operations and swim; • Use emergency escape routes; • Use internal emergency communication and alarm systems; • Distinguish the elements of fire and types and sources of ignition; • Use different types of extinguishers; • Act according to shipboard fire fighting procedures and organisations; • Follow instructions concerning: personal equipment, methods, extinguishing agents and procedures during fire fighting and rescue operations; • Protect the environment in accordance with relevant regulations; • Take precautions to prevent pollution of the environment; • Use resources efficiently; • Dispose of waste in an environmentally friendly fashion.
9.	**Assessment & evaluation**	Minimum requirements for assessment & evaluation of the trainees for graduating the learning module (i.e. minimum score for theoretical evaluation, for practical evaluation, etc.) i.e. Online training record book as a pathway for the course.

2. INSTRUCTOR MANUAL

2.1 Introduction

This instructor manual provides guidance on the material that is to be presented during the training course for HEALTH AND SAFETY AND ENVIRONMENTAL PROTECTION - OL, and has been arranged under the 17 (seventeen) Learning Outcomes (competences) identified in the course outline.
The reference materials indicated may be supplemented by additional texts or material at the discretion of the teacher/trainer.

The course outline and provisional timetable also provide guidance on the time allocation for the course, because the time actually taken for each subject area may vary, especially in respect of time allocated to practical activities. The detailed teaching syllabus must be carefully studied and appropriate lesson plans or lecture notes compiled. A template of a lesson plan is presented under point 2.2 of this Chapter.

Each lesson should commence with a statement of the learning outcomes it is intended to achieve. At the end of each lesson, the participants should be told which associated portions of the reference material they should read and any activity they should undertake. Questions arising from such readings and activities must be given priority at an appropriate time.

The presentation of the various subject areas should be done in such a way that those taking part in the course are involved in an interactive participation during the lessons and learning process. Questions from the course participants should be encouraged, as should answers to such questions from other course participants.

The lessons should aim at conveying as much practical instruction and practice as possible to the participants, in order to develop their knowledge of and their skills in the tasks they will be expected to carry out.
Course materials for additional study must be prepared and distributed if required.

2.2 Lesson plan

This lesson plan is just a template to give the teachers/ trainers a general idea on how to create their lessons for the various competences. This template can be used for every competence and adjusted as suitable for the institute to use.

Competence 2.1.1 Work according to instructions and rules for safety at work and prevention of accidents;			
Learning objective			
Learning outcomes			
Required equipment			
Lesson structure			
Learning activity	Didactical method (ABC method)	Materials	Time

2.3 Background materials

Bibliographical materials, reference documents, and other didactical materials are presented in Annex 1 of this Course Manual.

2.4 Practical training

This practical training links the theoretical content of the lessons to their practical use. Theoretical subjects are elaborated by the candidates autonomously in case studies. The candidate should deepen his or her knowledge in defined theoretical subjects by elaborating on a variety of facts and figures about this topic and present them in front of his or her classmates afterwards.

Discussions and reflection, interactive learning
Possible solutions to theoretical and practical subjects can be discussed within (parts of) the learning group. Different views and opinions on a defined subject are exchanged and discussed by the participants in order to broaden the individual's view of this problem and show different possible solutions and their respective advantages and disadvantages. A discussion should be monitored and steered (stimulated or consolidated) if necessary, in order to secure that every participant actively participates.

Team work
Assignments can be individual as well as group assignments, depending on the objective. An individual assignment should stimulate and show the competences of the individual. In a team work assignment the participants will have exposure to a wide range of experiences from quick problem-solving involving synergy, to experiences which may relate to such items as interpersonal difficulties in a group setting. Depending on the purpose of the assignment the team should be defined in advance and the assignment and the rules of the working process, if there are any, should be communicated to the group in a very clear and formal manner.

Annex 2 of this Course Manual presents a few exercises, case studies and practical scenarios which are useful for practical training and examination of the trainees.

2.5 Class room facilities and educational tools

For the theoretical part of the course a classroom is required with video presentation equipment, teaching aids, etc. For the practical part of the course a communication laboratory equipped with communication devices is necessary.

2.6 Examination & assessment

According to Article 17 Assessment of competences, of Directive (EU) 2017/2397 on the recognition of professional qualifications in inland navigation, Member States shall ensure that persons who apply for the Boatman certificate demonstrate that they meet the standards of competence by passing an examination that was organised:

(a) under the responsibility of an administrative authority in accordance with Article 18 or;
(b) as part of a training programme approved in accordance with Article 19.

The essential competence requirements set out in Annex II of the Directive (EU) 2017/2397 for Health and safety and environmental protection – Operational level are:

The Boatman shall be able to:

- Adhere to safe working rules, understand the importance of health and safety rules and the importance of the environment;
- Acknowledge the importance of training aboard and act immediately in the event of emergencies;
- Take precautions to prevent fire and use the fire fighting equipment correctly;
- Perform duties taking into account the importance of protecting the environment.

3. REGULATION AND CERTIFICATION

According to Chapter 2, Union Certificates of Qualification, Article 4, Obligation to carry a Union certificate of qualification as a deck crew member of Directive (EU) 2017/2397 on the recognition of professional qualifications in inland navigation:

- Member States shall ensure that deck crew members who navigate on Union inland waterways carry either a Union certificate of qualification as a deck crew member issued in accordance with Article 11 or a certificate recognised in accordance with Article 10(2) or (3);
- In Annex I of Directive (EU) 2017/2397 the minimum requirements for certification as a Boatman are included, such as:

  Every applicant for a Union certificate of qualification shall:
  (a)
  - Be at least 17 years of age;
  - Have completed an approved training programme as referred in article 19, which was a duration of at least two years, and which covered the standards of competence for the operational level set out in annex ii;
  - Have accumulated navigation time of at least 90 days as part of this approved training programme or after completion thereof;

  or

  (b)
  - Be at least 18 years of age;
  - Have passed an assessment of competence by an administrative authority as referred to in article 18, to verify that the standards of competence for the operational level set out in annex ii are met;
  - Have accumulated navigation time of at least 360 days, or have accumulated navigation time of at least 180 days if the applicant can also provide work experience of at least 250 days that the applicant acquired on a sea-going ship as a member of the deck crew;

  or

  (c)
  - Have a minimum of five years' work experience prior to the enrolment in an approved training programme, or have at least 500 days' work experience on a sea-going ship as a member of the deck crew prior to the enrolment in an approved training programme, or have completed any vocational training programme of at least three years' duration prior to the enrolment in an approved training programme;
  - Have completed an approved training programme as referred to in article 19, which was of a duration of at least nine months, and which covered the standards of competence for operational level set out in annex ii;
  - Have accumulated navigation time of at least 90 days as part of that approved training programme.

4. LESSON MATERIALS

The lesson materials referred to in this course manual are for inspiration and are free to use for the teachers of the educational institutes. The lesson materials will be available on the Edinna website (https://www.edinna.eu/) until the end of the project.

Thematic content of the Course Manual for HEALTH AND SAFETY AND ENVIRONMENTAL PROTECTION - OL is presented below.

The numbering of the chapters is in accordance with the Standards for competences for the Operational level - 7. HEALTH AND SAFETY AND ENVIRONMENTAL PROTECTION.

COMPETENCE 7

7.1 Safety at work

Competences

The Boatmaster shall be able to:

1. Work according to instructions and rules for safety at work and prevention of accidents;
2. Use personal protective equipment to prevent accidents;
3. Take required precautions before entering enclosed spaces.

7.1.1 Work according to instructions and rules for safety at work and prevention of accidents

Knowledge and skills

7.1.1.1 Knowledge of the advantages of safe working practices

Safe working practices

General duties and responsibilities of vessel owners
Vessel owners should:

- Provide adequate means and organisation and should establish a suitable policy on the safety and health of crew members consistent with international and national laws and regulations;
- Ensure that design of their vessels takes account of ergonomic principles and conforms to relevant international and national laws, regulations, standards or codes of practice;
- Provide and maintain vessels, equipment, tools, operating manuals and other documentation, and organise all planning and operations in such a manner that, as far as it is reasonably practicable, there is no risk of accident or injury to crew members. In particular, activities should be planned, prepared and undertaken so that:
  - Dangers likely to arise on board vessel are prevented;
  - Excessively or unnecessarily strenuous work positions and movements are avoided;
  - Organisation of all work takes into account the safety and health of crew members;
  - Materials and products are used safely and pose no danger to crew members' health; and
  - Working methods are employed which protect crew members against the harmful effects of chemical, physical and biological agents.
- Ensure that crew members perform their work with due regard to their safety and health;
- Instruct the boatmaster and the boatmaster should instruct the crew members that the work of all on board will be organised in such a way as to avoid unnecessary risks to safety and health;
- Make boatmasters and all the crew members fully aware of all activities on board that could affect their safety and health;
- Ensure that, before taking on their responsibilities, all crew members are suitably instructed in the hazards connected with their work and the on board environment and trained in the precautions which must be taken to avoid accidents and injury to health. The training should address day-to- day on board operations as well as contingency planning and emergency preparedness;
- Take all practicable steps to ensure that, before taking on their responsibilities, crew members are made aware of the relevant national and international laws, regulations, standards, codes of practice, instructions and advice relating to the prevention of accidents and injuries to health;
- Provide appropriate medical equipment and trained personnel in accordance with national laws and regulations;

- Report occupational accidents, diseases and dangerous occurrences to the competent authority in accordance with national laws and regulations. All accidents to crew members resulting in loss of life or serious injury should be reported forthwith to the competent authority and an investigation of these accidents should be carried out. Other injuries resulting in incapacity from work for periods of time as may be specified in national laws or regulations, as well as prescribed occupational diseases, should be reported to the competent authority within such time and in such form as may be specified;
- Investigate all accidents and near accidents, analyse their underlying causes and convey what is learned throughout the company as appropriate;
- Consider establishing a near-accident reporting system;
- Encourage crew members to report all unsafe and unhealthy conditions or operations;
- Provide each vessel with the necessary equipment, manuals and other information to ensure that all operations are carried out in such a manner as to reduce to a minimum any adverse effects on crew members' safety and health.

General duties and responsibilities of the Boatmaster

The Boatmaster should ensure that:

- Work carried out on or from the vessel is carried out in such a way as to avoid the possibility of accidents and the exposure of crew members to conditions which may lead to injury or damage to their health;
- The availability of operating manuals, vessel plans, national laws and regulations, safety procedures and other such information to those crew members who need such information to conduct their work safely;
- Any necessary instructions and notices concerning the safety and health of the crew are posted in prominent and suitable places or brought to the crew's attention by other effective means;
- Safety equipment, including all emergency and protective equipment, is maintained in good order and stowed properly;
- All statutory drills are carried out realistically, effectively and conscientiously at the required intervals and in compliance with any applicable rules and regulations;
- Practice and training are given in emergency procedures; the use of any special emergency equipment should be demonstrated to the crew members at regular intervals.

General duties and responsibilities of crew members at Operational level

Crew members should:

- cooperate as closely as possible with the vessel owner in the application of the prescribed safety and health measures;
- Take care of their own safety and health and of other persons who may be affected by their acts or omissions at work;
- Use and take care of personal protective equipment and clothing at their disposal and not misuse any means provided for their own protection or the protection of others;
- Report forthwith to their immediate supervisor any situation which they believe could pose a hazard and which they cannot properly deal with themselves;
- Comply with the prescribed safety and health measures; and
- Participate in safety and health meetings.

Advantages of safe working practices

A well designed and executed occupational health and safety programme is often said to be good for business as well as being a key legal and social obligation (making sure that employees in any size or type of business go home in the same condition that they came to work). Furthermore, so-called "best-practice" organisations not only recognise the basic value of good occupational health and safety, but see that extra efforts to ensure that its people are not harmed or made ill in any way at work (even at a minor level) is also an essential part of a truly excellent enterprise.

These best practice organisations therefore believe that occupational health and safety:

- helps demonstrate to all stakeholders that a business is socially responsible;
- Protects and enhances an organisation's reputation and credibility;
- Helps maximise the performance and/or productivity of employees;
- Enhances employees' commitment to the team/ organisation as a whole;
- Builds a more competent, happier and healthier workforce;
- Reduces business costs and disruption;
- Enables organisations to meet customers' occupational health and safety expectations, and
- Encourages the workforce in general to stay longer in active life.

Simple improvements to workplace safety practices can quickly increase competitiveness, profitability and the motivation of employees. In addition, the implementation of a new occupational health and safety management system can rapidly provide an effective framework to prevent or minimise accidents and workplace related ill-health and thereby show an immediate return on investment.

7.1.1.2 Knowledge of the nature of on board hazards

Nature of on board hazards

The various on board hazards are:

- slips, trips and falls due to slippery surfaces (oil, grease, garbage, water, ice, etc.) Or obstructions (pipelines, welding cables, lashing eyes, wires, ropes, etc.);
- Head injuries due to low doorway entrances, overhead loads, falling equipment or material;
- Falls through open manholes, unfenced 'tween decks, loose or missing gratings;
- Clothing, fingers getting caught in moving machinery such as grinding wheels, winch drums, gears, flywheels, etc.;
- Burns from steam pipes, hot machinery, welding sparks;
- Eye injuries through chipping, welding, chemicals;
- Hazards of extreme weather, e.g. cold temperatures can cause frost bite.

Dangers related to on board hazards

The various dangers related to on board hazards to personnel and vessels can arise during the following operations:

- Movement of the vessel;
- Provision for safe embarkation and disembarkation of the vessel (e.G. Gangplank, ship's boat);
- Stowing movable objects;
- Working with machinery;
- Working with electricity and electrical equipment/ devices;
- Fire precaution and fire fighting;
- Use of hand tools;
- Use of portable power tools;
- Slips, falls and tripping.

7.1.1.3 Ability to prevent dangers related to on board hazards

Movements of the craft

Crew members should move about the vessel bearing in mind the possibility of an unusual lurch or heavy roll by the vessel while in inland waterways.

Permanent fittings which cause obstruction and which may be dangerous to vehicles, lifting appliances or persons should be made conspicuous by means of colouring, marking or lighting.

Any deck obstructions and head-height obstructions that are a hazard should be painted in a bright, conspicuous colour, and where necessary, warning notices should be posted. Graphic symbols should be utilised where possible. Head-height obstructions should be padded.

All **passageways, walkways**, stairs and all deck surfaces used for transit should be properly maintained and kept free from materials or substances liable to cause slips or falls.

Transit areas should be provided with a surface which is slip resistant in dry as well as in wet conditions. Walkways on deck should be delineated by painted lines or otherwise and indicated by signs.

Any gear or equipment stowed to the side of a passageway or walkway should be securely fixed or lashed against the movement of the ship during voyage. When rough weather is expected, lifelines should be rigged securely across open decks.

All crew members who may have to use **watertight doors** should be instructed in their safe use. Areas of the vessel used for loading or unloading, other work processes or transit should be adequately and appropriately illuminated. It should be prohibited to enter unlighted or inadequately lighted places on the ship without safe portable lights.

Every **cargo hatchway** should be protected by means of a coaming or fencing to a height of at least 1m above the deck. Hatch covers, pontoons and beams that have been removed should be placed so as to leave a safe walkway from rail to hatch coaming and fore and aft. Access within cargo spaces and holds should be kept clear.

Mechanically, hydraulically and electrically powered hatch covers should be opened and closed only by designated members of the ship's crew or other authorised persons. The hatches should only be operated after ensuring it is clear to do so. Any openings through which a person might fall should be fitted with secure guards or fencing of adequate design and construction.

Safe access embarkation and disembarkation of the craft

Means of access to vessel

There should be a safe means of access between any craft and any quay, pontoon or similar structure or another ship alongside which the craft is secured to.

Crew members should be provided with adequate information on how to make their way safely to and from the craft through the terminal or shore side cargo handling area.

Crew personnel should not use a means of access which is unsafe. They should also use means of access with care, e.g. they should make several trips or use a stores crane when carrying personal gear, stores or ship's equipment rather than attempting to carry too much at once.

Access should generally be by an **accommodation ladder or gangway** which is appropriate to the deck layout, size, shape and maximum freeboard of the craft.

Any access equipment should be of good construction, sound material, adequate strength, free from obvious defect, properly maintained and inspected at frequent intervals. It should not be painted or treated to conceal cracks or defects.

Access equipment should be placed in position promptly after the craft has been secured and remain in position while the craft is secured.

A lifebuoy with a self-activating light and a separate safety line or some similar device should be provided at the point of access aboard the craft. All access equipment and the approaches to such equipment should be properly illuminated. As far as it is practicable, access equipment should be kept free of any snow, ice, grease or other substance likely to cause a slip or fall.

Any gap between the dockside and the craft, whereby a person on the craft's means of access might fall into the water, should be protected by a safety net, of suitable size, mesh and construction, secured to the ship and dockside, as appropriate.

The means of access and its immediate approaches should be kept free from obstruction and, as far as practicable, kept clear of any substance likely to cause a slip or fall. The means of access should be sited so that no suspended load passes over it.

The accommodation ladder or gangway should be so constructed that ordinary changes in the craft's draught or height above the quay can be easily accommodated. Duckboards should be fitted to provide a secure foothold at small angles of inclination.

The gap between the top of the gangway or ladder and the craft should be protected on each side by handrails, taut chains or other suitable means, with intermediate chains at a height to match the handrails and intermediate protection of the gangway.

Gangways and accommodation ladders should be clearly marked with the maximum permitted angle of use and maximum safe loading in both number of persons and total weight. Under no circumstances should this limit be exceeded.

If the gangway rests on rollers or wheels, it should be fitted or protected in such a way as to prevent the user's feet from being caught and it should be placed in a position which does not restrict the free movement of the rollers or wheels.

Safe stowage of movable objects

All cargoes should be stowed and secured in a manner that will avoid exposing the craft and persons on board to unnecessary risk. The safe stowage and securing of cargo depends upon proper planning, execution and supervision by properly qualified and experienced personnel.

Loading, stowage and securing of cargo other than bulk cargo is to be carried out in accordance with the craft's approved cargo-securing manual.

The following points should be taken into account:

- Cargo information, including gross mass of the cargo or cargo units and any special properties detailed on board or in the shipping documents, should be recorded and used in planning;
- Wherever practicable, where more than one port is involved for loading or unloading, cargo should be loaded in layers rather than in tiers, so as to avoid the development of high vertical walls of cargo;
- Care should be taken not to over stow lighter cargoes with heavier cargoes, which may lead to
- A collapse of the stow;
- Wherever practicable, cargo should be stowed so as to leave safe clearance behind the rungs of hold ladders and to allow safe access as may be necessary at inland waterway;
- The need to walk across or climb onto the deck cargo, where this may involve an approach to an unprotected edge with risk of falling, should be minimised;
- Care should be taken to avoid large gaps next to cargo where it is stacked against corrugated bulkheads.

Working with machinery

All operations in machinery spaces should be performed by a competent person under the supervision of a designated responsible crew member.

No person should operate a machine unless authorised and trained to do so. Machine operators should be competent in the use of the machine and familiar with its controls.

No work other than routine duties should be undertaken except on the orders of a designated responsible crew member. Maintenance work should be carried out in compliance with manufacturer's instruction manuals. When necessary, specific work should be carried out within the "permit-to-work" system.

Moving parts of machinery should be provided with permanent guards or other safety devices such as railings or fencing.

No guard, fencing or shielding should be removed for repair or maintenance except when the machinery to which it relates has been stopped. The machinery should not be restarted until the fencing or shielding has been replaced and secured.

All valves, pipes and fittings should be adequately supported and fixed or clamped to avoid vibration and possible fracture.

The source of any oil leak should be located as soon as possible and the leak stopped. All areas should be suitably illuminated. Areas under floor plates where oil pipes are located should be painted a light colour.

Care should be taken to keep the noise level as low as practicable, and to maintain or where necessary improve sound-absorbing arrangements.

Crew members should be informed of the danger of removing hearing protection in areas where the noise level is high, even for short periods. When work has to be carried out in such areas, a suitable system of communication should be agreed upon before the work begins.

Ventilation should be maintained to ensure a comfortable atmosphere so far as it is reasonably practicable in all areas, with special attention being given to working areas and control rooms.

Working with electricity and electrical equipment/ devices

Crew members should receive adequate training before being permitted to work on electrical installations. The installation should be maintained and protected to minimise the possibility of fire, external explosion, electrical shocks and danger to crew members.

All live parts should be effectively insulated and enclosed in conduits or otherwise protected and should be maintained in that condition.

All electrical equipment should be regularly inspected to ensure that it is suitable for its intended use. Any electrical faults or other defects should be immediately reported to the appropriate person and repaired by a competent person.

Attention should be paid to the maintenance of the emergency source of electrical power. All electrical appliances should be clearly marked to indicate their safe operating voltage. Flickering lights should be investigated and repaired by a competent person.

Circuits and appliances carrying different voltages in the same installation should be clearly distinguishable by notices, markings on distribution boxes and other conspicuous means.

Repairs to electrical installations should be carried out only by a competent person or when a "permit-to- work" has been issued. Every circuit should be protected against overload currents, so as to reduce damage to the system and keep the danger of fire to a minimum.

Personal protective equipment, such as rubber gloves and rubber boots, should be used whenever there is a risk of electric shock, but should not be regarded as providing full protection against such a risk.

Protection against contact with live equipment should be afforded by:

- Placing live parts out of reach;
- Effective enclosure of live parts; and
- Adequate insulation.

The following notices should be exhibited at suitable places:

- a warning notice prohibiting unauthorised persons from entering electrical equipment rooms, interfering with switchboards, and handling or interfering with electrical apparatus;
- A warning notice specifying the person to be notified in the event of an electrical accident or some other dangerous occurrence, and indicating how to communicate with that person;
- A notice specifying the voltage present in equipment or conductors; and
- A notice prohibiting the use of naked flames in the vicinity of the battery room.

Only competent persons should be authorised to repair electronic equipment.

Fire precautions and fire fighting

Fire prevention

Smoking should be permitted only in authorised areas, and instructions and prohibition notices should be prominently displayed.

Careless disposal of burning matches and cigarette ends is dangerous: ashtrays, or other suitable containers, should be provided and used in locations where smoking is permitted.

Crew members should be made aware of the dangers of smoking in bed. Care should be taken when **drying items of clothing**. Clothing should not be hung directly on or close to heaters and should never be dried in the engine-room.

Spontaneous combustion

Waste, rags, and other rubbish as well as clothes soaked with paint, oil, thinners, etc., are dangerous if left lying around as they may spontaneously combust. All waste should be stored in proper dustbins until it can be safely disposed of.

Galleys present particular fire hazards and the means to smother fat or cooking oil fires, such as a fire blanket and appropriate fire extinguisher, should be readily available. Water shall never be used in attempts to fight fires involving hot oil in cooking areas.

Action in the event of fire

The risk of fire breaking out on board a craft cannot be eliminated but its effects will be much reduced if the advice given from the competent person is conscientiously followed.

A fire can usually be extinguished most easily in its first few minutes. Prompt and correct action is essential. The alarm should be raised and the bridge informed immediately. If the craft is in port, the local fire authority should be called. If possible, an attempt should be made if safe and practicable to extinguish or limit the fire, by any appropriate means readily available, either using suitable portable extinguishers or by smothering the fire as in the case of a fat or oil fire in the galley.

Openings to the space should be shut to reduce the supply of air to the fire and to prevent it spreading. Any fuel lines feeding the fire or threatened by it should be isolated.

If practicable, combustible materials adjacent to the fire should be removed, boundary cooling of adjacent compartments should be considered and temperatures monitored if spaces are not otherwise accessible. If a space is filling with smoke and fumes, any crew members not properly equipped with breathing apparatus should leave the space without delay; if necessary, escape should be effected by crawling on hands and knees because the air close to deck level is likely to be relatively clear. Where available, emergency escape breathing devices (EEBDs) should be used.

After a fire has been extinguished, precautions should be taken against its spontaneous re-ignition. Crew members should not re-enter a space in which a fire has occurred without wearing breathing apparatus until it has been fully ventilated.

Professional use of hand tools

Vessel owners should ensure that all machines, tools and other equipment are suitable for the work in hand and the conditions in which they are to be used. Personal protective equipment, e.g. eye, face, hearing protectors and hair nets for long hair, should be worn when appropriate.

Tools should be treated with due care and should be used only for the purpose for which each tool is designed. Damaged or unsafe tools should not be used.

Tools that are not being used should be placed in a carrier, box or tool rack.
All tools should be stowed in lockers or other appropriate places at the end of a work period or operation.

Professional use of portable power tools

Power-operated tools are dangerous if they are not maintained and operated correctly. Special care should be taken when crew members work in damp conditions since the risk of electric shock is greatly increased in the presence of moisture or high humidity. Since crafts are largely made of metal, which conducts electricity, great care should be taken in the use of electrical tools.

Electrical tools designed to be earthed should be properly connected. Electrical tools should be inspected before use and particular attention should be paid to power supply leads. Electrical leads and hydraulic/pneumatic tool hoses should be kept clear of anything that might damage them.

Tool pieces, such as drills or bits, must be secure in the tool and must not be fixed or replaced while the tool is connected to a power source.

Power tools should be switched off and disconnected from the power source when not in use. Compressed air should never be directed at any part of a person's body as air puncturing a person's skin could have serious consequences. Compressed air should not be used to clean a working area.

Crew members should be particularly aware of the dangers of using high pressure pneumatic equipment, such as cleaning and scaling devices, as their misuse can lead to fatal consequences

Health and hygiene on board

A crew member's job is rather difficult and stressful, requiring both physical stamina and good psychological fitness. In order to improve the living and working conditions of crew members on board, hygiene norms are defined, and it is essential to strictly follow them to prevent quarantine from happening and to reduce the risk of poisoning.

The most serious challenge is infectious diseases
Various infectious diseases brought into our country as a result of travelling is quite a big problem indeed; it is dangerous for both crew members and other people.

In order to avoid infectious diseases, it is recommended to follow the basic rules of hygiene which are to be applied not only for work on board a craft:

- Ensure maximum cleanliness of the body – wash it every day;
- Wash hands after completion of work, each use of toilet, before eating;
- Change dirty clothing;
- Wear protective face masks, whenever necessary;
- Ensure maximum personal hygiene upon returning to a craft from the land.

Possibility of food poisoning

Food poisoning after eating or drinking frequently becomes a daily issue for crew members. Food poisoning is commonly caused by the lack of personal hygiene, eating off of dirty dishes, and, of course, eating unwashed, rotten food products and those that are stored or cooked at improper temperatures.

In order to avoid regular food poisoning cases, it is essential to check products carefully:

- Each time before preparing food, make sure that the products are fit to be consumed, i.E. Check the shelf life expiration date, assess the condition of a food product;
- Store the products properly under their classification;
- Wash fruit and vegetables with boiled water;
- Wash meat;
- Use clean dishes for eating;
- Wash hands before each meal.

Better psychological health

It is necessary to follow hygiene rules on board a craft not only because it can cause illnesses: it is stated that a physically healthy person has high self-esteem, is sociable and finds it easier to motivate oneself to work.

Environmental hygiene

A tidy and clean environment is as important as personal hygiene. Violations of hygiene rules are often present when inspecting outpatient clinics, laundry rooms, and sauna facilities. A craft is a workplace and also temporary home for a crew member, therefore making it clean by washing, cleaning or disinfecting the premises is the key.

Removal of slip, fall and tripping hazards

Slips, trips and falls are among the most common accidents leading to injuries on board vessel. All crew members know that a craft moving in waterways is drastically different from a shore-based work environment, with an unstable working platform inevitably making accidents more likely.
There are many causes but they generally fall into the following areas: poor on board housekeeping, not complying with safety procedures, not applying hard-won training and experience.

A craft's decks and internal spaces are prime locations for trip, fall and slip hazards. Raising crew awareness of trip and head-height hazards can be assisted by conspicuously marking obstructions, changes of deck height, steps and inclines with high visibility paint or "tiger-stripes".

Use may also be made of "watch your steps" type labels and strategically placed warning and instructions notices. Furthermore, where openings are created in decks during operations or repairs, it is vital that these are properly fenced off and marked.

Familiarising yourself with these areas and always staying alert is vital. First and foremost, crew should keep their eyes and ears open to potential hazards and report and rectify them as soon as possible. Those on a short voyage and junior crew can be particularly vulnerable, so proper familiarisation training and mentoring should be provided.

It is also important to ensure that safety management system procedures for safe operations and working practices are strictly adhered to, including the completion of appropriate risk assessment and permits to work. Having the discipline to keep decks free of obstructions, stores and equipment well stowed and secured, and working areas clean will make a big difference.

Regularly used walkways, ladders, and working areas, including mooring decks, should have non-slip coatings to provide a good foothold. Internal and external areas should be well lit for safe access and any defective light fittings rectified promptly.

7.1.1.4 Knowledge of relevant health and safety working instructions during activities that take place on board

Health and safety at work strongly emphasises the need to provide employees with instruction, information and training necessary to ensure their health and safety. Providing employees with health and safety information and training reduces the chance of them suffering injuries or ill health. It helps them acquire the skills, knowledge and attitude to make them competent in the safety and health aspects of their work and instils a positive health and safety culture.

The crew members should be provided with information on:

- The hazards and risks within the workplace;
- The hazards and risks affecting specific tasks or operations carried out by the person;
- The control measures in place to minimise exposure to these risks;
- Information and instructions on the job to be carried out and how to work safely;
- Measures to be taken in an emergency.

Training means showing a person the correct method of doing a task and making sure that he or she can carry out the task correctly and safely. It can be a formal, mandatory training course on safety or informal on the job training such as showing a person the correct method of doing a job, pointing out dangers and ensuring that the person understands and can do the job safely. All crew must be trained in safe work practices. This may include training in the safe use of equipment, use of safe work practices for the activities carried out on board and training in relation to any unique or unusual characteristics of the craft.
Work practices and the effectiveness of any training provided should be monitored. Where unsafe work practices are detected and health and safety measures are not being followed by any member of the crew, the work or activity should be stopped until corrective action has been taken and safety controls are fully complied with. New or young crew members may also require extra supervision.

7.1.1.5 Knowledge of applicable regulations concerning safe and sustainable working conditions

Communication (2014) 332 final from the Commission to the European Parliament, the Council, the European Economic and Social Committee of the regions on an EU Strategic Framework on Health and Safety at Work 2014-2020

This communication sets out key strategic objectives and a range of actions for promoting worker's health and safety, based on an identification of the outstanding problems and major challenges.

Communication COM (2004) 62 final from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions on the practical implementation of the provisions of the Health and Safety at Work Directives 89/931(Framework), 89/654

(Workplaces), 89/655 (Work Equipment), 89/656 (Personal Protective Equipment), 90/269 (Manual Handling of Loads) and 90/270 (Display Screen Equipment).

Prevention is the guiding principle for occupational health and safety legislation in the European Union. In order to avoid accidents from happening and occupational diseases to occur, EU-wide minimum requirements for health and safety protection at the workplace have been adopted.

The aforementioned EU Directives were already transposed and implemented into the national laws of EU Member States, and this report examines how these Directives have been transposed and applied within the Member States.

The 1989 Directive lays down the principles for the introduction of measures to encourage improvements in the safety and health of workers and provides a framework for specific workplace environments, developed in individual directives.

The EU legislation reportedly has had a positive influence on the national standards for occupational health and safety. At the same time, the health and safety measures at the workplace are reported to have widely contributed towards improved working conditions, boosting productivity, competitiveness and employment.

The Commission will continue its work towards a simplification and rationalisation of the Community legal framework by making the necessary legislative proposal for, on one hand, the consolidation of existing directives to make them more comprehensible and, on the other, for the simplification of the provisions of the various Directives related to the implementation reports in view to providing a single report on their implementation.

7.1.1.6 Ability to prevent accidents in activities which might be hazardous to personnel or craft related to:

Loading and unloaded cargoes

Transporting loads is a very dangerous operation. It might seem like a simple task of getting stuff from one place and bringing it to another. But loading, unloading and transporting cargo can cause serious injury and even fatality. Workers loading and unloading cargo are exposed to serious danger in that heavy objects may hit or fall on them if they do not follow the right loading and unloading safety procedures.

Loading, stowage and securing of cargo other than bulk cargo is to be carried out in accordance with the craft's approved cargo-securing manual.

When deck cargo is stowed against and above craft's rails or bulwarks, a wire rope pendant or a chain, extending from the ring bolts or other anchorage on the decks to the full height of the deck cargo, should be provided and used to save personnel having to go over side to attach derrick guys and preventers directly to the anchorages on the deck.

Safety arrangements made prior to working with cargo should ensure that adequate and suitable lifting plant is available, in accordance with the register of lifting appliances and cargo gear, and that all plant and equipment and any special gear necessary is available and used. Cargo gear should be checked regularly throughout the cargo operation for damage or malfunction.

Repair or maintenance work, such as chipping, spray painting, shot blasting or welding, should not be undertaken in a space where cargo operations are in progress.

Loads being lowered or hoisted should not pass or remain over any person engaged in any work in the cargo space area, or over means of access. Personnel should take care when using access ladders in hatch squares whilst cargo operations are in progress.

A signaller should always be employed at a hatchway when cargo is being worked, unless the crane driver or winch-man has a complete, unrestricted view of the load or total working area. The signaller should be in a position where they have a total view of the operation; where this is not possible, then, additional signallers should be used to assist.

Before giving a signal to hoist, the signaller should receive clearance from the person making up the load that it is secure, and should ascertain that no one else would be endangered by the hoist. Before giving the signal to lower, the signaller should warn personnel in the way and ensure all are clear.

Hooks, slings and other lifting gear should not be loaded beyond their safe working loads. Strops and slings should be of sufficient size and length to enable them to be used safely and be so applied and pulled sufficiently tight to prevent the load or any part of the load from slipping and falling.

Suitable precautions, such as the use of packing or chafing pieces, should be taken to prevent chains, wire and fibre ropes from being damaged by the sharp edges of loads.

Trays and pallets (unit loads) should be loaded using a pallet loader where available. If slings are used, the trays and pallets should be hoisted with four-legged slings and, where necessary, nets and other means should be used to prevent any part of the load falling.

Bundles of long metal goods, such as tubes, pipes and rails, should be slung with two slings or strops and, where necessary, a spreader. Slings or strops should be double wrapped and secured to prevent the sling coming loose. A suitable lanyard should also be attached, where necessary.

When work is interrupted or has ceased for the time being, the hatch should be left in a safe condition, with either guardrails or the hatch covers in position.

During cargo operations, cargo spaces should be adequately lit, avoiding strong contrasts of light and shadow or dazzle. Open or naked lights should not be used. Portable lights should be adequately guarded, suitable for the task, and firmly secured in such a manner that they cannot be accidentally damaged. Portable lights should never be lowered or suspended by their electrical leads, and leads should be run so that they are clear of loads, running gear and moving equipment.

Where work is being undertaken on or near the cargo 'face', the face should be secured against collapse, especially where bagged cargo may be bleeding from damage.

Where it is necessary to mount a face, a portable ladder should be used, properly secured against slipping or shifting sideways, or held in position by other personnel. When work is undertaken in areas where there is a risk of falling, safety net(s) should be erected. Such nets should not be secured to hatch covers. Personnel should be aware that cargoes may have been fumigated at other points in the transport chain, and there is a risk that toxic fumes may build up in enclosed spaces.

Mooring and unmooring

All crew members involved in mooring and unmooring operations of any kind should be informed of the hazards of engaging in such operations. A competent person should be in charge of mooring operations and ascertain that there are no persons in a dangerous position before any heaving or letting go operation is commenced.

On each occasion that a vessel berths, all relevant circumstances such as weather, passing vessels, etc., should be considered in determining a safe securing pattern of ropes and wires.

Mixed moorings of wires and ropes in the same direction should not be used because wires and ropes stretch differently. There should be sufficient crew members available to ensure the safe conduct of operations. Only competent persons should operate windlasses and winches.

Under no circumstances whatsoever should crew members stand in a bight of a rope or wire which is lying on deck. Crew members should never stand or move across a rope or wire that is under strain. Ropes and wires are frequently under strain during mooring operations and crew members should, as much as possible, always stand in a place of safety from whiplash should ropes or wires break.

Due to the types of man-made ropes that may be on board ship, crew members should be trained in the techniques of "stopping off" wires and ropes. Chain-securing devices should be used for stopping off wire mooring ropes but never for fibre ropes.

A designated crew member should regularly inspect the moorings when a vessel is alongside and the moorings should be kept tight at all times to prevent the ship's movement.

Mooring to buoys

Where mooring to buoys by the ship's crew is permitted by the local authority, the following additional precautions should be followed:

- lifebuoys, with and without attached lines, should be readily available;
- crew members engaged in mooring to buoys from a ship's boat should wear personal protective equipment and a life-jacket;
- equipment should be provided to enable anyone who falls into the water to climb on board the boat;
- the eye of a slip wire used for mooring to buoys should never be put over the buts;
- mooring strong points, such as chain-securing devices and quick-release mechanisms, should be maintained in a serviceable condition.

Working aloft

Consideration should be given to a permit-to-work system for work aloft or over the side depending on the nature of the work. A form for working aloft should take account of the particular nature of the operation.

Particular attention should be paid to water and weather conditions and the possibility of squalls before working aloft or over the side is commenced. In general, working aloft or over the side should not be permitted if the movement of a ship in an inland waterway makes such work hazardous.

Special consideration should be given to the problems of working near the ship's whistle, funnel, radio aerials and radar scanners. All relevant officers should be informed before work commences and all relevant equipment should be isolated, shut down or appropriate procedures adopted. Warning notices should be posted as appropriate. The Boatmaster should be informed when the work is completed.

Young or inexperienced persons should not be required to work aloft or over the side unless accompanied by an experienced crew member or under adequate supervision. All crew members should wear safety harnesses and safety nets should be rigged where appropriate. Persons working over the side should wear life jackets or other suitable flotation devices. Someone should be in attendance on deck and a lifebuoy with a line attached should be readily available.

Warning notices that crew members are working aloft should be posted on deck and elsewhere as appropriate. Tools should not be carried in pockets but secured in belt tool carriers and they should be kept secured to the belt with a lanyard or string during the work.

Tools and stores should be sent up and lowered by line in suitable containers. All equipment, such as lizards, blocks and gantlines, should be carefully examined before use and if there is any doubt as to the standard, quality and condition of any item it should not be used.

Where possible, only permanent fixtures to the ship's structure, such as welded eye pads, should be used as securing points for lizards, blocks and gantlines.

Lizards and gantlines should be away from, or protected from, sharp edges. Cargo handling operations should not take place in the vicinity where crew members are working aloft. Crew members working aloft or over the side should be continuously supervised by a competent person.

Working with chemicals

Dangerous and irritating substances should be handled only under the supervision of a responsible crew member. Crew members should wear appropriate personal protective equipment.

Crew members should be aware that materials such as residual fuel oil and used or spent engine oil contain substances known to be carcinogenic. In addition to any carcinogenic effects, contact between oil and human skin may lead to a range of skin complaints ranging from mild irritation to severe oil acne. Contact must be avoided by taking suitable precautions, e.g. the owner should provide barrier creams and personal protective equipment.

Boatmasters should ensure that the data sheet information provided by the manufacturers with their products is made available to all crew members who may come into contact with these products.

Composite bonding material can contain unsaturated polyesters which may cause skin irritation which can be difficult to control. Appropriate personal protective clothing should be worn when using substances which contain unsaturated polyesters.

Many adhesives emit fumes which are detrimental to health. Appropriate respiratory equipment should be worn and work spaces should be well ventilated. Fire precautions should be observed when working with adhesives.

Some adhesives, such as "super-glues", can bond skin upon contact. Such adhesives should be used with great caution and the manufacturer's instructions should be closely followed if skin becomes bonded to objects or to other parts of the body. Force should never be used to separate skin or to detach skin from objects.

Under no circumstances should "super-glues" be used for the purposes of practical jokes. When possible, information on the nature of the material should be obtained and any particular hazards identified and suitable precautions taken.

Even seemingly innocuous material may contain harmful substances of which crew members are unaware. Appropriate personal protective equipment should always be worn when insulation, paint and other coating are removed.

All types of asbestos have a fibrous structure which can produce dust harmful to health if the surface integrity is damaged or disturbed. The danger is from minute fibres which can become lodged in the lungs and may cause cancer at a later period.

Crew members should be supplied with information if asbestos is on board craft. Such information should indicate the specific location. Asbestos which is sealed is unlikely to release dust; old asbestos may be in poor condition and consideration should be given to its removal. In general, asbestos should be removed only by a specialist removal contractor.

Paints may contain toxic or irritant substances and a paint for which no manufacturer's information is available should not be used. Some paints dry by evaporation of the paint's solvent and the process may cause flammable or toxic vapours. All interior and enclosed spaces should be well ventilated while painting is in progress and until the paint has dried.

Smoking should not be permitted during painting. Naked lights, such as matches, should not be used in spaces until paint has fully dried. Great care should be taken when mixing two-pack (two components) paint as a chemical reaction takes place during the mixing which might create heat and fumes.

Chemical rust removers are corrosive and precautions should be taken to protect eyes and skin. Spaces where paint and painting equipment are stored should be well ventilated.

Working with batteries

Battery rooms should be adequately ventilated to avoid accumulation of explosive gases. Light fittings and any electrical equipment in the battery room should be of a type certified as being suitable for a hydrogen atmosphere. Particular hazards when charging batteries are hydrogen explosion and short circuits. During charging, a battery gives off hydrogen and oxygen and the subsequent mixture can be easily ignited. Short circuits may cause arcing which could lead to an explosion or burn crew members.

Only authorised persons should enter battery rooms and, when doing so, they should ensure that they do not introduce any source of ignition. Smoking is prohibited in battery rooms. Care should be taken when using metal tools or implements to avoid making contact with the metal battery case or terminals. Battery rooms should be kept clear of any equipment, including any other electrical equipment, likely to act as a source of ignition, and should not be used as storerooms.

Lead-acid batteries and alkaline batteries should not be stored in the same room because of the possible interaction of the electrolytes. Smoking and any type of open flame should be prohibited in a battery compartment. A conspicuous notice to this effect should be displayed at the entrance to the compartment.

Safe and effective means of inspecting and servicing the batteries should be provided by adequate lighting and access to each cell, and personal protective clothing, gloves and goggles should be supplied and worn by crew members engaged in topping up the batteries. Warning: Open flames and naked lights should not be used to inspect battery cells.

Lighting fittings in battery compartments should be properly maintained at all times, with protective glasses in position and properly tightened. If cracked or broken glasses cannot be replaced immediately, the electric circuit should be isolated until replacements are obtained.

Portable electric lamps and tools, and other portable power tools that might give rise to sparks, should not be used in battery compartments. The battery compartment should not be used as a store for any unrelated materials or gear not associated.

A short circuit of even one cell may produce an arc or sparks that may cause an explosion of any hydrogen present. Additionally, the very heavy current that can flow in the short-circuiting wire or tool may cause burns due to rapid overheating of the metal.

Insulation and/or guarding of cables in battery compartments should be maintained in good condition. All battery connections should be kept clean and tight to avoid sparking and overheating. Temporary clip- on connections should never be used because they may work loose due to vibration and cause a spark or short circuit.

Metal tools, such as wrenches or spanners, should never be placed on top of batteries because they may cause sparks or short circuits. The use of insulated tools is recommended.

Jewellery, watches and rings, etc. should be removed when working on batteries. A short circuit through any of these items will heat it rapidly and may cause a severe skin burn. If rings cannot be removed, they should be heavily taped in insulating material.

The battery chargers and all circuits fed by the battery should be switched off when leads are being connected or disconnected. If a battery is in sections, it may be possible to reduce the voltage between cells in the work area, and hence the severity of an accidental short circuit or electric shock, by removing the jumper leads between sections before work is begun. It should be appreciated that whilst individual cell voltages may not prevent a shock risk, dangerous voltages can exist when numbers of cells are connected together in series.

The battery-charging systems should be checked to ensure that it is only possible to charge within the specified rate. Battery boxes should be checked for fixing and integrity as part of the planned maintenance. Battery cell vent plugs should be screwed tight while connections are being made or broken. The ventilation tubes of battery boxes should be examined regularly to ensure that they are free from obstruction.

Lids of battery boxes should be fastened while open for servicing and properly secured again when the work is finished. Batteries should be kept battened into position to prevent shifting in rough weather. Alkaline and lead-acid batteries should be kept in separate compartments or separated by screens. Where both lead-acid and alkaline batteries are in use, great care should be exercised to keep apart the materials and tools used in servicing each type, because contamination of the electrolyte may cause deterioration of battery performance and mixing of the two electrolytes produces a vigorous chemical reaction, which could be very dangerous.

Both acid and alkaline electrolytes are highly corrosive. Immediate remedial action should be taken to wash off any accidental splashes on the person or the equipment. Hands should always be washed as soon as the work is finished.

Batteries should always be transported in the upright position to avoid spillage of electrolyte. A sufficient number of people should be employed because the batteries are heavy and painful strains or injury can otherwise easily result.

Presence in engine room

Crew members should never enter or remain in an unmanned machinery space alone, unless they have received permission from or been instructed by the responsible person in charge at the time. They may only be sent to carry out a specific task that they may be expected to complete in a comparatively short time. Before entering the space, at regular intervals whilst in the space and on leaving the space, they must report by telephone, or other means provided, to the duty deck officer.

Before they enter the space, the method of reporting should be clearly explained. Consideration should be given to, in appropriate instances, to using a permit to work.

If it is the responsible person in charge who enters the machinery space alone, they too should report to the Boatmaster before entry, at regular intervals whilst in the space and on leaving the space.

Notice of safety precautions to be observed by crew members working in unmanned machinery spaces should be clearly displayed at all entrances to the space. Warning should be given that in unmanned machinery spaces there is a likelihood of machinery suddenly starting up.

Unmanned machinery spaces should be adequately illuminated at all times. nWhen machinery is under bridge control, the bridge should always be advised when a change in machinery setting is contemplated by the engine room staff, and before a reversion to engine room control of the machinery.

Before machinery is serviced or repaired, measures should be taken to prevent it being turned on or started automatically or from a remote-control system.

Electrically operated machinery should be isolated from the power supply. Steam-operated machinery should have both steam and exhaust valves securely closed, the valves locked or tied shut or some other means employed to indicate that the valves should not be opened. The same care is required when dealing with heated water under pressure as is required when working on steam-operated machinery or pipework.

In all cases, warning notices should be posted at or near the controls giving warning that the machinery concerned is not to be used. Hydraulic-operated machinery should have its own oil supply valve isolated and the oil return valve if fitted.

Lifting loads (manually and mechanically)

Manual handling

It is important to identify some areas that may require attention in respect of manual handling. In all cases, a risk assessment should be used as the basis for appropriate control measures, which should be put in place to protect those who may be affected.

The assessment should take full account not only of the characteristics of the load and the physical effort

required but also of the working environment (e.g. ship movement, confined space, high or lowtemperature, physical obstacles such as steps or gangways) and any other relevant factors (e.g. the age and health of the person, the frequency and duration of the work).

The term "manual handling" is used to describe any operation that includes any transporting or supporting of a load, lifting, putting down, pushing, pulling, carrying or moving by hand or bodily force. This guidance is generally concerned with preventing musculoskeletal injury. Musculoskeletal injuries can occur as a result of accident, poor organisation or an unsatisfactory working method.

The vessel owners' companies are required to take appropriate measures or provide the means to:

- Assess the risk of injury from any hazardous manual-handling activity;
- Avoid the need for any hazardous manual-handling operations, which may cause injury to crew members, e.G. By re-organisation of the work, or automating or mechanising the operation;
- Reduce the risk of injury from hazardous manual handling;
- Provide information on the weight of each load and, if appropriate, which side is heaviest;
- Train crew members in appropriate manual-handling techniques. Before instructing personnel to lift or carry by hand, where there is a risk of injury, companies should consider whether alternative means of doing the same job would reduce this risk.

Means of reducing the risk of injury may include:

- Re-organisation of the workplace (to enable crew members to maintain good posture while lifting or carrying); and
- Taking account of an individual's capabilities when allocating tasks.

Instruction for personnel should involve experienced and properly trained crew members demonstrating best practice, especially to entry level personnel. Instructions for crew members include:

- Full and proper use of any system of work provided by the company;
- Use any mechanical aids provided;
- Follow appropriate systems of work laid down in respect of health and safety;
- Take sensible precautions to ensure that you are aware of any risk of injury from a load before picking it up;
- Cooperate on all health and safety matters;
- Inform your line manager of identified hazardous handling activities.

Mechanical handling

Cargo handling equipment should be operated only by trained and experienced persons. Manufacturer's instructions regarding operation and maintenance as contained in the craft's cargo handling manual should be followed at all times.

Equipment should be inspected by a responsible person prior to and after use. No equipment should be used or operated unless the prescribed certificates of tests and examinations are on the ship and are current and valid.

The crew member with primary responsibility for cargo operations should check that all safety features are in place and that any possible hazards are clearly marked and otherwise dealt with to prevent injury to any persons who may be working on board the vessel. The Boatmaster should ensure that the crew is aware of any hazardous cargoes or operations. Appropriate protective equipment should be provided to crew members before commencement of cargo operations.

Prior to commencement of cargo operations, clear means and lines of communication should be established between the ship's crew and terminal personnel or dockworkers. This is particularly important in case of hazardous cargoes or hazardous operations. If hand signals are to be used, their meaning must be clear to all those concerned in the operation.

All crew members must take particular care to not exceed the safe working load of any equipment. The Boatmaster should take particular care, especially in older vessels, not to overstress any part of the ship's structure. When work is interrupted or has temporarily ceased, hatches should be left in a safe condition, with either guard-rails or the hatch covers in position.

No other work should be carried out in a space in which cargo is being worked. Crew members should immediately report the damage of cargo handling equipment to a responsible ship's officer. Damaged equipment should be immediately taken out of service.

When dangerous goods are carried, the special regulations should be strictly followed. Cargo gear should be properly stowed to prevent it from breaking loose and posing a hazard when the vessel is on movement.

Cargo should be stowed and secured assuming the worst weather conditions which may be expected. When deck cargoes are carried, particularly timber, attention should be paid to ensuring the ship's stability throughout the voyage, especially in consideration of the possibility of added weight due to absorption of water or accumulation of ice or snow.

Entry into and working in enclosed spaces

All enclosed spaces should be considered unsafe for entry until proven otherwise. If there is an unexpected reduction in or loss of ventilation, in spaces which are usually ventilated by whatever means, then those spaces should also be considered as dangerous.

Any enclosed spaces may have an atmosphere deficient in oxygen, and/or contain flammable or toxic fumes, gases or vapours, thus presenting a major risk to health or life for anyone entering it. Areas in which an unsafe atmosphere is present or can arise include cargo holds, double bottoms, cargo tanks, pump rooms, compressor rooms, fuel tanks, ballast tanks, cofferdams, void spaces, duct keels, inter-barrier spaces, sewage tanks, cable trunks, pipe trunks, pressure vessels, battery lockers, chain lockers, inert gas plant scrubber and blower spaces and the storage rooms for CO_2, halons and other media used for fire extinguishing or inerting.

Such enclosed spaces should not be entered except upon the explicit instruction of the master or the responsible officer. If a deficiency of oxygen or the presence of toxic gases, vapours or fumes is suspected in any space, then that space should be considered dangerous.

The crew should be drilled periodically in enclosed spaces rescue and medical first aid.

Precautions on entering in enclosed spaces

Before a space is entered, the following precautions should be taken, as appropriate, to make it safe for entry without the need for breathing apparatus, and to ensure that it remains safe whilst crew members are inside:

- A competent person should make an assessment of the space and a responsible officer should be appointed to take charge of the operation;
- The potential hazards should be identified;
- The space should be prepared and secured for entry;
- The atmosphere should be tested;
- A "permit-to-work" system should be used;
- Entry procedures should be established and followed;
- Continuous ventilation should be maintained throughout.

Additional precautions, including the use of breathing apparatus, should be taken where the aforementioned precautions have been followed and an unsafe atmosphere has been established.

A crew member should not enter a dangerous space to attempt a rescue without first having called for assistance and then having donned a breathing apparatus. Even then entry should not be made until assistance arrives.

Preparing and securing the space for entry

Care should be taken to avoid the effects of a possible release of pressure or vapour when opening the entrance to the space.

The space should be isolated and secured against the escape of dangerous substances by blanking off pipelines or other openings or by closing valves. Valves should then be tied, or some other method employed to show that they must not be opened.

The space should be cleaned or washed if necessary, to remove as much as possible of the sludge or other deposit liable to give off dangerous fumes. Special precautions may be necessary.

The space should be thoroughly ventilated by natural or mechanical means, to ensure that all harmful gases are removed and no pockets of oxygen-deficient atmosphere remain. Compressed oxygen should not be used to ventilate any space.

The persons in charge, on the bridge, on the deck, in the engine room, or the cargo control room should be informed as necessary of any space to be entered so that, for example, fans are not stopped, equipment not started or valves not opened by remote control. Appropriate warning notices should be placed on the relevant controls or equipment.

Where necessary, pumping operations or cargo movements should be suspended when entry is being made into a dangerous space.

Testing the atmosphere of enclosed spaces

Only persons trained in the use of the equipment should test the atmosphere of a space. Equipment should be properly calibrated before use.

Testing of the atmosphere should be carried out before entry and at regular intervals thereafter.

Testing of the atmosphere before entry should be made by remote means. If not possible, the competent person should ensure that all attempts have been made to reduce the danger posed by the atmosphere and only then should entry be made with the additional precautions.

Testing of the atmosphere should be carried out on different levels, where appropriate. Personal monitoring equipment designed purely to provide a warning against oxygen deficiency and hydrocarbon concentrations should not be used as a means of determining whether a dangerous space is safe to enter.

Use of a permit-to-work system

A "permit-to-work" system should be used. Entry into a space should be planned in advance and if unforeseen problems or hazards arise during the operation, then work should be stopped and the space evacuated immediately. Permits to work should be withdrawn, and the situation reassessed. Permits to work should be revised as appropriate after the reassessment.

Everyone should leave the space on expiry of a "permit-to-work", and the entrance should be closed or otherwise secured to prevent re-entry, or declared safe for normal entry when it is no longer dangerous.

Procedures and arrangements before entry

Access to and lighting within the space should be adequate. No sources of ignition should be taken or put into the space unless the master or responsible officer is satisfied that it is safe to do so. A rescue team and resuscitation equipment should be available for immediate action. The resuscitation equipment should be positioned ready for use at the entrance.

Only trained personnel should be assigned duties at entry, functioning as attendants or as members of rescue teams. The number entering should be limited to those persons who actually need to work in the space and could be rescued in the event of an emergency.

At least one person, trained in entry procedures and the action to be taken in the event of an emergency, should be detailed to stay by the entrance whilst it is occupied.

A communication system should be agreed and tested by all involved, to ensure that persons entering the space can keep in touch with the person stationed at the entrance. A communication system should be set up between the responsible officer and the person stationed at the entrance. It should be checked that entry with breathing apparatus is possible before entry is allowed. The extent by which movement could be restricted, or the removal of a casualty could be hampered, by the use of breathing apparatus, lifelines or harnesses should be ascertained.

Rescue harness lifelines should be long enough for the purpose and easily detachable by the wearer, but should not otherwise come away from the harness.

Procedures and arrangements during entry

The space should be continuously ventilated whilst occupied and during temporary breaks. All persons in the space should leave it immediately should the ventilation system fail. Whilst the space is occupied the atmosphere should be tested periodically. Should there be any deterioration in the conditions all persons should leave immediately. Work should stop and all persons should leave the space if unforeseen difficulties or hazards occur. The situation should then be reassessed. If any person working in a space feels in any way adversely affected he or she should give a pre-arranged signal to the person standing by the entrance and immediately leave the space.

A rescue harness should be worn to facilitate recovery in the event of an accident. The general (or crew) alarm should be sounded in the event of an emergency, so that immediate back-up can be given to the rescue team.

Additional requirements for entry into a space where the atmosphere is suspect or known to be unsafe

Where the atmosphere is considered suspect or unsafe to enter without breathing apparatus and provided all reasonable attempts at gas-freeing have been carried out, entry may be made if this is essential for testing purposes, the working of the ship, the safety of life or the safety of the ship. The number of persons entering should be the minimum necessary to undertake the work.

Breathing apparatus should always be worn. Respirators must not be used because they do not provide a supply of clean air from a source independent of the atmosphere in the space.

Two air supplies should be available to the wearer of breathing apparatus, except in the case of emergency, or where this is impractical because movement in the space would be seriously impeded. A continuous supply provided from outside the space should normally be used. Should it prove necessary to change over to the self-contained supply, the person should immediately vacate the space.

Precautions should be taken to safeguard the continuity of the outside source of air during occupation of the space by the wearer of breathing apparatus.

Special attention should be given to supplies originating from the engine room. A single air supply may be acceptable, where remote testing of the space is not reasonably practicable provided prolonged presence in the space is not required and the person is situated so that he can be hauled out immediately in case of emergency. A rescue harness should be worn. Lifelines should be used where practicable, and should be attended by a person stationed at the entrance who

has received training in how to pull an unconscious person from a dangerous space. If hoisting equipment would be needed to effect a rescue, the availability of persons to operate the equipment in the event of an emergency should be ensured.

Portable lights and other electrical equipment should be of a type approved for use in a flammable atmosphere. Personal protective equipment should be worn where there is a hazard due to chemicals, in liquid, gaseous or vapour form.

A pre-arranged plan should be drawn up to deal with the rescue of collapsed persons within a dangerous space, which should take into account the design of the individual ship and of the equipment and manpower on board. The need to allocate personnel to relieve or back-up those first into the space should be considered.

If a person working in the space indicates that he or she is being affected by the atmosphere, using the agreed communication system, the person stationed by the entrance should immediately raise the alarm. On no account should the person stationed at the entrance to the space attempt to enter it before additional help has arrived. No one should attempt a rescue without wearing breathing apparatus and a rescue harness and, whenever possible, the use of a lifeline.

If air is being supplied through an air-line to the person who has become unwell, an immediate check should be made that his or her air supply is being maintained at the correct pressure.

An incapacitated person should be removed from the space as quickly as possible, unless he or she is gravely injured, e.g. a broken back, when essential first-aid treatment should be administered first. The restoration of the casualty's air supply at the earliest possible moment must be the first priority.

7.1.1.7 Ability to understand orders and to communicate with others in relation to on board duties

Communication is an essential part of human interaction. The benefits of effective communication are many and obvious as they enhance all aspects of our personal and professional lives. Ineffective or misunderstood communications in our personal lives may give rise to problems or embarrassment but in our professional lives misunderstandings may have much more serious results. In the world of international shipping, with crew members from many countries sailing on vessels trading to all parts of the world, effective communication between those on board and between ship and shore is vitally important.

As in all workplaces, the ability of the crew members to contribute to effective communications and teamwork is pivotal to smooth running and safe operations.

Communication is an act of imparting, giving, transmitting and receiving information. Teamwork means working together in an organised and cooperative effort. Effective communications and teamwork therefore requires giving clear and concise information, listening, questioning and receiving feedback that confirms understanding by others to achieve a commonly held purpose or goal.

Many accidents are found to be due mainly to operational issues of proper procedure, maintenance and design, rather than to proper implementation of regulations but effectiveness of bridge resource management and particularly ineffective relationship between Boatmaster and the crew members are recurrent themes. Communications difficulties often occur in these areas due in part to cultural differences but also to the language barriers.

Communication inside the bridge team

Before the vessel leaves for a voyage the Boatmaster must inform the bridge team about the specific elements of the journey like:

- Route plan;
- Requirements that must be fulfilled by the bridge team during the voyage;
- Discussions about the particularities of the route and identifying the sensible points;
- Defining the way of work on the bridge in order to assure the necessary level of safety.

Communication inside the bridge team must be clear. Communication between crew members who speak different languages, especially with inexperienced crew members must be done in a common language. The advantage of pre-established and generally understood navigation commands can be appreciated in this context. The full list of EDINNA Standards inland navigation communications phrases – Riverspeak – is comprehensive.

Participate in group discussions to achieve appropriate work outcomes. The ability of the personnel on board to coordinate their activities and to effectively communicate between them is vital in emergency situations.

It is especially important for the Boatmaster to be able to communicate efficiently with the crew members whenever it is necessary; but in most of the situations it is important for the Boatmaster to be able to transmit his or her intentions and orders to his or her crew members, especially in case of emergency. No matter if the vessel is underway or if it is doing an entrance in the port manoeuvre, the crew members must function as an upright team.

A crew team member with a well explained plan by the Boatmaster and at the same time a well understood plan, will possess a good response in case of emergency. Where the members of the bridge team are able to anticipate dangerous situations and to recognise the development of an error chain, they will have the capacity of taking the necessary actions for avoiding that certain situation and correcting the committed errors.

If the Boatmaster is making a good schedule of the vessel's voyage, the bridge team will have a better control of the vessel's evolution and will avoid the appearance of unpredicted events due to the configuration of the navigation area. The way that the configuration of the initial plan and applying the emergency one is being done, is related to the experience of the bridge team and of the Boatmaster and the appearance of unpredicted problems. Whenever it is possible, when the voyage is completed successfully, the Boatmaster must discuss with the bridge team the way the voyage was planned and executed, especially the observed weak points. This kind of discussion leads to correction of the initial plan and obtaining a better voyage plan that can be used next time for the same route.

7.1.2 Use personal protective equipment

7.1.2.1 Knowledge of personal protective equipment

Personal protective equipment

Risks to the health and safety of crew members must be identified and assessed. It will often not be possible to remove all risks, but attention should be given to control measures that will make the working environment and working methods as safe as reasonably practicable.

Personal protective equipment must be used only when risks cannot be avoided or reduced to an acceptable level by safe working practices. This is because personal protective equipment does nothing to reduce the hazard and can only protect the person wearing it, leaving others vulnerable.

Controls should be chosen taking into account various factors. In order of effectiveness these are:

- Elimination;
- Substitution by something less hazardous and risky;
- Enclosure (enclose the hazard in a way that eliminates or controls the risk);
- Guarding/segregation of people;
- Safe system of work that reduces the risk to an acceptable level;
- Written procedures that are known and understood by those affected;
- Reviewing the blend of technical and procedural control;
- Adequate supervision;
- Identification of training needs;
- Information/instruction (signs, hand-outs); and
- Ppe (last resort) – cannot be controlled by any other means.

It should be noted that the use of personal protective equipment may in itself cause a hazard, e.g. through reduced field of vision, loss of dexterity or agility. The Company must ensure that crew members are provided with suitable personal protective equipment where it is needed.

The Company should assess the equipment required to ensure that it is suitable and effective for the task in question, and meets the appropriate standards of design and manufacture.

Suitable equipment should:

- Be appropriate for the risks involved, and the task being performed, without itself leading to any significant increased risk;
- Fit the crew member correctly after any necessary adjustment;
- Take account of ergonomic requirements and the seafarer's state of health; and
- Be compatible with any other equipment that the seafarer has to use at the same time, so that it continues to be effective against the risk.

The Company must also ensure that PPE is regularly checked and maintained or serviced. Records should be maintained of servicing and any repair required and carried out.

All crew members required to use protective equipment must be properly instructed and trained in its use. This should include being advised of its limitations and why it is needed. A record should be kept of who has received training.

Defective or ineffective protective equipment provides no defence. It is therefore essential that the correct items of equipment are selected and that they are properly maintained at all times. The manufacturer's instructions should be kept safe with the relevant apparatus and, if necessary, referred to before use and when maintenance is carried out. Personal protective equipment should be kept clean and should be disinfected as and when necessary for health reasons.

A competent person should inspect each item of protective equipment at regular intervals and in all cases before and after use. All inspections should be recorded. Equipment should always be properly stowed in a safe place after use.

Crew members must wear the protective equipment or clothing supplied when they are carrying out a task for which it is provided, and follow appropriate instructions for use.

Personal protective equipment should always be checked by the wearer each time before use. Crew members should comply with the training they have received in the use of protective items, and follow the manufacturer's instructions for use.

Types of equipment

Overalls, gloves and suitable footwear are the proper working dress for most work about the vessel but these may not give adequate protection against particular hazards in particular jobs.

Personal protective equipment must always be selected according to the hazard being faced and the kind of work being undertaken, in accordance with the findings of the risk assessment.

Personal protective equipment can be classified as follows:

7.1.2.2 Ability to use personal protective equipment, for example:

Eye protection

Face and eye protectors are available in a wide variety of designs. Careful consideration should be given to the characteristics of the respective hazard to ensure the selection of the appropriate protector.
Ordinary prescription (corrective) spectacles, unless manufactured to a safety standard, do not afford protection. Certain box-type goggles are designed so that they can be worn over ordinary spectacles.

Respiratory protection

Appropriate respiratory protective equipment should be provided for work in conditions where there is a risk of oxygen deficiency or exposure to poisonous, dangerous or irritating fumes, dust, or gases.

The selection of correct equipment is essential. Since there is a wide variety of equipment available for shipboard use, advice should be sought on the appropriate equipment for use on particular ships and for particular purposes.

Type	Examples
Head protection	Safety helmets, bump caps, hair protection
Hearing protection	Earmuffs, earplugs
Face and eye protection	Goggles and spectacles, facial shields
Respiratory protective equipment	Dust masks, respirators, breathing apparatus
Hand and foot protection	Gloves, safety boots and shoes
Body protection	Safety suits, safety belts, harnesses, aprons, high visibility clothing
Protection against drowning	Lifejackets, buoyancy aids and lifebuoys
Protection against hypothermia	Immersion suits and anti-exposure suits

Crew members should be trained in the use and care of equipment. The face-piece incorporated in respirators and breathing apparatus must be fitted correctly to prevent leakage. The wearing of spectacles, unless adequately designed for the purpose, or beards and whiskers are likely to interfere with the face seal.

Ear protection

Crew members who by the nature of their duties, are exposed to high levels of noise such as those working in machinery spaces, should be provided with and should wear ear protectors.

Various types of hearing protectors are available for shipboard use, including ear plugs and earmuffs, each of which may be of different design standards. Protectors should be of a type recommended as suitable for the particular circumstances and climatic conditions.

In general, earmuffs give the most effective protection. Hearing protectors should be made available at the entrance to the machinery space.

Head protection

Helmets may be designed for different purposes. A helmet designed to provide protection from objects falling from above may not be suitable for protecting crew members from chemical splashes. Thus, it may be necessary to carry different types of helmets on particular ships.

In general, the shell of a helmet should be of one-piece construction, with an adjustable cradle inside to support the helmet on the wearer's head and, where appropriate, a chin-strap to prevent the helmet from falling off.

Protective clothing

Special outer clothing may be needed for protection when personnel are exposed to particular contaminating or corrosive substances. This clothing should be kept for the particular purpose and dealt with as directed in the relevant sections of this Code.

Employees who face possible body injury of any kind that cannot be eliminated through engineering, work practice or administrative controls, must wear appropriate body protection while performing their jobs.

There are many varieties of protective clothing available for specific hazards. Employers are required to ensure that their employees wear personal protective equipment only for the parts of the body exposed to possible injury.

High-visibility clothing should be worn when it is important to be seen to be safe, e.g. during loading and unloading operations.

7.1.3 Take required precautions before entering enclosed spaces

7.1.3.1 Knowledge of the hazards associated with entering enclosed spaces

The hazards associated with enclosed spaces include:

Toxic Atmosphere

A toxic atmosphere may cause various acute effects, including impairment of judgement, unconsciousness and death. A toxic atmosphere may occur due to the presence or ingress of hazardous substances. These substances may be present in the enclosed space for various reasons such as:

- Remaining from previous processing or storage;
- Arising from the disturbance of sludge and other deposits;
- The presence of a fire or flames within the space;
- See page from improperly isolated adjoining plant;
- Formation during the work processes carried out in the space;
- Being released from under scale and in brickwork as a result of the work process.

Oxygen Deficiency

Oxygen can be lacking in a confined space for the following reasons:

- Displacement of air by another gas;
- Various biological processes or chemical reactions (such as rotting of organic matter, rusting of metals, burning, etc.);
- Absorption of air onto steel surfaces, especially where these are damp.

Oxygen Enrichment

An excess of oxygen, in the presence of combustible materials, results in an increased risk of fire and explosion. Some materials, which do not burn in air, may burn vigorously or even spontaneously in an enriched oxygen atmosphere.

Flammable or Explosive Atmospheres

A flammable atmosphere presents a risk of fire or explosion. Such an atmosphere can arise from the presence in the confined space of flammable liquids or gases or of a suspension of combustible dust in air. If a flammable atmosphere inside a confined space ignites, an explosion may occur, resulting in the expulsion of hot gases and the disintegration of the structure.

Flowing Liquid or Free Flowing Solids

Liquids or solids can flow into the confined space causing drowning, suffocation, burns and other injuries. Solids in powder form may also be disturbed in a confined space resulting in an asphyxiating atmosphere.

Excessive Heat

The enclosed nature of a confined space can increase the risk of heat stroke or collapse from heat stress, if conditions are excessively hot. The risk may be exacerbated by the wearing of personal protective equipment or by lack of ventilation.

7.1.3.2 Knowledge of precautions to be taken and tests on measurements to be carried out to determine whether or not an enclosed space has been made safe for entry, and while working in enclosed space

Precautions on entering in enclosed spaces

Before a space is entered, the following precautions should be taken, as appropriate, to make it safe for entry without the need for breathing apparatus, and to ensure that it remains safe whilst crew members are inside:

- A competent person should make an assessment of the space and a responsible officer should be appointed to take charge of the operation;
- The potential hazards should be identified;
- The space should be prepared and secured for entry;
- The atmosphere should be tested;
- A "permit-to-work" system should be used;
- Entry procedures should be established and followed;
- Continuous ventilation should be maintained throughout.

Additional precautions, including the use of breathing apparatus, should be taken where the aforementioned precautions have been followed and an unsafe atmosphere has been established.

A crew member should not enter a dangerous space to attempt a rescue without first having called for assistance and then having donned a breathing apparatus. Even then entry should not be made until assistance arrives.

Duties and responsibilities of a competent person and of a responsible crew member

The designated competent person should be capable of making an informed assessment of the likelihood of a dangerous atmosphere being present or arising subsequently in a space. The competent person should have sufficient theoretical knowledge and practical experience of the hazards that might be met in order to be able to assess whether precautions are necessary. The assessment should include any potential hazards which might be met, and should take into account any dangers from neighbouring or unconnected spaces, as well as the work needing to be done in the space itself.

A responsible crew member should be designated to take charge of every operation where entry into a potentially dangerous space is necessary. This officer may be the same person as the competent person. The responsible officer must decide on the basis of the competent person's assessment the procedures which must be followed for entry into the space.

These will depend on whether the assessment shows:

- No risk is envisaged to the life or health of a person entering the space;
- No immediate risk to life or health but that a risk could arise during the course of work in the space;
- An immediate risk to life or health.

If no risk to life or health is envisaged, and it is considered that conditions in the space will not change, then entry may be made. The space should be monitored as long as anyone is inside.

Preparing and securing the space for entry

Care should be taken to avoid the effects of a possible release of pressure or vapour when opening the entrance to the space.

The space should be isolated and secured against the escape of dangerous substances by blanking off pipelines or other openings or by closing valves. Valves should then be tied, or some other method employed to show that they must not be opened.

The space should be cleaned or washed if necessary, to remove as much as possible of the sludge or other deposit liable to give off dangerous fumes. Special precautions may be necessary.

The space should be thoroughly ventilated by natural or mechanical means, to ensure that all harmful gases are removed and no pockets of oxygen-deficient atmosphere remain. Compressed oxygen should not be used to ventilate any space.

The persons in charge, on the bridge, on the deck, in the engine room, or the cargo control room should be informed as necessary of any space to be entered so that, for example, fans are not stopped, equipment not started or valves not opened by remote control.

Appropriate warning notices should be placed on the relevant controls or equipment. Where necessary, pumping operations or cargo movements, should be suspended when entry is being made into a dangerous space.

Testing the atmosphere of confined and enclosed spaces

Only persons trained in the use of the equipment should test the atmosphere of a space. Equipment should be properly calibrated before use. Testing of the atmosphere should be carried out before entry and at regular intervals thereafter. Testing of the atmosphere before entry should be made by remote means. If not possible, the competent person should ensure that all attempts have been made to reduce the danger posed by the atmosphere and only then should entry be made with the additional precautions.

Testing of the atmosphere should be carried out on different levels, where appropriate. Personal monitoring equipment designed purely to provide a warning against oxygen deficiency and hydrocarbon concentrations should not be used as a means of determining whether a dangerous space is safe to enter.

Use of a permit-to-work system

A "permit-to-work" system should be used. Entry into a space should be planned in advance and if unforeseen problems or hazards arise during the operation, then work should be stopped and the space evacuated immediately. Permits to work should be withdrawn, and the situation reassessed. Permits to work should be revised as appropriate after the reassessment.

Everyone should leave the space on expiry of a "permit-to-work", and the entrance should be closed or otherwise secured to prevent re-entry, or be declared safe for normal entry when it is no longer dangerous.

Procedures and arrangements before entry

Access to and lighting within the space should be adequate. No sources of ignition should be taken or put into the space unless the master or responsible officer is satisfied that it is safe to do so. A rescue team and resuscitation equipment should be available for immediate action. The resuscitation equipment should be positioned ready for use at the entrance.

Only trained personnel should be assigned duties at entry, functioning as attendants or as members of rescue teams. The number entering should be limited to those persons who actually need to work in the space and could be rescued in the event of an emergency.

At least one person, trained in entry procedures and the action to be taken in the event of an emergency, should be detailed to stay by the entrance whilst it is occupied. A communication system should be agreed and tested by all involved, to ensure that persons entering the space can keep in touch with the person stationed at the entrance.

A communication system should be set up between the responsible officer and the person stationed at the entrance.

It should be checked that entry with breathing apparatus is possible before entry is allowed. The extent by which movement could be restricted, or the removal of a casualty could be hampered, by the use of breathing apparatus, lifelines or harnesses should be ascertained.

Rescue harness lifelines should be long enough for the purpose and easily detachable by the wearer, but should not otherwise come away from the harness.

Procedures and arrangements during entry

The space should be continuously ventilated whilst occupied and during temporary breaks. All persons in the space should leave it immediately should the ventilation system fail. Whilst the space is occupied the atmosphere should be tested periodically. Should there be any deterioration in the conditions all persons should leave immediately.

Work should stop and all persons should leave the space if unforeseen difficulties or hazards occur. The situation should then be reassessed. If any person working in a space feels in any way adversely affected he or she should give a pre-arranged signal to the person standing by the entrance and immediately leave the space. A rescue harness should be worn to facilitate recovery in the event of an accident.

The general (or crew) alarm should be sounded in the event of an emergency, so that immediate back-up can be given to the rescue team.

Additional requirements for entry into a space where the atmosphere is suspect or known to be unsafe

Where the atmosphere is considered suspect or unsafe to enter without breathing apparatus and provided all reasonable attempts at gas-freeing have been carried out, entry may be made if this is essential for testing purposes, the working of the ship, the safety of life or the safety of the ship. The number of persons entering should be the minimum necessary to undertake the work.

Breathing apparatus should always be worn. Respirators must not be used because they do not provide a supply of clean air from a source independent of the atmosphere in the space.

Two air supplies should be available to the wearer of breathing apparatus, except in the case of emergency, or where this is impractical because movement in the space would be seriously impeded. A continuous supply provided from outside the space should normally be used. Should it prove necessary to change over to the self-contained supply, the person should immediately vacate the space.

Precautions should be taken to safeguard the continuity of the outside source of air during occupation of the space by the wearer of breathing apparatus.

Special attention should be given to supplies originating from the engine room. A single air supply may be acceptable, where remote testing of the space is not reasonably practicable provided prolonged presence in the space is not required and the person is situated so that he or she can be hauled out immediately in case of emergency. A rescue harness should be worn. Lifelines should be used where practicable, and should be attended by a person stationed at the entrance who has received training in how to pull an unconscious person from a dangerous space. If hoisting equipment would be needed to effect a rescue, the availability of persons to operate the equipment in the event of an emergency should be ensured.

Portable lights and other electrical equipment should be of a type approved for use in a flammable atmosphere. Personal protective equipment should be worn where there is a hazard due to chemicals in liquid, gaseous or vapour form. A pre-arranged plan should be drawn up to deal with the rescue of collapsed persons within a dangerous space, which should take into account the design of the individual ship and of the equipment and manpower on board. The need to allocate personnel to relieve or back-up those first into the space should be considered.

If a person working in the space indicates that he or she is being affected by the atmosphere, using the agreed communication system, the person stationed by the entrance should immediately raise the alarm. On no account should the person stationed at the entrance to the space attempt to enter it before additional help has arrived. No one should attempt a rescue without wearing breathing apparatus and a rescue harness and, whenever possible, the use of a lifeline.

If air is being supplied through an air-line to the person who has become unwell, an immediate check should be made that his or her air supply is being maintained at the correct pressure. An incapacitated person should be removed from the space as quickly as possible, unless he or she is gravely injured, e.g. a broken back, when essential first-aid treatment should be administered first. The restoration of the casualty's air supply at the earliest possible moment must be the first priority.

Breathing apparatus and resuscitation equipment

Every crew member likely to use breathing apparatus should be instructed in its use by a competent person. The full, pre-wearing check and donning procedures recommended by the manufacturer should be undertaken by the master, or the responsible officer, and the person about to enter the space. In particular the following should be checked:

- That there will be sufficient clean air at the correct pressure;
- That low pressure alarms are working properly;
- That the face mask fits correctly against the user's face, so that, combined with pressure of the air coming into the mask, there will not be an ingress of oxygen deficient air or toxic vapours when the user inhales. It should be noted that facial hair or spectacles may prevent the formation of an airtight seal between a person's face and the face mask;
- That the wearer of the breathing apparatus understands whether or not his or her air supply may be shared with another person and if so is also aware that such procedures should only be used in an extreme emergency;
- That when work is being undertaken in the space the wearer should keep the self-contained supply for use when there is a failure of the continuous supply from outside the space.

When in a dangerous space:

- No one should remove his or her own breathing apparatus;
- Breathing apparatus should not be removed from a person unless it is necessary to do so to save his or her life.

Where any person may be required to enter a dangerous space appropriate resuscitators should be provided, and if entry is expected to occur at water the vessel should be provided with the appropriate equipment. If the appropriate equipment has not been provided entry should not take place.

Maintenance of equipment and training

A competent person should maintain and periodically inspect and check for correct operation all breathing apparatus, rescue harnesses, lifelines, resuscitation equipment and any other equipment provided for use in, or in connection with, entry into dangerous spaces or during emergencies. A record should be kept of the inspections and checks. All items of breathing apparatus should be inspected and checked for correct operation before and after use.

Equipment for testing the atmosphere of dangerous spaces should be kept in good working order and, where applicable, regularly serviced and calibrated. The manufacturer's recommendations should be kept with the equipment and should be followed.
Vessel owners should provide crew members with the necessary training, instructions and information on entry into dangerous spaces, which should include:

- Recognition of the circumstances and activities likely to lead to the presence of a dangerous atmosphere;
- Recognition of the hazards associated with entry into dangerous spaces, and the precautions to be taken;
- The use and proper care of equipment and clothing required for entry into dangerous spaces;
- Instructions and drill in rescue from dangerous spaces.

7.1.3.3 Ability to apply safety instructions before entering certain spaces on board for example:

Holds

Do's and Don'ts for safe operation of holds

Do's:

- Always rectify steel-to-steel faults before renewing rubber packing or rubber renewals will not be effective;
- Always keep chains and cleats correctly adjusted;
- Always attach locking pins and chains to doors and hatch covers in the open position;
- Always keep coaming tops clean and double drainage channels in good order;
- Always open hatch covers and clean coaming tops and double drainage channels after loading bulk cargo through the grain or cement hatches. This must be done prior to final closing of covers for sea;
- Always keep wheels, hinge pins and chain tension equipment well greased;
- Always keep hydraulic systems oil tight;
- Always give notice that maintenance is being performed on equipment;
- Ensure no one can start the system or equipment;
- Always prevent access hatch from being locked closed when personnel are in the hold;
- Always lock hatch covers fully open before switching off power;
- Always check wires for broken strands and fraying. Grease regularly.

Don'ts

- Enter a hold with suspect atmosphere;
- Apply petroleum-based grease or paint to rubber packing surfaces;
- Remove the rubber ball valve from drain valves;
- Allow grooves to form in coaming tops in way of the side panel edges;
- Use anything other than the recommended oil in the hydraulic system;
- Leave cleats loose when proceeding to sea;
- Attempt to open or close side-rolling covers with loads or cargo debris on top;
- Screw down cleats beyond normal tension.

Cofferdams

When driving sheet piling to form a cofferdam, employees will use suitable eye and hearing protection. Life vests will be worn by all employees and visitors when over, near, or adjacent to water that may create a drowning hazard.

Employees working on or in the cofferdam will do so in groups of no less than two (2). If a crew member is absent and cannot be accounted for, the supervisor will notify his or her manager, who will direct an immediate search of the area for the missing employee.

Where overtopping of the cofferdam by high water is possible, provisions for controlled flooding will be included in the design. A stokes-type stretcher with blankets, an approved first-aid kit, and lifting bridles will be located on and/or in the cofferdam for removal of a sick or injured employee.

Air monitoring will be conducted within the cofferdam work area before any employee enters the area. A log of these test readings will be maintained.

Monitoring

As the cofferdam is dewatered, surveys will be taken and measurements logged each time the water level is pumped down. After the cofferdam is dewatered, the cells will be monitored until they have stopped moving and are set. The interlocks of all visible sheet piling, where used, will be examined and any separations welded shut with a strap added to the affected piles.

After the cofferdam dewatering has been completed, it will be monitored for movement by visual (survey) means and by mechanical means, if necessary. As work starts and progresses in the cofferdam, the cells will be monitored daily for movement. Any movement will require visual examination of all areas potentially affected by movement to detect damages or threats of sheet kick-out, blowout, or unzipping of the sheet interlocks.

Access

Where personnel or equipment are required or permitted on or in cofferdams, walkways, bridges, ramps, standard railings, or equivalent protection will be provided. At least two ladders, walkways, ramps, roads, or other means of exit will be provided for personnel and equipment on or in cofferdams. In addition, at least one rapid means of exit will be provided for personnel and equipment working on or in cofferdams. This may consist of a crane with a personnel basket and/or bridle cables for equipment lifts standing by the operation.

Where employees are required to work inside the cofferdam at some distance from a means of exit or to repair an actual or potential cell failure, a crane with a personnel basket or similar device will be provided. The crane or lift operator will remain at his or her station while employees are in the cofferdam.

Emergency Situations

Where personnel and/or equipment work on or in a cofferdam, a siren with flashing lights will be provided as a warning device. Employees will be trained and signs posted stating that activation of the siren and lights require immediate evacuation by the nearest means possible. An emergency plan, such as the following, will be developed and followed: 4.4.7

- Determine whether there is an emergency;
- Sound the alarm;
- Evacuate people and equipment, if possible;
- Take a head count for missing employees;
- Search for any missing employee;
- Notify the management team members;
- Open the controlled flooding device(s) as directed;
- Secure the area to protect employees, the public, equipment, and other assets.

The emergency plan and call sheet will be communicated to employees at a training meeting before beginning cofferdam work. A written copy will be given to each employee. Copies will be posted in change shacks and crew boxes on the project.
Each crew working on or in the cofferdam will have a pre-arranged place to meet in the event of an evacuation order. The foreman will be responsible for taking a head count of employees at the rendezvous point to determine whether the entire crew is accounted for.

Evacuation tests should be planned and conducted to assure employee compliance and familiarity along with discovering any problem areas before a real emergency develops.

Double hull

Double hull enclosed space is difficult to ventilate. Entry into enclosed spaces with a compartmental structure, such as double hull, which is more difficult to ventilate than conventional tanks, require particular care when monitoring the tank atmosphere. Entry into this space should be undertaken in two stages:
The first stage should be for the purpose of atmosphere verification and a general safety review. The personnel making the entry should be equipped with:

- An emergency escape breathing set;
- Personal gas detector capable of monitoring hydrocarbon and oxygen levels;
- Portable radio;
- Emergency light source (torch);
- A retrieval harness;
- An alternative means of attracting attention, such as a whistle.

Only after the first stage has verified that the atmosphere throughout the tanks is safe for the intended task should entry for other purposes be permitted.

Access to and within the space should be adequate and well illuminated. No source of ignition should be taken into the space unless the designated responsible crew member is satisfied that it is safe to do so. Use only equipment that is certified intrinsically safe in potentially flammable atmospheres, especially in fuel oil tanks.

In all cases, rescue and available resuscitation equipment should be positioned ready for use at the entrance to the space. Rescue equipment means breathing apparatus together with fully charged spare cylinders of air, life lines and rescue harnesses, and torches or lamps, approved for use in a flammable atmosphere. A means of hoisting an incapacitated person from the confined space may be required.

The number of personnel entering the space should be limited to those who need to work in the space. When necessary, a rescue harness should be worn to facilitate recovery in the event of an accident.
At least one attendant should be detailed to remain at the entrance to the space while it is occupied.
An agreed and tested system of communication should be established between any person entering the space and the attendant at the entrance, and between the attendant at the entrance to the space and the officer on watch.

Ventilation should continue while the space is occupied and during temporary breaks. In the event of a failure of the ventilation system, any personnel in the space should leave immediately. Good natural ventilation is acceptable if for example two accesses are open so there is a through draft of fresh air. Care needs to be taken in large enclosed spaces without forced ventilation as there may be pockets of poor quality air that have not been replaced by good air.

The atmosphere should be tested periodically while the space is occupied and personnel should be instructed to leave the space should there be any deterioration of conditions.

If unforeseen difficulties or hazards develop, the work should be stopped and the space evacuated so that the situation can be reassessed. Permits should be withdrawn and only reissued, with any appropriate revisions, after the situation has been reassessed.

If any worker in a space feels in any way adversely affected they should give the prearranged signal to the attendant standing by the entrance and immediately leave the space.

Should an emergency occur, the alarm should be sounded so that back-up is immediately available to the rescue team.

If air is being supplied through an airline to a person who is unwell, a check should be made immediately that the air supply is being maintained at the correct pressure.

7.1.3.4 Ability to take precautions concerning work in enclosed spaces

Tips for Working in Enclosed Spaces

In order to avoid all those possible outcomes by taking the precautions necessary for ensuring that enclosed space entry is safely and carefully approached and executed, the following tips can be taken into account at least:

Before entering in the enclosed space, you should ensure that you can eliminate or control hazardous elements in the environment. You need to ensure that you pay attention to the atmosphere. Get an instrument to monitor your environment for things like hazardous gases that can't be detected by your nose.

Make sure that the area is well-ventilated. You can try using forced-air ventilation in confined spaces, because it's very effective at displacing and diluting the contaminant in a confined environment.

Make use of personal protective equipment after you have attempted all the methods stated above. Ensure that the personnel using the personal protective equipment are trained and knowledgeable about proper use of this equipment.

Reduce the likelihood of additional hazards being introduced – simply isolate the enclosed space. Be sure that there is an outside attendant, who is there, ready and able to monitor safety conditions. They should also be present to assist in the event of an emergency and to request external assistance as well. Always make proper preparations for a rescue. Be prepared to jump into action, with a good plan and the right equipment, if an emergency situation arises.

Ensure that the lighting in the confined space is good. That way the person operating in there will be able to perform safely and comfortably (without fear).
Keep in contact at all times, so that the workers inside of the confined space can notify people outside of any problems they're facing or if everything is going well.

EMERGENCY SITUATIONS

Competences

The Boatman shall be able to:

1. Act in case of emergencies according to applicable instructions and procedures;
2. Perform medical first aid;
3. Use and maintain personal protective equipment and ship board life-saving equipment;
4. Provide assistance in the case of rescue operations and swim;
5. Use emergency escape routes;
6. Use internal emergency communication and alarm systems.

7.2.1 Act in case of emergencies according to applicable instructions and procedures

7.2.1.1 Knowledge of the various types of emergencies

Types of emergencies

- Fire fighting
- Abandon ship
- Man overboard
- Engine Room Flooding
- Cargo Hold Flooding
- Oil spills

Crew members should be informed of the location to which they must go on hearing the emergency signal and of their duties when they arrive at that station. The location should be well marked.

The Boatmaster should ensure that a muster list is compiled and kept up to date and that copies are displayed in conspicuous places throughout the vessel. The muster list should contain details of the general alarm signal and other emergency signals and the action to be taken when such signals are activated. The means by which the order to abandon ship is given should also be included. The muster list should indicate the individual duties of all personnel on board and all crew members should be given written details of their own duties.

All crew members concerned should muster at a drill wearing the appropriate clothing. The purpose of drills is to familiarise personnel with their respective duties and to ensure that they can carry out those duties in an appropriate manner. Each crew member should participate in drills in accordance with national and international requirements.

The timing of drills should be varied to ensure that crew members who because of their duties have not taken part in a particular drill may participate in the next drill.

Crew members should receive training as soon as possible, if possible before joining the vessel, to ensure that there is no period of time when the crew member is incapable of carrying out safety-related responsibilities.

Drills often involve the whole crew but it might be preferable to confine certain drills to crew members with specific tasks.bAlthough drills are an essential part of emergency training, a training scheme should consist of more than just drills. Information should be given to the entire crew on saving life and instructions provided to certain crew members on the use of particular items of equipment.

7.2.1.2 Knowledge of the routine to follow in the case of an alarm

An emergency situation on board the craft must be handled with confidence and calmness, as hasty decisions and "jumping to conclusions" can make matters even worse. Efficient tackling of emergency situations can be achieved by continuous training and by practical drills on board craft. However, it has been seen that in spite of adequate training, people get panic attacks and eventually do not do what they should in an emergency situation.

As far as the crew member is concerned, first and foremost, he or she must be aware of the different types of emergency situations that can arise on board craft. This would help in understanding the real scenario in a better way, and would also lead to taking correct actions to save life, property, and environment.

A brief instruction guide must be prepared and must be given to all the crew members on board to tackle different emergency situations, such as:

Emergency Situation Guide

All the crew members should familiarise themselves thoroughly with the Fire Training Manual and the training manual on Life Saving Appliances of the craft.

General Alarm

In case of a general alarm:

- Rush to muster station with life jacket and act according to the craft's muster lists;
- Act as per the emergency explained by the officer in charge.

Fire alarm

In case of a fire alarm:

- Inform boatmaster / responsible crew member on watch;
- Check if it is a false or true alarm;
- Report back findings;
- In case of fire, raise the fire/general alarm as soon as possible. Try to put out the fire and if it is not possible, muster according to the Fire Muster List.

Man Overboard signal

In case of Man Overboard Signal:

- Rush to the deck and try to locate the crew member fallen in the water;
- Throw lifebuoy and inform deck.

Abandon Ship Signal

- In case of abandon ship signal:
- Rush to the muster station;
- Carry as much ration, water, and warm clothing as you can carry;
- Act according to the vessel's Muster Lists.

Engine Room Flooding

In case of engine room flooding, Chief Mechanical Engineer/Boatmaster should be called immediately and general alarm should be raised. Immediate action should be taken in preventing more water to enter the engine room and Emergency bilging from the Engine Room should be established in accordance with the responsible crew member.

Cargo Hold Flooding

In case of cargo hold flooding, Boatmaster must be informed immediately. All precaution must be taken to contain the flooding to that hold. General alarm must be raised.

Pollution prevention

In case of any oil spill/pollution immediate action should be taken according to the vessel's "Oil Pollution Prevention Plan".

Emergency Plan and Onboard Equipment should be used in case of Oil Spill.

In case of any other emergency situations, call for help either by using the phone or by activating the EMERGENCY CALL. Whatever the situation, keep the Boatmaster informed of the situation all the time.

7.2.1.3 Knowledge of procedures applicable in the case of an accident

In the event of an accident or incident aboard or in the vicinity of your craft:

- INFORM your owner and/or manager;
- NOTIFY the local correspondent;
- INVESTIGATE the accident or incident;
- COLLECT and retain any evidence or documentation;
- ASK witnesses to write down what happened;
- KEEP detailed records of all relevant facts;
- TAKE photographs wherever possible.

7.2.1.4 Ability to act according to instructions and procedures

A fire on board may occur in any vessel and has to be managed not only successfully, but also quickly, in order to prevent increased damage or even loss of vessel and crew, which could happen if the fire spreads.

A muster drill, sometimes referred to as a lifeboat drill or a boat drill, is an exercise that is conducted by the crew of a vessel prior to embarking on a voyage. Effective action is only possible if pre-planned and practical procedures have been developed and are frequently exercised. The practical procedures prescribe various operating and training procedures designed to cope with emergency situations or to prevent such situations occurring. A muster drill prepares passengers for safe evacuation, in the event of an emergency on board the vessel, and familiarises the crew and the passengers with escape routes. EMERGENCY. This may include:

- Being informed of the different response procedures in all areas along the route;
- Ensuring that if an incident occurs, it is properly and rapidly assessed by people knowledgeable in responding to incidents;
- Ensuring that proper emergency instructions are carried on board the vessel;
- Facilitating a prompt response by the vessel owner and crew in the emergency situation based on practice and experience, with the following objectives.

Fire on board is one of the most dangerous emergencies for a vessel. Establish procedures to IDENTIFY potential vessel board emergency situations. The general emergency signal is a signal used on board vessels in times of emergency.

7.2.2 Perform medical first aid and use life-saving appliances

7.2.2.1 Knowledge of general principles of first aid including appreciation of body structure and functions on board a craft after assessment of a situation

Structure and functions of the human body

Giving proper medical treatment and examining sick or injured persons appropriately requires basic knowledge of the location and functioning of the human body.

Musculoskeletal system

The musculoskeletal system consists of the bones and the joints that connect them, as well as the muscles. The bones of the extremities are so-called long bones; the skull and the bones of the chest and pelvis are so-called flat bones. Bones are surrounded by a tight bone membrane, under which lies the actual hard bone surface. The bone is living tissue, which self-repairs after an injury by forming new bone under the bone membrane. The bone marrow is softer and more porous than the surface bone. New blood cells are formed in the marrow.

Circulatory system

The heart, arteries and veins form the circulatory system. The heart pumps blood to all organs through the arteries, and the blood returns to the heart through the veins.

Respiratory system

The respiratory system consists of the nose, mouth, pharynx, larynx, trachea, the bronchi, two lungs and diaphragm.

Digestive system

The digestive system consists of the gastrointestinal tract, the esophagus, stomach, small intestine, large intestine, rectum and anus, as well as the teeth, tongue, salivary glands, liver and pancreas.

Nervous system

The nervous system consists of the central nervous system (CNS), i.e. the brain and the spinal cord, and the peripheral nerves that radiate from it.

The eye

The eye is a ball about 2.5 cm in diameter, surrounded by the white sclera. The transparent cornea is situated in the anterior part of the eye.

The ear

The outer ear consists of the external ear (auricle) and the external auditory canal.

The skin

The skin is composed of two layers: the epidermis, or outer layer, which is covered by the "horny layer" (stratum corneum), and dermis, or lower layer.

General principles of first aid aboard vessel

First aid must be administered immediately to:

- Restore breathing and heart-beat;
- Control bleeding;
- Remove poisons;
- Prevent further injury to the patient (for instance, removal of the patient from a room containing carbon monoxide or smoke).

A rapid, emergency evaluation of the patient should be made immediately at the scene of the injury to determine the type and extent of the trauma. Because every second may count, only the essential pieces of the patient's clothing should be removed.

In case of injured limb, get the sound limb out of clothing first, and then peel the clothes off the injured limb. If necessary, cut clothes to expose the injured part.

Keep workers from crowding round. The patients' pulse should be taken. If it cannot be felt at the wrist, it should be felt at the carotid artery at the side of the neck. If there is no pulse, heart compression and artificial respiration must be started. The patient should be treated for shock, if the pulse is weak and rapid, or the skin pale, cold, and possibly moist, with an increased rate of shallow, irregular breathing.

Remember that shock can be a great danger to life, and its prevention is one of the main objectives of first aid. The patient should be kept in the position that best provides relief from his or her injuries. Usually this is a lying-down position, which increases circulation of the blood to the head. The patient should be observed for type of breathing and possible bleeding. If he or she is not breathing, artificial respiration must be given.

Severe bleeding must be controlled. During this time, the patient, if conscious, should be reassured and told that all possible help is being given. The rescuer should ask about the location of any painful areas.

The patient should be kept in a lying-down position and moved only when absolutely necessary. The general appearance of the patient should be observed, including any signs and symptoms that may indicate a specific injury or illness. The patient should not be moved if injuries of the neck or spine are suspected. Fractures should be splinted before moving a patient. No attempt should be made to set a fracture.

Wounds and most burns should be covered to prevent infection. Once life-saving measures have been started or deemed not necessary, the patient should be examined more thoroughly for other injuries.

The patient should be covered to prevent loss of body heat. If necessary, protect him or her also from heat. The patient should not be given alcohol in any form. Never underestimate and do not treat as being minor injuries those such as:

- Unconsciousness;
- Suspected internal bleeding;
- Stab or puncture wounds;
- Wounds near joints;
- Possible fractures;
- Eye injuries.

Never consider anyone to be dead, until you and others agree that:

- No pulse can be felt, and no sounds are heard when the examiner's ear is put to the chest;
- Breathing has stopped;
- The eyes are glazed and sunken;
- There is progressive cooling of the body (this may not apply if the surrounding air temperature is close to normal body temperature).

7.2.2.2 Ability to maintain physical and mental conditions and personal hygiene in the case of first aid

Emergency first aid procedures consist of the following:

- Assessment of the situation and rescuing the victim from danger;
- Securing breathing;
- Securing circulation;
- Stopping bleeding and treatment of shock.

When the situation has been stabilised, the actual treatment and the possible transportation of the patient to shore for further treatment can be started. On arrival at the scene, a rapid evaluation of what has happened must be made. If the dangerous situation continues, the patient must be rescued from it. The helper must at all times make sure that he/she is not in danger himself/herself (electric shock, gas, fire, etc.).

First aid administration must be started immediately when it is safe to do so. The patient's own breathing is assessed and mouth-to-mouth respiration started, if necessary. If the patient's heart is not beating, cardiac massage is started.

A breathing patient is placed on his/her back, and an unconscious patient on his/her side. It must be ensured that the lungs are getting oxygen, the respiratory tract is open and the pulse can be felt. External bleeding must be stopped.

When the patient is no longer in imminent danger, he/she is examined more carefully, his/her wounds are bound more carefully, and fractures are supported. The patient is protected and settled as comfortably as possible. Any necessary further medical treatment is initiated, and the patient's condition is monitored constantly, and, if necessary, his/her transportation to shore is arranged.

Priorities

On finding a casualty:

- Look to your own safety, do not become the next casualty;
- If necessary, remove the casualty from danger or remove danger from the casualty (but see observation below on a casualty in an enclosed space). If there is only one unconscious or bleeding casualty (irrespective of the total number of casualties), give immediate treatment to that casualty only, and then send for help.

If there is more than one unconscious or bleeding casualty:

- Send for help;
- Then start giving appropriate treatment to the worst casualty in the following order of priority: severe bleeding; stopped breathing/heart; unconsciousness.

If the casualty is in a space, do not enter the enclosed space unless you are a trained member of a rescue team acting under instructions. Send for help and inform the Boatmaster.

It must be assumed that the atmosphere in the space is hostile. The rescue team must not enter unless wearing breathing apparatus which must also be fitted to the casualty as soon as possible. The casualty must be removed quickly to the nearest safe adjacent area outside the enclosed space unless his/her injuries and the likely time of evacuation make some treatment essential before he can be moved.

7.2.2.3 Knowledge of relevant measures in the case of accidents in accordance with the recognised best practices

European Resuscitation Council Guidelines for Resuscitation 2015 - ERC, published in 2015 based on the 2015 Consensus on Science and Treatment Recommendations, provide important evidence-based support for current first aid practice

According to these Guidelines, first aid is defined as the helping behaviours and initial care provided for an acute illness or injury. First aid can be initiated by anyone in any situation. A first aid provider is defined as someone trained in first aid who should:

- Recognise, assess and prioritise the need for first aid;
- Provide care using appropriate competences;
- Recognise limitations and seek additional care when needed.

The main goals of first aid are to preserve life, alleviate suffering, prevent further illness or injury, and promote recovery. The definition for first aid addresses the need to recognise injury and illness, the requirement to develop a specific skill base and need for first aid providers to simultaneously provide immediate care and to activate Emergency Medical Services or other medical care as required.

First aid assessment and interventions should be medically sound and based on scientific evidence-based medicine, or in the absence of such evidence, on expert medical consensus. The scope of first aid is not purely scientific, as both training and regulatory requirements will influence it.

7.2.2.4 Ability to assess needs of casualties and threats to own safety

First aid must be administered immediately to:

- Restore breathing and heart-beat;
- Control bleeding;
- Remove poisons;
- Prevent further injury to the patient (for instance, his/her removal from a room containing carbon monoxide or smoke).

A rapid, emergency evaluation of the patient should be made immediately at the scene of the injury to determine the type and extent of the trauma. Because every second may count, only the essential pieces of the patient's clothing should be removed.

In case of an **injured limb**, get the sound limb out of clothing first, and then peel the clothes off the injured limb. If necessary, cut clothes to expose the injured part. Keep workers from crowding round.

The patient's pulse should be taken. If it cannot be felt at the wrist, it should be felt at the carotid artery at the side of the neck. If there is no pulse, heart compression and artificial respiration must be started. The patient should be treated for shock, if the pulse is weak and rapid, or the skin pale, cold, and possibly moist, with an increased rate of shallow, irregular breathing.

Remember that shock can be a great danger to life, and its prevention is one of the main objectives of first aid. The patient should be kept in the position that best provides relief from his/her injuries. Usually this is a lying- down position, which increases circulation of the blood to the head. The patient should be observed for type of breathing and possible bleeding. If he/she is not breathing, artificial respiration must be given.

Severe bleeding must be controlled. During this time, the patient, if conscious, should be reassured and told that all possible help is being given. The rescuer should ask about the location of any painful areas.

The patient should be kept in a lying-down position and moved only when absolutely necessary. The general appearance of the patient should be observed, including any signs and symptoms that may indicate a specific injury or illness.

The patient should not be moved if injuries of the neck or spine are suspected. Fractures should be splinted before moving a patient. No attempt should be made to set a fracture.

Wounds and most burns should be covered to prevent infection. Once life-saving measures have been started or deemed not necessary, the patient should be examined more thoroughly for other injuries.
The patient should be covered to prevent loss of body heat. If necessary, protect him/her from heat as well.
The patient should not be given alcohol in any form.
Never underestimate and do not treat as being minor injuries those such as:

- Unconsciousness;
- Suspected internal bleeding;
- Stab or puncture wounds;
- Wounds near joints;
- Possible fractures;
- Eye injuries.

Never consider anyone to be dead, until you and others agree that:

- No pulse can be felt, and no sounds are heard when the examiner's ear is put to the chest;
- Breathing has stopped;
- The eyes are glazed and sunken;
- There is progressive cooling of the body (this may not apply if the surrounding air temperature is close to normal body temperature).

7.2.2.5 Ability to perform required measures in cases of emergency, including to:

Position casualty

The priority management of a breathing but unresponsive victim, including one whose circulation has been successfully restored following cardiac arrest, is the maintenance of an open airway. Victims with agonal breathing should not be placed in the recovery position.

Although the available evidence is weak, the use of a recovery position places a high value on the importance of decreasing the risk of aspiration or the need for more advanced airway management. Given the absence of high quality evidence, the recovery position is recommended due to the lack of demonstrated associated risk.
In such situations such as trauma, it may not be appropriate to move the individual into a recovery position.

Position individuals who are unresponsive but breathing normally into a lateral, side-lying recovery position as opposed to leaving them supine (lying on back). In certain situations such as resuscitation related agonal respirations or trauma, it may be not appropriate to move the individual into a recovery position.

ERC recommends the following sequence of actions:

- Kneel beside the victim and make sure that both legs are straight;
- Place the arm nearest to you at right angles to the body, elbow bent with the hand palm uppermost;
- Bring the far arm across the chest, and hold the back of the hand against the victim's cheek nearest to you;
- With your other hand, grasp the far leg just above the knee and pull it up, keeping the foot on the ground;
- Keeping the hand pressed against the cheek, pull on the far leg to roll the victim towards you onto his or her side;
- Adjust the upper leg so that both hip and knee are bent at right angles;
- Adjust the hand under the cheek if necessary, to keep the head tilted and facing downwards to allow liquid material to drain from the mouth;
- Check breathing regularly.

If the victim has to be kept in the recovery position for more than 30 min turn him or her to the opposite side to relieve the pressure on the lower arm.

Apply resuscitation techniques

The sequences of steps for the initial assessment and treatment of the unresponsive victim are:

- Unresponsive and not breathing normally;
- Call Emergency Services - EMS;
- Give 30 chest compressions;
- Continue CPR 30:2;
- As soon as AED (Automated External Defibrillator) arrives, switch it on and follow instructions.

Sequences:

Opening the airway and checking for breathing

The trained provider should assess the collapsed victim rapidly to determine if they are responsive and breathing normally. Open the airway using the head tilt and chin lift technique whilst assessing whether the person is breathing normally. Do not delay assessment by checking for obstructions in the airway. The jaw thrust and finger sweep are no longer recommended for the lay provider. Check for breathing using the technique described in the above figure noting the critical importance of recognising agonal breathing.

Agonal breathing is the medical term for the gasping that people do when they're struggling to breathe because of cardiac arrest or other serious medical emergency. The desperate gasping for air is usually a symptom of the heart no longer circulating oxygenated blood, or there is an interruption of lung activity that is reducing oxygen intake. It can often signal that death is imminent.

If you see someone struggling to breathe, call your local emergency medical services immediately. Agonal breathing may occur with cardiac arrest or a stroke. So it's possible the person may lose consciousness while gasping. Stroke symptoms include:

- Weakness on one side of the body;
- Lack of coordination;
- Poor speech or an inability to understand speech;
- A sudden headache.

Alerting emergency services

112 is the European emergency phone number, available everywhere in the EU, free of charge. It is possible to call 112 from landlines and mobile phones to contact any emergency service: an ambulance, the fire brigade or the police. Some European countries provide an alternative direct access number to emergency medical services, which may save time. Bystanders should therefore follow national guidelines on the optimal phone number to use.

Early contact with the emergency services will facilitate the dispatcher in the recognition of cardiac arrest, telephone instruction on how to perform CPR, emergency medical service/first responder dispatch, and on locating and dispatching of an AED.

If possible, stay with the victim while calling the emergency services. If the phone has a speaker facility switch it to speaker as this will facilitate continuous dialogue with the dispatcher including (if required) CPR instructions. It seems reasonable that CPR training should include how to activate speaker phone. Additionally bystanders may be used to help call the emergency services.

Starting chest compression

In an adult needing CPR, there is a high probability of a primary cardiac cause. When blood flow stops after cardiac arrest, the blood in the lungs and arterial system remains oxygenated for some minutes. To emphasise the priority of chest compression, it is recommended that CPR should start with chest compression rather than initial ventilations. Manikin studies indicate that this is associated with a shorter time to commencement of CPR.

When providing manual chest compression:

1. Deliver compressions in the centre of the chest;
2. Compress to a depth of at least 5 cm but not more than 6 cm;
3. Compress the chest at a rate of 100-120 compressions/min with as few interruptions as possible;
4. Allow the chest to recoil completely after each compression; do not lean on the chest.

Hand position

Experimental studies show better hemodynamic responses when chest compressions are performed on the lower half of the sternum. It is recommended that this location be taught in a simplified way, such as "place the heel of your hand in the centre of the chest with the other hand on top". This instruction should be accompanied by a demonstration of placing the hands on the lower half of the sternum.

Chest compressions are most easily delivered by a single CPR provider kneeling by the side of the victim, as this facilitates movement between compressions and ventilations with minimal interruptions. Over-the- head CPR for single CPR providers and straddle-CPR for two CPR providers may be considered when it is not possible to perform compressions from the side, for example when the victim is in a confined space.

Compression depth

Fear of doing harm, fatigue and limited muscle strength frequently result in CPR providers compressing the chest less deeply than recommended. Four observational studies, published after 2010 Guidelines, suggest that a compression depth range of 4.5-5.5 cm in adults leads to better outcomes than all other compression depths during manual CPR.

The ERC (European Resuscitation Council) endorses the ILCOR (International Liaison Committee on Resuscitation) recommendations that it is reasonable to aim for a chest compression of approximately 5 cm but not more than 6 cm in the average sized adult. In making this recommendation the ERC recognises that it can be difficult to estimate chest compression depth and that compressions that are too shallow are more harmful than compressions that are too deep. The ERC therefore decided to retain the 2010 guidance that chest compressions should be at least 5 cm but not more than 6 cm. Training should continue to prioritise achieving adequate compression depth.

Compression rate

Chest compression rate is defined as the actual rate of compressions being given at any one time. It differs from the number of chest compressions in a specific time period, which takes account of any interruptions in chest compressions.

The ERC recommends, therefore, that chest compressions should be performed at a rate of 100-120 compressions/min.

Minimising pause in chest compressions

Delivery of rescue breath, shocks, ventilations and rhythm analysis leads to pauses in chest compressions. Pre-and post-shock pauses of less than 10 s, and chest compression fraction >60% are associated with improved outcomes. Pauses in chest compressions should be minimised, by ensuring CPR providers work effectively together.

Firm surface

CPR should be performed on a firm surface whenever possible. Air-filled mattresses should be routinely deflated during CPR. The evidence of use of back-boards is equivocal. If the back-board is used, take care to avoid interrupting CPR and dislodging intravenous lines or other tubes during board placement.

Chest wall recoil

Leaning on the chest preventing full chest wall recoil is common during CPR. Allowing complete recoil of the chest after each compression results in better venous return to the chest and may improve the effectiveness of CPR. CPR providers should, therefore, take care to avoid leaning after each chest compression.

Duty cycle

Optimal duty cycle (ratio of the time chest is compressed to the total time from one compression to the next) has been studied in animal models and simulation studies with inconsistent results. A recent human observational study has challenged the previously recommended duty cycle of 50:50 by suggesting compression phases >40% might not be feasible, and may be associated with decreased compression depth. For CPR providers, the duty cycle is difficult to adjust, and is largely influenced by other chest compression parameters. In reviewing the evidence, the ERC acknowledges there is very little evidence to recommend any specific duty cycle and, therefore, insufficient new evidence to prompt a change from the currently recommended ratio of 50%.

Feedback on compression technique

The use of CPR feedback and prompt devices during CPR in clinical practice is intended to improve CPR quality as a means of increasing the chances of ROSC (Return of Spontaneous Circulation) and survival. The forms of feedback include voice prompts, metronomes, visual dials, numerical displays, waveforms, verbal prompts and visual alarms.

The use of CPR feedback or prompt devices during CPR should only be considered as part of a broader system of care that should include comprehensive CPR quality improvement initiatives, rather than as an isolated intervention.

Rescue breaths

In non-paralysed, gasping pigs with unprotected, unobstructed airways, continuous-chest-compression CPR without artificial ventilation resulted in improved outcome. Gasping may be present early after the onset of cardiac arrest in about one third of humans, thus facilitating gas exchange.

During CPR, systemic blood flow, and thus blood flow to the lungs, is substantially reduced, so lower tidal volumes and respiratory rates than normal can maintain effective oxygenation and ventilation.

Mouth-to-nose ventilation

Mouth-to-nose ventilation is an acceptable alternative to mouth-to-mouth ventilation. It may be considered if the victim's mouth is seriously injured or cannot be opened, the CPR provider is assisting a victim in the water, or a mouth-to-mouth seal is difficult to achieve.

Compression-ventilation ratio

A ratio of 30:2 was recommended in Guideline 2010 for the single CPR provider attempting resuscitation of an adult. ERC recommends a compression ventilation ratio of 30:2. The ERC, therefore, endorses the ILCOR recommendations that all CPR providers should perform chest compression for all patients in cardiac arrest.

Control bleeding

The human body contains approximately 5 litres of blood. A healthy adult can lose up to half a litre of blood without harmful effects, but the loss of more than this can be threatening to life. Haemorrhage from major blood vessels of the arms, neck, and thighs may occur so rapidly and extensively that death occurs in a few minutes. Haemorrhage must be controlled immediately to prevent excessive loss of blood.

Bleeding may occur externally following an injury to the outside of the body, or internally from an injury in which blood escapes into tissue spaces or the body cavity.

The signs and symptoms of excessive loss of blood are:

- Weakness or fainting;
- Dizziness;
- Pale, moist and clammy skin;
- Nausea;
- Thirst;
- Fast, weak and irregular pulse;
- Shortness of breath;
- Dilated pupils;
- Ringing in the ears;
- Restlessness; and
- Apprehension.

The patient may lose consciousness and stop breathing. The number of symptoms and their severity are generally related to how fast the blood is lost and in what amount.

Once the bleeding has been controlled, the patient should be placed in a reclining position, encouraged to lie quietly and treated for shock.

Fluid should not be given by mouth when internal injury is suspected.

Control

Bleeding may be controlled by direct pressure, elevation, and pressure at pressure points. A tourniquet should be applied only when every other method fails to control the excessive bleeding.

Direct pressure

The simplest and preferred method for controlling severe bleeding is to place a dressing over the wound and apply pressure directly to the bleeding site with the palm of the hand.

Ideally a sterile dressing should be applied. Otherwise, the cleanest cloth available should be used. In the absence of a dressing or cloth, the bare hand may be used until a dressing is available. If the dressing becomes soaked with blood, another dressing should be applied over the first one with firmer hand pressure. The initial dressing should not be removed because this will disturb the clotting process.

The bandage should be tied over the dressing to provide additional pressure. Do not cut off the circulation. A pulse should be felt on the side of the injured part away from the heart. If the bandage has been applied properly, it should be allowed to remain in place undisturbed for at least 24 hours. If the dressing is not soaked with blood and the circulation beyond the pressure dressing is adequate, it need not be changed for several days.

Elevation

When there is a severe bleeding wound of an extremity or the head, direct pressure should be applied on a dressing over the wound with the affected part elevated. This elevation lowers the blood pressure in the affected part and the flow of blood pressure in the affected part and the flow of blood are lessened.

Tourniquet

A tourniquet should be applied to control bleeding only when all other means have failed. Unlike direct and hand pressure, a tourniquet shuts off all normal blood circulation beyond the site of application. Lack of oxygen and blood may lead to the destruction of tissue, possibly requiring amputation of a limb. Releasing the tourniquet periodically will result in loss of blood and danger of shock. If the tourniquet is too tight or too narrow, it will damage the muscles, nerves and blood vessels; if too loose, it may increase blood loss. Also, there have been cases where tourniquets have been applied and forgotten. If a tourniquet is applied to save a life, immediate Radio Medical Advice must be obtained.

A tourniquet must be improvised from a wide band of cloth. An improvised tourniquet may be made from folded triangular bandages, clothing or similar material. Record the time the tourniquet was applied. If you are sending the casualty to hospital, attach a sheet of paper to this clothing or an extremity, indicating the time.

Note:

- Never cover the tourniquet with clothing or bandages, or hide it in any way;
- Never loosen the tourniquet, unless a physician advises it.

Apply appropriate measures of basic shock management

Shock following an injury is the result of a decrease in the vital functions of the various organs of the body. These functions are depressed because of inadequate circulation of blood or an oxygen deficiency. Shock usually follows severe injuries such as extensive burns, major crushing injuries (particularly of the chest and abdomen), fractures of large bones, and other extensive or extremely painful injuries.

Shock follows:

- The loss of large quantities of blood;
- Allergic reactions;
- Poisoning from drugs, gases, and other chemicals;
- Alcohol intoxication; and
- Rupture of a stomach ulcer.

It also may be associated with many severe illnesses such as infections, strokes and heart attacks.

In some individuals the emotional response to trivial injuries or even to the mere sight of blood is so great that they feel weak and nauseated and may faint. This reaction may be considered to be an extremely mild form of shock which is not serious and will disappear quickly if the patient lies down.

Severe shock seriously threatens the life of the patient. Signs and symptoms of shock are:

- Paleness: The skin is pale, cold, and often moist. Later it may develop a bluish, ashen colour. If the patient has dark skin, the colour of mucous membranes and nail beds should be examined;
- Rapid and shallow respirations: Alternatively breathing could be irregular and deep;
- Thirst, nausea and vomiting: These frequently occur in a haemorrhaging patient in shock;
- Weak and rapid pulse: Usually the pulse rate is over 100;
- Restlessness, excitement and anxiety: These occur early, later giving way to mental dullness and still later to unconsciousness. In this late stage the pupils are dilated, giving the patient a vacant, glassy stare.

Although these symptoms may not be evident, all seriously injured persons should be treated for shock to prevent its possible development.

Treatment:

- Eliminate the causes for shock: This includes controlling bleeding, restoring breathing and relieving severe pain;
- Have the injured person lie down: The patient should be placed in a horizontal position. The patient's legs may be elevated approximately 30cm to assist the flow of blood to the heart and head. The legs should not be elevated if there is injury to the head, pelvis, spine, or chest, or difficulty in breathing;
- Keep the patient warm, but not hot: Too much heat raises the surface temperature of the body and diverts the blood supply away from vital organs to the skin;
- Relieve pain as quickly as possible: If pain is severe, 10 mg of morphine sulphate may be given by intramuscular injection. If the blood pressure is low, morphine sulphate should not be given because it may cause an additional drop in the pressure. Also, it should not be given to injured patients unless pain is severe. The dosage should be repeated only after obtaining Radio Medical Advice;
- Administer fluids: Liquids should not be given by mouth if the patient is unconscious, drowsy, convulsing, or about to have surgery. Also, fluids should not be given if there is a puncture or crush wound to the abdomen, or a brain injury. If none of the above conditions is present, give the patient a solution of oral rehydration salts (half a glass every 15 minutes). Alcohol should never be given.

Apply appropriate measures in the event of burns and scalds, including accidents caused by electric current

Clothing on fire

If someone's clothing is on fire, by far the best way to put the fire out is to use a dry-powder extinguisher at once. If a dry-powder extinguisher is not available, then lay the person down and smother the flames by wrapping him or her in any available material, or throw bucketfuls of water over him/her, or use a hose, if available. Make sure that all smouldering clothing is extinguished.

The powder from a fire extinguisher will not cause much, if any, eye damage. Most people shut their eyes tightly if sprayed with powder. Any powder in the eye should be washed out immediately after the fire has been extinguished and while burns are being cooled.

Heat burns and scalds

All heat burns should be cooled as quickly as possible with running cold water, applied for at least 10 minutes, or by immersion in basins of cold water. If it is not possible to cool a burn on the spot, the casualty should be taken to a place where cooling can be carried out. Try to remove clothing gently but do not tear off any that adhered to the skin. Then cover the burned areas with a dry, non-fluffy dressing larger than the burns, and bandage in place.

Electrical burns and electrocution

Make sure you do not become the next casualty when approaching any person who is in contact with electricity. If possible, switch off the current. Otherwise insulate yourself before approaching and touching the casualty, by using rubber gloves, wearing rubber boots, or standing on an insulating rubber mat. Electrical lines may be removed from the casualty with a wooden pole, a chair, an insulated cord, or other non-metal object.

Then check casualty immediately for breathing and heartbeat. If casualty is not breathing give artificial respiration. If heart is stopped, apply heart compression. Send for help. When the casualty is breathing, cool any burnt areas with cold water and apply a clean, dry, non-fluffy covering to these areas.

The treatment for electrical burns is the same as for thermal burns. It includes relief of pain, prevention and treatment of shock and control of infection.

Electrical burns may be followed by paralysis of the respiratory centre, unconsciousness and instant death.

Rescue and transport a casualty

The removal of a sick or injured person either from the site of an accident or ashore is a matter of importance, since his/her life may depend on the arrangements made, particularly if he/she has spinal injuries, a heart condition, or a severe fracture, with any of which he/she is likely to be suffering from shock. So use the utmost gentleness, reassure your patient, try to have a clear picture in your mind of the nature of the disability you are dealing with, and exercise common sense.

Unless there is danger from fire, explosion or toxic substances, do not move a casualty until:

- Suspected fractures have been immobilised; and
- Severe bleeding has been stopped.

Then check out the best route for transport, lift the casualty gently and carry him/her smoothly – remember that every jolt causes unnecessary pain.

The method of transport will depend on the situation of the casualty and the nature of the injury.

If the vessel is in port, it is usually best to await the arrival of an ambulance because the attendants will be expert in handling casualties. You can assist them and give them the benefit of your knowledge. For instance, if a patient has fallen to the bottom of a hold, the best procedure is to take down a stretcher, give first aid treatment, then place the stretcher on a hatch cover or similar flat platform and have the patient lifted by vessel's crane over the side. This lift can be a frightening experience for a helpless and shocked person and he/she will be reassured if the person in charge stands on the hatch cover with legs astride the stretcher, maintaining balance by holding on to the guy wires. Similarly, if the patient is on deck and the gangway is narrow or unsteady, it may be far less unnerving for him/her if he/she is lowered over the side on a hatch cover or something similar.

Manhandling

Ordinary manhandling may be possible, in which case two helpers carry a casualty, with each one using an arm to support the casualty's back and shoulders and his/her spare hand to hold the casualty's thighs. If conscious, the casualty may help to support him-/herself with his/her hands on the shoulders of the helpers.

The simple pick-a-back method is useful only where the casualty is conscious and able to hold on by putting his/her arms round the carrier's neck.

In a narrow space, the simple for-and-aft carry may be best. One helper supports the patient under his/her arms and the other under his/her knees.

One advantage of the three-handed seat, is that one of the helpers has a free arm and hand that can be used either to support an injured limb or as a back support for the casualty. Which of the two helpers has the free arm will depend on the nature of the injury.

As a last resort, the drag-carry method may have to be used in narrow spaces, particularly where there is wreckage following an explosion and where it may be possible for only one man to reach a trapped patient and rescue him/her. After the initial rescue, two men may be able to undertake further movement through a narrow space.

Stretcher

A good general purpose stretcher for use on board of the vessels: it is easily carried, gives firm support to the patient and is particularly useful in narrow spaces, when difficult corners have to be hoisted.

7.2.2.6 Ability to improvise bandages and to use materials in emergency kit

First aid is all about treating injuries and illnesses before seeking medical help. If you don't have a first aid kit available on board you can improvise using common household items.

It is recommended that you pick up a comprehensive first aid kit containing the appropriate sterile first aid dressings and items. However, if you find yourself having to improvise:

Items to use for the improvised first aid kit:

Clingfilm

Clingfilm can be used to cover burn and scald injuries once they've been cooled for at least ten minutes. Burns should be covered with a non-fluffy dressing to reduce the risk of infection developing in the burn. Clingfilm is ideal to use as it won't stick to the burn and is an effective barrier against infection. Don't wrap the cling film tightly around the burn, instead just lay it loosely to cover the injury. Burn injuries will swell so it is important to give the injured area space to swell and expand. Also, make sure you use clean clingfilm!

Frozen Food

A bag of frozen food (for example, frozen peas or other vegetables) is great to use on a sprain/strain or minor head injury. The cold will reduce the swelling and associated inflammation from an injury and may improve healing.

Remember never to apply ice or other freezing items directly to the skin as this could cause cold burns. Instead, wrap the ice or bag of frozen food in a towel in place over the injury.

Clean Towels or Clothes

Direct pressure over a wound is the most effective way to control major bleeding. Elevating the injury will help but is unlikely to completely stop the bleeding.

If you don't have a pressure bandage available then you can improvise using any clean towels or clothes to hand. Apply firm direct pressure over the wound whilst awaiting the arrival of EMS.

Monitor the victim for the development of shock and keep the pressure applied until further help arrives.

Bottled Water or Other Drinks

Burns or scalds should be cooled for a minimum of ten minutes. Major burns or burns involving chemicals may require a longer cooling period. If you don't have running tap water to hand, use any bottled water or other non-toxic liquid to cool the burn.
It is vital that cooling happens immediately in order to remove the heat from the burn and prevent further damage to the skin and underlying tissues. Cooling a burn quickly will speed up healing and reduce the risk of the victim developing permanent scarring from the burn injury.

7.2.3 Use and maintain personal protective equipment and shipboard life-saving equipment

7.2.3.1 Knowledge of periodical checks of personal protection, escape routes and rescue equipment as regards function, damage, wear and other imperfections

Life-saving appliances shall be stowed on board in such a way that they can be reached easily and safely when required. Concealed storage places shall be clearly marked.

Life-saving equipment shall be inspected in accordance with the manufacturer's instructions.
Personal protective equipment, also known as PPE, is designed to protect the wearer against health and safety risks in the workplace. It includes items such as helmets, Hi-Vis clothing, footwear, safety goggles, harnesses and more. It can also include the use of hearing and breathing protection, such as respirators and ear guards, for dangers that are more internal.
The regulations require that PPE should be used for shipboard duties as required and no employee should be put in any dangerous situations. It should only be used in circumstances that cannot be controlled in any other way.

Firstly, all PPE must be properly assessed before it is used in order to make sure it is fit for purpose. This means it needs to be maintained and stored properly and that the necessary instructions are provided for safe use. The crew members should become familiarised with the different types of equipment to ensure that they are using the PPE in the correct way.

Assessing PPE

The conditions in every workplace will be different, which means that a risk assessment needs to be carried out to see what PPE is required. If you are unsure, then ask your company or superior about the suitability of equipment for different tasks. In some cases, this may involve getting specialist advice from the manufacturer.

You will need to answer certain questions before making your decision. This includes whether the PPE will reduce overall risk and is it suitable to the environmental conditions? Can it be adjusted to fit the employee correctly in all situations? And if more than one item of PPE is needed, will they be compatible?

Choosing PPE

You need to make sure you are choosing PPE that is up to standard. Look for the CE mark which means it complies with the PPE Regulations from 2002. Make sure you are choosing equipment that is suitable for the person who will be wearing it. You are also required to provide adequate training in the correct use of the equipment.

Maintenance

Under the regulations you are obliged to make sure all equipment is in good working order. This includes storing it in the correct way when not being used, for example, by use of a dedicated space such as a dry, clean cupboard. Equipment should be regularly inspected for cleanliness and state of repair. Any specific repair work should be carried out by a specialist, including fitting spare parts.
The PPE exist to keep us all safer at work, so having thorough knowledge of them is not only required by law, but helps to prevent accident and injury.

Personal Safety Equipment Required on Vessels

Fire extinguisher

It is mandatory for all ships to have all the various types of fire extinguishers for efficient handling of different cases of fires that may arise on the ship. In such cases, portable fire extinguishers can be tremendously helpful and can be used to put out small-scale fires aboard the ship. Fire extinguishers should be placed in the areas of ships that are easily accessible and close to potential fire sources on board.

Fire Suits

Fire suits, also known as fire proximity suits, are used by seafarers while diffusing large fires. The material used to make these suits is heat-resistant and hence protects the bodies of the people wearing them. In case of large fires aboard ships, it is important for the people in charge of diffusing the fire to be wearing these suits. All ships are required to carry at least two of these suits.

Breathing Equipment

In case of a fire on board, it becomes hard for people to breathe due to the smoke. In such cases, breathing equipment such as oxygen cylinders and masks can be of help. The oxygen masks provide a short supply of oxygen in case of emergencies, while oxygen cylinders provide a much larger and reserved source of oxygen. The oxygen cylinders also come with tanks that can replace the used one. They also include an alarm which warns the user when the air in the cylinder is low, thus giving the wearer a timely notice to change the cylinder.

Escape Smoke Hood

During fires, it is not only the flames that cause injuries. The gases and smoke that result from the fire are also fatal for people. Here, escape smoke hoods come in handy. Escape smoke hoods are lightweight hoods made of flame-retardant fabric and block a number of toxic gases. In case of a fire, these escape hoods can be of help during the evacuation, giving the wearers a wide window of time. These escape smoke hoods are to be placed in areas that are accessible and well-ventilated.

Personal Locator

Personal Locator Beacons (PLBs) are small devices that send out electronic transmission signals in case of emergencies. These signals pinpoint the exact location of the beacon and alert authorities about the emergency thus deploying a rescue team to assist those in need. These devices work in remote locations where a cell phone network is not accessible. The personal locator beacons are usually used with other personal protection equipment like survival suits or life jackets.

Pyrotechnics

These are the distress signals that are used in case of extreme emergencies. Pyrotechnics on board ships are provided to grab the attention of people and other ships in the immediate vicinity, so that they can offer immediate help in case of emergencies. Pyrotechnics are basically the visual forms of SOS signals. Hand Flares, Smoke signals, Rocket Parachute flares are pyrotechnics that are used on ships. These pyrotechnics must be kept in accessible places away from fuel and combustibles. They must be disposed of properly in case of expiration.

Thermal Insulation

Bulkheads, walls and decks of the ships need to be insulated to reduce the spread of fire, to prevent moisture, to reduce energy use for heating and cooling and to protect goods on board the ship. The mechanical equipment on ships needs to be insulated to reduce emissions, to reduce the load on equipment and for personnel protection. Thus, thermal insulation on ships reduces the impact machine emissions have on the environment and also provides a habitable setting for the people on the ship.

First Aid Kit

First aid kits are perhaps the most important components of the personal safety equipment. They include all the medicines and remedies for emergencies. Having a properly stocked first aid kit can be of tremendous help on board ships providing immediate medical help and sometimes even saving a life. In a case of emergency, it is important to first radio for professional help and then try to assist using a first aid kit.

Resuscitator Kit

While at sea, during medical emergencies, a resuscitator kit works as a substitute for an ambulance till the patient is given the required medical help. A resuscitator kit provides IPPV and oxygen inhalation therapy to the patient in case of emergencies. It also includes a manual resuscitator, manual suction apparatus, automatic ventilator and small oxygen cylinder and other surgical and diagnostic items.

Hence, it is important to stock up on this safety equipment before embarking on the ship. Even with the help of the given equipment, one must immediately contact authorities and seek professional help in case of emergencies.

7.2.3.2 Ability to react in the case of identified imperfections including relevant communication procedures

On board the vessels, one very important task is to communicate and alert each and every passenger and crew member of the situation and dictate the necessary steps and instructions to be followed.

Any miscommunication or lack of communication can have disastrous ramifications. Hence, these systems also form a part of life-saving equipment. All vessels are fitted with general alarm systems so as to alert and summon the crew to their fire stations or boat stations.

Passenger vessels are to be equipped with public address systems. Communication systems also include Portable Very High Frequency (VHF) Radios (commonly referred to as walkie-talkies) and are provided for emergency crew communications.

All passenger vessels shall have internal communication facilities according to Article 7.08 of ES TRIN. Such facilities shall also be available in the service rooms and, where there is no direct communication from the steering position, in the access and muster areas for passengers.

All passenger areas shall be reachable via a loudspeaker system. The system shall be designed in such a way as to ensure that the information transmitted can be clearly distinguished from background noise. Loudspeakers are optional where direct communication between the wheelhouse and the passenger area is possible.

The vessel shall be equipped with an alarm system. The system shall include:
an alarm system enabling passengers, crew members and vessel board personnel to alert the vessel's command and crew.

This alarm should be given only in areas assigned to the vessel's command and to the crew; it should only be possible for the vessel's command to stop the alarm. The alarm shall be capable of being triggered from at least the following places:

- In each cabin;
- In the corridors, lifts and stairwells, with the distance to the nearest trigger not exceeding 10m and with at least one trigger per watertight compartment;
- In lounges, dining rooms and similar recreation rooms;
- In toilets, intended for use by persons with reduced mobility;
- In engine rooms, galleys and similar rooms where there is a fire risk;
- In the cold-storage rooms and other store rooms.

- An alarm system enabling the vessel's command to alert passengers;

This alarm shall be clearly and unmistakably audible in all rooms accessible to passengers. It shall be capable of being triggered from the wheelhouse and from a location that is permanently staffed;

- An alarm system enabling the vessel's command to alert the crew and vessel board personnel;

The alarm system shall also reach the recreation rooms for the shipboard personnel, the cold-storage rooms and other store rooms.

Alarm triggers shall be protected against unintentional use.

7.2.3.3 Ability to use life-saving appliances, for example:

Lifebuoys including relevant equipment

Every life buoy shall:

- Have an outer diameter of not more than 800 mm and an inner diameter of not less than 400 mm;
- Be constructed of inherently buoyant material; it shall not depend upon rushes, cork shavings or granulated cork, any other loose granulated material or any air compartment which depends on inflation for buoyancy;
- Be capable of supporting not less than 14.5 Kg of iron in fresh water for a period of 24 hours;
- Have a mass of not less than 2.5 Kg;
- Not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 seconds;
- Be constructed to withstand a drop into the water from the height at which it is stowed above the waterline in the lightest condition, without impairing either its operating capability or that of its attached components;
- If it is intended to operate the quick-release arrangement provided for the self-activated signals and self-igniting lights, have a mass of not less than 4 kg; and
- Be fitted with a grabline not less than 9.5 Mm in diameter and not less than four times the outside diameter of the body of the buoy in length. The grabline shall be secured at four equidistant points around the circumference of the buoy to form four equal loops.

Lifebuoy self-igniting lights Self-igniting lights shall:

- Be such that they cannot be extinguished by water;
- Be of white colour and capable of either burning continuously with a luminous intensity of not less than 2 cd in all directions of the upper hemisphere or flashing at a rate of not less than 50 flashes and not more than 70 flashes per minute with at least the corresponding effective luminous intensity;
- Be provided with a source of energy.

On board craft there shall be at least three lifebuoys, in accordance with European Standards EN 14144: 2003, or in accordance with the 1974 SOLAS Convention, Chapter III, Regulation 7.1, and the LSA Code, sub-section 2.1.

They shall be ready for use and attached to the deck at appropriate points without being attached to their mounting. At least one lifebuoy shall be in the immediate vicinity of the wheelhouse and shall be equipped with a self-ignition, battery-powered light that will not be extinguished in water.

In addition, all parts of the deck intended for passengers and not enclosed shall be equipped with suitable lifebuoys, which shall be positioned on both sides of the vessel not more than 20m apart.

Lifejacket marking	Infant	Child	Adult
User's size:			
Weight (kg)	Less than 15	15 or more but less than 43	43 or more
Height (cm)	Less than 100	100 or more but less than 155	155 or more

Half of the prescribed lifebuoys shall be fitted with a buoyant cord at least 30m with a diameter of 8 to 11mm. The other half of the prescribed lifebuoys shall be fitted with a self-igniting, battery-powered light which will not be extinguished in water.

Lifejackets including relevant equipment on lifejackets, such as fixed or flashing lights and whistle firmly secured by a cord

A lifejacket shall not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 seconds.

If a lifejacket fully complies with the requirements of two adjacent size ranges, it may be marked with both size ranges, but the specified ranges shall not be divided. Lifejackets shall be marked by either weight or height, or by both weight and height.

If an adult lifejacket is not designed to fit persons weighing up to 140 kg and with a chest of up to 1 750 mm, suitable accessories shall be available to allow it to be secured to such persons.

An adult lifejacket shall be so constructed that:

- At least 75% of persons who are completely unfamiliar with the lifejacket can correctly don it within a period of 1 minute without assistance, guidance or prior demonstration;
- After demonstration, all persons can correctly don it within a period of 1 minute, without assistance;
- It is clearly capable of being worn in only one way or inside-out and, if donned incorrectly, it is not injurious to the wearer;
- The method of securing the lifejacket to the wearer has quick and positive means of closure that do not require the tying of knots;
- It is comfortable to wear;
- It allows the wearer to jump into the water from a height of at least 4.5m while holding on to the lifejacket, and from a height of at least 1m with arms held overhead, without injury and without dislodging the lifejacket or its attachments.

Adult lifejackets shall have sufficient buoyancy and stability in calm fresh water to:

- Lift the mouth of exhausted or unconscious persons;
- Turn the body of unconscious, face-down persons in the water;
- Incline the body backwards from the vertical position;
- Lift the head above horizontal;
- Return the wearer to a stable face-up position after being destabilised when floating in the flexed position.

An adult lifejacket shall allow the person wearing it to swim a short distance and to board a survival craft. An infant or child lifejacket shall perform the same as an adult lifejacket except as follows:

- Donning assistance is permitted for small children and infants.

The requirements for infant lifejackets:

- Facilitate the rescue of the infant by a caretaker;
- Allow the infant to be fastened to a caretaker and contribute to keeping the infant close to the caretaker;
- Keep the infant dry, with free respiratory passages;
- Protect the infant against bumps and jolts during evacuation; and
- Allow a caretaker to monitor and control heat loss by the infant.

A lifejacket shall have buoyancy which is not reduced by more than 5% after 24 hours submersion in fresh water. The buoyancy of a lifejacket shall not depend on the use of loose granulated materials. Each lifejacket shall be fitted with a whistle firmly secured by a lanyard.

Lifejacket lights and whistles shall be selected and secured to the lifejacket in such a way that their performance in combination is not degraded.
A lifejacket shall be provided with a releasable buoyant line or other means to secure it to a lifejacket worn by another person in the water.

A lifejacket shall be provided with a suitable means to allow a rescuer to lift the wearer from the water into a survival craft or rescue boat.

Inflatable lifejacket

A lifejacket which depends on inflation for buoyancy shall have not less than two separate compartments and shall:

- Inflate automatically upon immersion, be provided with a device to permit inflation by a single manual motion and be capable of having each chamber inflated by mouth.

Lifejacket lights

Each lifejacket light shall:

- Have a luminous intensity of not less than 0.75 Cd in all directions of the upper hemisphere;
- Have a source of energy capable of providing a luminous intensity of 0.75 Cd for a period of at least 8 hours;
- Be visible at as great a segment of the upper hemisphere as is practicable when attached to a lifejacket; and
- Be of white colour.

A personalised, automatically inflatable lifejacket shall be within reach of every person who is regularly on board a craft. Such life jackets shall conform to: European Standards EN ISO 12402-2:2006, EN ISO 12402-3: 2006, EN-ISO 12402-4:2006, or SOLAS Convention 1974, Chapter III, Regulation 7.2, and the LSA Code, sub-section 2.2.

Non-inflatable lifejackets in accordance with these Standards shall also be admissible for children. In addition, on passenger vessels, life-saving equipment shall be within reach for all shipboard personnel. For vessel board personnel not responsible for undertaking duties according to the safety rota, non- inflatable or semi-automatically inflatable lifejackets are allowed.

Individual life-saving equipment shall be available for 100% of the maximum permitted number of passengers. Non-inflatable or semi-automatically inflatable lifejackets are also allowed.

7.2.3.4 Knowledge of functions of ship's boat

All ship's boats shall be properly constructed and shall be of such form and proportions that they have ample stability on the water and sufficient freeboard when loaded with their full complement of persons and equipment, and are capable of being safely launched under all conditions of trim. All lifeboats shall have rigid hulls and shall be capable of maintaining positive stability when in an upright position in calm water and loaded with their full complement of persons and equipment and holed in any one location below the waterline, assuming no loss of buoyancy material and no other damage.

Each ship's boat shall be fitted with a permanently affixed approval plate, containing at least the following items:

- Manufacturer's name and address;
- Lifeboat model and serial number;
- Month and year of manufacture;
- Number of persons the lifeboat is approved to carry. All ship's boats shall be of sufficient strength to:
- Enable them to be safely launched into the water when loaded with their full complement of persons and equipment; and
- Be capable of being launched and towed when the vessel is making headway at a speed of 5 knots (approx. 7 Km/h) in calm water.

Hull and rigid covers shall be fire-retardant or non-combustible.

Seating shall be provided on thwarts, benches or fixed chairs which are constructed so as to be capable of supporting a static load equivalent to the number of persons, each weighing 100 kg.

Each ship's boat to be launched by falls shall have sufficient strength to withstand a load, without residual deflection on removal of that load.

Ship's boat buoyancy

All ship's boats shall have inherent buoyancy or shall be fitted with inherently buoyant material which shall not be adversely affected by water, oil or oil products, sufficient to float the lifeboat with all its equipment on board when flooded and open to the waterway.

Ship's boat propulsion

Every lifeboat shall be powered by a compression-ignition engine. No engine shall be used for any lifeboat if its fuel has a flashpoint of 430 C or less.

The engine shall be provided with either a manual starting system or a power starting system. Any necessary starting aids shall also be provided.

Ship's boat fittings

All ship's boats shall be provided with at least one drain valve fitted near the lowest point in the hull which shall automatically open to drain water from the hull when the lifeboat is not waterborne and shall automatically close to prevent entry of water when the lifeboat is waterborne. Each drain valve shall be provided with a cap or plug to close the valve, which shall be attached to the lifeboat by a lanyard, a chain or other suitable means. Drain valves shall be readily accessible from inside the lifeboat and their position shall be clearly indicated. All ship's boats shall be provided with a rudder and tiller.

Ship's boat markings

The number of persons for which the ship's boat is approved. The name and port of registry of the vessel to which the ship's boat belongs shall be marked on each side of the lifeboat's bow.

The following crafts shall be equipped with a ship's boat according to European Standards EN 1914:2016:

- Motor vessels and barges exceeding 150 tdw;
- Tugs and pushers with a water displacement of more than 150 m3;
- Floating equipment;
- Passenger vessels.

It shall be possible for one person to launch such ship's boat safely within five minutes from the first manual action necessary. If a powered launching device is used this shall be such that safe, quick launching shall not be impaired if its supply fails.

Inflatable ship's boats shall in addition:
- Comprise at least two separate air compartments;
- Inflate automatically or by manual command when launched;
- Assume and maintain a stable trim irrespective of the load to be supported, even when only half the air compartments are inflated.

7.2.3.5 Ability to prepare, launch, sail, recover and stow the vessel's boat

Preparation and safety of the vessel's boat

The vessel's boat hangs outboard from the davit. This is a small crane with a hand winch. It is required by law that the ship's boat can be launched by someone within five minutes. This makes it necessary to regularly check and maintain the davit in good and safety conditions.

This can be done in the following way:
- Check that the equipment of the ship's boat is complete (oars, mooring rope and bailer);
- Check the lifting wire and the four jumps for wear;
- Lubricate the winch and check that it is still working properly;
- Check that the davit can still turn outboard;
- Check whether the drainage plug can still close and remove sand and dirt;
- A ship's boat has a drainage plug. This ensures that rainwater can drain. The drainage plug is therefore often open when the ship's boat is not in use. When you are going to use the ship's boat, you must first close the drainage plug.

When crew members are going to use the vessel's boat, they must also wear the right clothing. These are:
- Warm and not too loose clothing;
- Sturdy non-slip shoes (no boots);
- A life jacket.

A vessel's boat is intended as a means of rescue and is part of the mandatory equipment of an inland vessel. The vessel's boat must be stable and not sink. The legally required equipment for a vessel's boat consists of:
- A set of oars;
- A mooring rope;
- A bailer.

For rowing with vessel's boat two oars must be used. These are on the sides of the boat. When rowing, the blades of the oars (the lower parts) are moved through the water.

Before you start rowing, you have to learn to put the oars in and out of the water correctly and safely. You can easily lose a belt. In a stationary boat, oars are always with the blade on the stern deck with the handle forward. There is then one oar on the port side and one on the starboard side. When there is enough space around the boat, you can put the oars in the row rolls. These are on the sides of the ship's boat. To do this, you grab the oar with your hand by the handle and place the oar in the row roller.

While rowing it is important to sit well in the middle of the ship's boat. Keep the oars equally deep in the water on both sides. Then pull the straps towards you. Try to distribute the force evenly between the two belts. If you do not do that correctly, you will go in circles.

There are two expressions used in rowing. These are:
- Retrieval is pulling the oars towards you so that the boat moves forward;
- Ironing is pushing the oars away from you so that the boat moves backwards.

Sailing with an outboard motor

Before using an outboard motor, check the following:
- Whether there is enough fuel in the tank;
- Whether the motor is properly secured and secured with a chain or rope;
- That the fuel hoses are connected properly and in the correct direction you usually start an outboard motor by hand. You do that like this:
- Open the fuel tank vent;
- Move the clutch of the outboard motor to the neutral position;
- Squeeze the pump to get the fuel from the tank to the engine;
- Set the throttle to start;
- Give the starter rope a big tug to start the engine.

When the engine is running, you can put the clutch in forward gear. Then accelerate with the throttle to set sail. To be on the safe side, always take a pair of oars with you as the engine can fail.

Safety when sailing with an outboard motor

Sailing with an outboard motor is faster than when you are rowing or prying. That's why everyone has to get on board. If you don't do this, you could hit the water when making a sharp turn. That's why you also have to wear your life jacket.

Some outboards are equipped with a dead man's switch. This is a special cord that you put on your wrist. When the cord becomes tight, for example because you fall overboard, the motor stops automatically. Always put this cord on your wrist when sailing with an outboard motor.

You are sailing with a dangerous substance: petrol. Petrol is highly flammable and the petrol vapour in particular is highly explosive. So no fire may be lit on board while using the outboard motor. You are therefore not allowed to smoke!

7.2.4 Provide assistance in the case of rescue operations and swim

7.2.4.1 Ability to rescue and transport a casualty

Man overboard recovery presents some difficult issues. The first problem is that of locating the casualty and the second that of recovering him/her.

If the casualty is seen to fall overboard or is subsequently located, it is vital that as many persons as is practically possible are detailed to continuously visually observe his/her position. Once the casualty has been found or if seen to fall overboard the location can be marked with a lifebuoy.

Practice has shown that different man overboard manoeuvres may be required depending upon the situation prevailing and the type of vessel involved.

Actually recovering a person from the water is usually achieved by use of a lifeboat. In some conditions practiced and skilled crew members may use the lifeboat to recover the casualty.

The condition of a man overboard casualty will depend on a number of factors including how they have responded to the "cold shock", what they are wearing and how long they have been in the water.

They must be rescued with great care or their condition may considerably worsen. Getting the person on board can be difficult, particularly if the casualty is unconscious or otherwise unable to help him-/herself. If there is no specific recovery equipment a short strap can be quickly made from a length of rope and a parbuckle can be improvised using ropes or nets.

If possible the casualty should be recovered horizontally rather than vertically, particularly if they have been in the water for some time.

7.2.4.2 Ability to use swimming skills for rescue operations

Rescue Swimming refers to skills that enable an individual to attempt a rescue when a swimmer is in difficulty. These include a combination of communication skills, specific "rescue" swimming strokes, and release and evade techniques for self-preservation should the rescue go wrong.

From the outset once a swimmer in difficulty is spotted, eye contact must be maintained at all times. Assess the situation: environment, available physical equipment, others who can help, etc.

Attempt to establish voice contact, which if successful can often result in a "voice rescue." A rescuer should enter the water only as a last resort.

Rescues should be attempted in the following order: talk, throw, reach, wade, row, swim, tow and carry.

7.2.5 Use emergency escape routes

7.2.5.1 Ability to keep escape routes free (according to local features on board)

Safety organisation

According to the provisions of the European Standard laying down Technical Requirements for Inland Navigation vessels (ES-TRIN), adopted by CESNI, the safety organisation on board of the inland vessels consists of:

A safety rota shall be provided on board passenger vessels. The safety rota describes the duties of the crew and the shipboard personnel in the following eventualities:

- Breakdown;
- Fire on board;
- Evacuation of passengers;
- Person overboard.

Specific safety measures for persons with reduced mobility shall be taken into consideration.

The crew members and shipboard personnel designated in the safety rota should be assigned their various duties, depending on the posts they occupy. Special instructions to the crew shall ensure that, in the event of danger, all doors and openings in the watertight bulkheads will be hermetically closed immediately.

The safety rota includes a safety plan, in which at least the following are clearly and precisely designated:

- Areas intended for use by persons with reduced mobility;
- Escape routes, emergency exits and muster and evacuation areas;
- Life-saving equipment and ship's boat;
- Fire extinguishers and fire extinguishing and pressurised sprinkler systems;
- Other safety equipment;
- The alarm system;
- The bulkhead doors and the position of their controls, as well as the other openings;
- Doors;
- Fire dampers;

- Fire alarm system;
- Emergency power plant;
- Ventilation system control units;
- Shore connections;
- Fuel line shut-offs;
- Liquefied gas installations;
- Public address systems;
- Radio-telephone equipment;
- First aid kits.

The safety rota shall:
- Be duly stamped by the inspection body, and
- Be prominently displayed at an appropriate point of each deck.

Safe escape routes

Safe escape routes should be provided on board of passenger vessels, which must meet the following requirements:
- Escape routes should be maintained in a safe condition, clear of obstacles;
- Additional aids for escape should be provided as necessary to ensure accessibility, clear marking, and adequate design for emergency situations;
- Stairways, ladders and corridors serving crew spaces and other spaces to which the crew normally have access should be arranged so as to provide ready means of escape to a deck from which embarkation into survival craft may be effected.

There should be at least two means of escape, as widely separated as possible, from each section of accommodation and service spaces and control stations.

The normal means of access to the accommodation and service spaces below the open deck should be arranged so that it is possible to reach the open deck without passing through spaces containing a possible source of fire (e.g. machinery spaces, storage spaces of flammable liquids).

The second means of escape may be through portholes or hatches of adequate size and preferably leading directly to the open deck.

At least two means of escape should be provided from machinery spaces, except where the small size of a machinery space makes it impracticable. Escape should be by steel ladders that should be as widely separated as possible.

7.2.6 Use of internal emergency communication and alarm system

7.2.6.1 Ability to use emergency communication and alarm systems and equipment

Emergency communication system

Internal communication facilities on board

There shall be internal communication facilities on board vessels with a wheelhouse designed for radar navigation by one person. It shall be possible to establish communication links from the steering position:
- With the bow of the vessel or convoy;
- With the stern of the vessel or convoy if no direct communication is possible from the steering position;
- With the crew accommodation;
- With the boatmaster's cabin.

Reception at all positions of these internal communication links shall be via loudspeaker, and transmission shall be via fixed microphone. The link with the bow and the stern of the vessel or convoy may be of the radio-telephone type.

Special provisions applicable to passenger vessels

Electrical equipment

Only electrical equipment shall be permitted for lighting.

For the following rooms and locations, adequate lighting and emergency lighting shall be provided:
- Location where life-saving equipment is stored and where such equipment is normally prepared for use;
- Escape routes, access for passengers, including gangways, entrances and exits, connecting corridors, lifts and accommodation area companionways, cabin areas and accommodation areas;
- Markings on the escape routes and emergency exits;
- In other areas intended for use by persons with reduced mobility;
- Operation rooms, engine rooms, steering equipment rooms and their exits;
- Wheelhouse;
- Emergency electrical power source room;
- Points at which extinguishers and fire extinguishing equipment controls are located;
- Areas in which passengers, shipboard personnel and crew, muster in the event of danger.

There shall be an emergency power plant, consisting of an emergency electrical power source and emergency switchboard, which, in the event of a failure of the supply to the following electrical equipment, can immediately take over as their replacement supply, where the equipment does not have its own electrical power source:

- Navigation lights;
- Audible warning devices;
- Emergency lighting;
- Radio-telephone installations;
- Alarm, loudspeaker and on board message communications systems;
- Searchlights;
- Fire alarm system;
- Other safety equipment such as automatic pressurised sprinkler systems or fire extinguishing pumps;
- Lifts and lifting equipment.

The light fittings for the emergency lighting shall be marked as such:
The emergency power plant shall be installed outside the main engine room, outside the rooms housing the power sources and outside the room where the main switchboard is located.

Cables feeding the electrical installations in the event of an emergency shall be installed and routed in such a way as to maintain the continuity of supply of these installations in the event of fire and flooding. These cables shall never be routed through the main engine room, galleys or rooms where the main power source and its connected equipment is installed, except insofar as it is necessary to provide emergency equipment in such areas.

The emergency power plant shall be installed either above the margin line or as far away as possible from the power sources, so as to ensure that, in the event of flooding it is not flooded at the same time as these power sources.

Alarm system

There shall be an independent alarm system enabling the accommodation, engine rooms and, where appropriate, the separate pump rooms to be reached. The helmsman shall have within reach an on/off switch controlling the alarm signal; switches which automatically return to the position when released are not acceptable.

The sound pressure level for the alarm signal shall be at least 75 dB (A) within the accommodation area. In engine rooms and pump rooms the alarm signal shall take the form of a flashing light that is visible on all sides and clearly perceptible at all points.

7.3 Prevent fire and use fire fighting equipment

Competences:

The Boatman shall be able to:

1. Distinguish the elements of fire and types and sources of ignition;
2. Use different types of fire extinguishers;
3. Act according to shipboard fire fighting procedures and organisation;
4. Follow instructions concerning: personal protective equipment, methods, extinguishing agents and procedures during fire fighting and rescue operations.

7.3.1 Distinguish the elements of fire and types and sources of ignition

7.3.1.1 Knowledge of the possible causes of fire during different activities as well as knowledge of the classification of fires according to the European Standards EN or equivalent

Causes of fire

Smoking and naked lights

Careless smoking tops the list of causes of fire. Smoking is a strong habit and as such people not only tend to smoke without any regard to circumstances or location but they also hardly pay any heed to the safe disposal of lit cigarettes, cigars, pipe tobacco and matchsticks.

Temperature of a burning cigarette is about 5000C. Thus glowing ashes and tobacco contain enough heat to start a fire in such materials as dunnage, paper, cardboard, cordage, linen and beddings.

If a person is tired after a busy day and smoking in bed, a smouldering fire can result if the glowing tobacco touches the bedding, resulting smoke will most certainly cause drowsiness and possible suffocation or asphyxiation of this person before the fire is discovered.

A person who has been drinking alcohol and smoking too, tends to be careless and has to be observed carefully by other crew members so that his/her careless actions do not jeopardise safety of crew and vessel. Thus open flames, glowing embers and smoke can prove dangerous as well as unhygienic.

Smoking on board a ship is therefore only permitted in designated smoking areas. These areas must be identified and clearly marked thus. In port, shore personnel boarding the vessel for various works should be appraised of shipboard smoking regulations as well as locations of designated smoking areas on board.

Safety matches and / or cigarette lighters must never be carried on person outside ship's accommodation.

Many terminals expressly forbid smoking or even carrying on person of matchboxes and / or cigarette lighters, around their premises.

Spontaneous combustion and auto ignition

Some materials when damp or soaked with paints, oils of vegetable origin in particular can ignite without external application of heat.

Auto ignition temperature of a material is the temperature at which a flammable material will ignite without initiation of a spark or flame.

Spontaneous combustion is the process of gradual increase in temperature of a material as a result of oxidation, without drawing any heat from its surrounding. This process finally results in ignition of the material concerned.

Lagging on steam pipes or cotton rags if soaked with oils and or paints and stocked in a warm area without ventilation is prone to spontaneous combustion. This oil begins to oxidise and produces heat in the process. This heat causes the remaining oil to oxidise faster and produce still more heat that will start building up around the rag. This in turn will ignite any other flammable substance resulting in a major fire. Petroleum liquids when heated sufficiently will ignite without the application of a naked flame. When fuel or lube oil under pressure sprays onto a hot surface, it will get hotter and will auto ignite as a result.

Electrical circuits and electrical equipment

Electricity is a safe and convenient source of power if the equipment concerned is properly insulated and wired. If worn out, misused or poorly wired, electrical energy is converted into heat and the equipment concerned becomes a source of ignition and thus a fire hazard.

Only approved electrical equipment for shipboard use that will withstand the strenuous conditions are installed and/or used on board a vessel. Any electrical equipment on board must be installed, maintained, tested and repaired in accordance with existing regulations and only by qualified personnel.

Radio transmitting antenna

During medium and high frequency radio transmission, significant energy is radiated which can induce an electrical potential capable of producing an incentive spark, in unearthed receivers within 500m range from transmitting antennae. In case antenna insulators have a surface coating of salt, dirt or water, high or medium frequency transmission can cause arcing. Low energy transmissions such as satellite communication or use of UHF/VHF communication is not considered dangerous. All stays, cranes, derricks and fittings must be earthed. During cargo loading/transfer/discharge, cargo tank washing, cargo tank purging operations, MF-HF transceiver to be switched off.

Properly sited radars do not present any ignition hazard on board a vessel but use of ship's 10 cm radar is capable of including an electrical potential into nearby conductors ashore.

Flammable liquids used on board vessels

Most commonly found on board are bunker fuels, lube oils of various grades, diesel oils, kerosene, paints and thinners.

For some flammable liquids, rate of vapour release is over a wide temperature range, e.g. gasoline gives off vapour even at minus 430C thus proving itself a continuous fire hazard.

Heating increases the rate of vapour release. This vapour is heavier than air, will seek low places, can spread to a distant source of ignition and dissipate slowly.

Bunker fuels and lube oils must be heated to release sufficient vapour for combustion. But once a light or heavy flammable liquid is burning, radiation feedback and the chain reaction quickly increase flame production.

Classes of fire

Class A

Class A fires are fires in ordinary combustibles such as wood, paper, cloth, trash, and plastics. These solid substances are mainly of organic origin and contain carbon and its compounds.

Irrespective of the causes of ignition, a class A fire burns solid fuel. It can be extinguished either by water, foam or multi-purpose dry chemical powder. However, for complete extinguishment, class A fires should be entirely cooled down below the ignition temperature of the burning substance.

Class B

Class B fire refers to a fire involving flammable liquids such as petroleum (gasoline, kerosene, petrol, diesel, octane, etc.), paint, alcohol, solvent, oil and tar, etc., that normally do not leave any embers or residues (or very low amounts of residues). Most of these liquids have high carbon content and the compounds in them are highly combustible.

A class B fire does not leave embers or ashes and can be best extinguished by providing a wall between the fuel and the oxygen, a technique known as smothering. The most effective extinguishing agent against a class B fire is foam. However, the type of foam to be used depends on whether it is water soluble or hydrocarbon.

A small class B fire can also be extinguished by multipurpose dry chemical powder or by water mist that can effectively cool the fire. Re-ignition may also occur if the sources of heating the substance (above the ignition temperature) are not removed. One should never use water stream on a class B fire as it helps to spread the fire since these liquids are lighter than the water.

Class C

Class C fires include flammable gases such as propane and butane.

Class C fires do not include fires involving cooking oils and grease. These gases are highly combustible and may cause large scale fires and explosions if mixed with enough oxygen.

A class C fire does not leave embers or ashes and can be best extinguished by dry chemical powder and CO_2. Before trying to extinguish a class C fire, the source of the gaseous substance must be found and cut off. This could be closing the valve of the gas containing cylinder. A spark in the presence of any of these gasses, with the required amount of oxygen, may also cause an explosion.

Class E

These fires can be a severe hazard to fire fighters using water or other conductive agents, as electricity may be conducted from the fire, through water, to the fire fighter's body, and then earth. Electrical shocks have caused many fire fighter deaths.

Electrical fire may be fought in the same way as an ordinary combustible fire, but water, foam, and other conductive agents are not to be used. If the fire is or possibly could be electrically energised, it can be fought with any extinguishing agent rated for electrical fire. Carbon dioxide CO_2, NOVEC 1230, FM- 200 and dry chemical powder extinguishers such as PKP (Purple- K) and even baking soda are especially suited to extinguishing this sort of fire. PKP should be a last resort solution to extinguishing the fire due to its corrosive tendencies. Once electricity is shut off to the equipment involved, it will generally become an ordinary combustible fire.

Class D

Class D fires are fires in combustible metals such as potassium, sodium, aluminium, and magnesium. Metal fires represent a unique hazard because people are often not aware of the characteristics of these fires and are not properly prepared to fight them. Therefore, even a small metal fire can spread and become a larger fire in the surrounding ordinary combustible materials. Certain metals burn in contact with air or water (i.e. sodium), which exaggerate this risk.

Care must be taken when extinguishing metal fires. Water and other common fire fighting agents can excite metal fires and make them worse.

The most common agents are sodium chloride granules and graphite powder. In recent years, powdered copper has also come into use. These dry powder extinguishers should not be confused with those that contain dry chemical agents. The two are not the same, and only dry powder should be used to extinguish a metal fire. Using a dry chemical extinguisher in error, in place of dry powder, can be ineffective or actually increase the intensity of a metal fire.

Class F

Class F fires are fires in cooking oils and greases such as animal fats and vegetable fats.

Class F fires involve unsaturated cooking oils in well-insulated cooking appliances located in commercial kitchens.

Though such fires are technically a subclass of the flammable liquid/gas class, the special characteristics of these types of fires, namely the higher flash point, are considered important enough to recognise separately. Water mist can be used to extinguish such fires. Appropriate fire extinguishers may also have hoods over them that help extinguish the fire. Sometimes fire blankets are used to stop a fire in a kitchen or on a stove.

7.3.1.2 Knowledge of the elements of the combustion process

Fire is the rapid oxidation of any combustible material. It is a chemical reaction involving fuel, heat, and oxygen. These three elements, commonly referred to as the fire triangle, in the right proportions, will always produce a fire. Remove any one side of the triangle and the fire will be extinguished.

Further fire research determined that a fourth element, a chemical chain reaction, was a necessary component of fire. The fire triangle was changed to a fire tetrahedron to reflect this fourth element. A tetrahedron can be described as a pyramid which is a solid having four plane faces. Essentially all four elements must be present for fire to occur, fuel, heat,

oxygen, and a chemical chain reaction.
Once ignited, a chain reaction must take place whereby fires can sustain their own heat by the further release of heat energy in the process of combustion and may propagate, provided there is a continuous supply of an oxidiser and fuel. Removal of any one of these essential elements will result in the fire being extinguished.

Combustion process

The combustion process occurs in two modes:

- Flaming;
- Non-flaming, smouldering or glowing embers.

For the flaming mode it is necessary for solid and liquid fuels to be vaporised. The solid fuel vapours are thermally driven off, or distilled and the liquid fuel vapours evaporated. It is this volatile vapor from the solid or liquid fuels that we see actually burning in the flaming mode. This gas or vapor production, emitted from the fuel is referred, to as pyrolysis. Once a flame has been established, heat transfer from the flame to the fuel surface continues to drive off more volatile gases and perpetuates the combustion process.
Continued burning in the flaming mode requires a high burning rate, and the heat loss associated with transfer of heat from the flame area by conduction, convection, and radiation must be less than the energy output of the fire. If the heat loss is greater than the energy output of the fire, the fire will be extinguished.
Both modes, flaming and non-flaming surface modes, can occur singly, or in combination. Flammable liquids and gases only burn in the flaming mode. Wood, straw, and coal are examples where both modes may exist simultaneously.

Stages of a fire

Incipient – This first stage begins when heat, oxygen and a fuel source combine and have a chemical reaction resulting in fire. This is also known as "ignition" and is usually represented by a very small fire which often (and hopefully) goes out on its own, before the following stages are reached. Recognising a fire in this stage provides your best chance at suppression or escape.

Growth – The growth stage is where the structures fire load and oxygen are used as fuel for the fire. There are numerous factors affecting the growth stage including where the fire started, what combustibles are near it, ceiling height and the potential for "thermal layering". It is during this shortest of the 4 stages when a deadly "flashover" can occur; potentially trapping, injuring or killing fire fighters.

Fully Developed – When the growth stage has reached its max and all combustible materials have been ignited, a fire is considered fully developed. This is the hottest phase of a fire and the most dangerous for anybody trapped within.

Decay – Usually the longest stage of a fire, the decay stage is characterised by a significant decrease in oxygen or fuel, putting an end to the fire. Two common dangers during this stage are first – the existence of non-flaming combustibles, which can potentially start a new fire if not fully extinguished. Second, there is the danger of a backdraft when oxygen is reintroduced to a volatile, confined space.

7.3.1.3 Ability to apply the basic of fire fighting

Fire is considered as one of the most challenging emergencies on board because, if not properly addressed from the beginning, it entails the risk of total loss of the ship and of injuries/fatalities. One way to address this emergency is the proper training through efficient and regular drills which ensure that crew members are ready to handle a fire on board. The quick response to fire emergencies on board is of utmost importance, taking into consideration that almost half of fire incidents take place while the vessel is in voyage.

When a fire breaks out on board, the reality is that the vessel's crew is all alone to respond to a fire. Even if the vessel is at port, the initial stages of response on board, which are vital to control the fire, should be taken by the crew.

Therefore, properly trained crew members on board should be the focal point of shipping companies and crew providers in order to prevent fire incidents and enhance safety.

Key factors

For an effective fire fighting response, there are three important factors:

Fire fighting equipment

The safety certificate of each vessel includes all portable and fixed fire fighting equipment of the vessel. Crew members must support, check, inspect and maintain the good operational condition of this equipment. Additionally, during surveys and annual inspections Classification Societies have to verify the condition of such equipment. An additional safety barrier and check is the Managing Companies' inspection procedures through audits, superintendent inspections, etc.

Crew training

Crew members have to achieve a minimum level of competence through basic training. The advanced fire fighting course is the next stage of training and refers mainly to management level crew members or those in charge of fire fighting teams. On board familiarisation is the next step of crew training as there are additional specific items that crew members should be trained on board each specific ship.

On scene training

This is the most challenging factor to be successfully developed and achieved as it requires step by step training through frequent focused drills. The most important to be achieved through such training is the team spirit and team response during fire emergencies. However, taking into consideration the frequent rotation of crew on board the same vessel it is difficult to maintain a satisfactory overall response.

7.3.2 Use different types of extinguishers

7.3.2.1 Knowledge of the different characteristics and classes of fire extinguishers

Water extinguisher

Signal Red

Best for: Fires involving organic solid materials such as wood, cloth, paper, plastics, coal, etc.

Danger: Do not use on burning fat or oil or on electrical appliances.

How to Use: Point the jet at the base of the flames and keep it moving across the area of the fire. Ensure that all areas of the fire are out.

How it Works: Water has a great cooling effect on the fuel's surface and thereby reduces the pyrolysis rate of the fuel.

Water spray extinguisher (water with additive)

Signal Red

Best For: Fires involving organic solid materials such as wood, cloth, paper, plastics, coal, etc. These offer significantly improved fire fighting capability compared to traditional jet type water fire extinguishers.

Danger: Do not use on burning fat or oil or on electrical appliances.

How to Use: Point the jet at the base of the flames from a safe distance of approx. 3m and keep it moving across the area of the fire. Ensure that all areas of the fire are out.

How it Works: Water has a great cooling effect on the fuel's surface and thereby reduces the pyrolysis rate of the fuel. Instead of a jet nozzle a spray nozzle is used, with a higher pressure, which creates a fine spray. This allows for a given quantity of water to have a considerable increase in the surface area presented to the fire. This makes extinguishing more efficient by more rapid extraction of heat, formation of steam, etc. They can also contain surfactants which help the water penetrate deep into the burning material which increases the effectiveness of the extinguisher.

Water mist extinguisher ("dry" water mist)

Signal Red on a White Background

Best For: The first broad spectrum extinguisher to tackle A, B, C rated risks as well as fats and deep fat fryers (Class F). Models with dielectric test to 35k Volts can be safely used on electrical fires (up to 1000 Volt) if a safety distance of 1m is adhered to, as their mist (de-ionised water) does not conduct electricity and the extinguisher does not normally form puddles, which could conduct electricity.

How to Use: Point the jet at the base of the flames from a safe distance of approx. 3m and keep it moving across the area of the fire. Ensure that all areas of the fire are out. The fire draws the microscopic water particles into the fire.

How it Works: Water is turned into microscopic particles in the supersonic nozzle. The water mist is drawn to the fire where it cools and suffocates the fire. The mist also forms a safety barrier between user and fire, which keeps some of the heat back.

CO_2 portable fire extinguishers

Signal Black

Best For: Live electrical equipment, although it allows re-ignition of hot plastics. Now mainly used on large computer servers, although care has to be taken not to asphyxiate people when using the extinguisher in small server rooms.

Danger: Do not use on chip or fat pan fires, as it can carry burning fat out of the container. This type of extinguisher does not cool the fire very well and you need to ensure that the fire does not start up again. Fumes from CO^2 extinguishers can asphyxiate if used in confined spaces: ventilate the area as soon as the fire has been controlled. Only use CO_2 extinguishers with frost-free horns, as the hand holding the horn can otherwise be frozen to the horn, as the gas gets very cold during the discharge.

How to Use: The discharge horn should be directed at the base of the flames and the jet kept moving across the area of the fire. Recommended distance of use 2 m.

How it Works: Carbon dioxide extinguishers work by suffocating the fire. Carbon dioxide displaces oxygen in the air. However, once discharged, the CO_2 will dissipate quickly and allow access for oxygen again, which can re-ignite the fire.

Foam portable extinguishers
Signal Cream
Best For: Fires involving solids and burning liquids, such as paint and petrol but not suitable for chip or fat pan fires.

Danger: Do not use on chip or fat pan fires, electrical fires.

How to Use: For fires involving solids, point the jet at the base of the flames and keep it moving across the area of the fire. Ensure that all areas of the fire are out. For fires involving liquids, do NOT aim the jet straight into the liquid. Where the liquid on fire is in a container, point the jet at the inside edge of the container or on a nearby surface above the burning liquid. Allow the foam to build up and flow across the liquid. Use from a safe distance of approx. 3 meters.

How it Works: They are mainly water based, with a foaming agent so that the foam can float on top of the burning liquid and break the interaction between the flames and the fuel surface.

Powder extinguisher multi-purpose
Signal Blue
Danger: Safe on live electrical equipment, although does not penetrate the spaces in equipment easily and the fire may re-ignite. This type of extinguisher does not cool the fire very well and care should be taken that the fire does not flare up again.

Smouldering material in deep seated fires such as upholstery or bedding can cause the fire to start up again. Do not use on domestic chip or fat pan fires. There is danger of inhalation if powder extinguishers are used within buildings. Due to this, and the potential for powder to impair vision, powder extinguishers are no longer recommended for use within enclosed spaces.

How to Use: Point the jet or discharge horn at the base of the flames and, with a rapid sweeping motion, drive the fire towards the far edge until all the flames are out. If the extinguisher has a hand control, wait until the air clears and if you can still see the flames, attack the fire again. Recommended safe distance 3-5 m.
How it Works: Similarly to almost all extinguishing agents the powder acts as a thermal ballast making the flames too cool for the chemical reactions to continue. Some powders also provide a minor chemical inhibition, although this effect is relatively weak. These powders thus provide rapid knockdown of flame fronts, but may not keep the fire suppressed.

Chemical extinguisher
Signal Canary Yellow
Best For: Wet chemical fire extinguishers are ideal for Class F fires, involving cooking oils and fats, such as lard, olive oil, sunflower oil, maize oil and butter.

Danger: Check manufacturer's instructions for suitability of use. These extinguishers are usually not recommended for class B fires such as petrol.

How to Use: Apply the wet chemical using the extended applicator in slow circular movements, which gives a gentle, yet highly effective application. Apply the fine spray onto the burning fat until the surface of the burning cooking oil changes into a soapy like substance which prevents re-ignition. The gentle application helps to prevent burning oil splashing out of the container. Make sure that you empty the entire content of the wet chemical extinguisher onto the oil/fat, as the fire can re-ignite otherwise.

How it Works: Most class F extinguishers contain a solution of potassium acetate, sometimes with some potassium citrate or potassium bicarbonate. The extinguishers spray the agent out as a fine mist. The mist acts to cool the flame front, while the potassium salts saponify the surface of the burning cooking oil, producing a layer of foam over the surface. This solution thus provides a similar blanketing effect as a foam extinguisher, but with a greater cooling effect. The saponification only works on animal fats and vegetable oils, so most class F extinguishers cannot be used for class B fires. The misting also helps to prevent splashing the blazing oil.

7.3.2.2 Ability to apply various methods of fire fighting and use extinguishing equipment and fixed installations taking into account for example: the use of different types of portable extinguishers, and the influence of wind while approaching the fire
Use of fire extinguisher
Even though extinguishers come in a number of shapes and sizes, they all operate in a similar manner. Here's an easy acronym for fire extinguisher use: PASS: Pull, Aim, Squeeze, and Sweep. General instructions for use:

- Before using the fire extinguisher, ensure you have selected the correct extinguisher for the class of fire that you intend to fight;

- Ensure that you are positioned between the fire and a safe exit or escape route. Pull out safety pin firmly (this will be held in by an anti-tamper seal device);
- Apply the powder by rapid sweeping in bursts across the flame front and/or sweeping up the flames - keeping out of the smoke & powder;
- If the fire is not out on completion of the extinguisher's contents, then leave immediately by a safe route from the building, closing all doors behind you.

Understanding the different types of fire is usually a good way to understand which type of fire extinguisher one should use. It is essential to understand which extinguisher works, because 'one size fits all' approach may endanger lives. The extinguishers are often colour coded to ensure people identify which ones should be used where. The colours are Signal Red, Signal Red on a White Background, Blue, Cream, Black, and Canary Yellow.

Before you tackle a fire

Many people put out small fires quite safely. However, some people die or are injured by tackling a fire which is beyond their capabilities. Here is a simple fire code to help you decide whether to put out or get out:

- Only tackle a fire in its very early stages;
- Always put your own and other people's safety first;
- On discovering the fire, immediately raise an alarm;
- Make sure you can escape if you need to and never let a fire block your exit;
- If you cannot put out the fire or if the extinguisher becomes empty, get out and get everyone else out of the space immediately, closing all doors behind you as you go.

Preparation prior to a fire or incident is vital.

The responsible person and crew members must learn the basic procedures indicated on the Station Bill and any special procedures to cover special loads or hazards. Intimate knowledge of the ship's facilities shown on the ship's fire safety plan is essential to control the fire in the early stages.

The crew must be fully aware of their tasks and use of their equipment and it must be tested during a fire drill. All the equipment used in controlling a fire must be in a perpetual state of readiness, from the ventilation controls through to the batteries fully charged in the lamps - everything is important.

The crew members of the vessel are required to have basic skills and competence for efficient intervention in case of fire.

These requirements are as follows:

- Use of various portable fire extinguishers;
- Use of ba (breathing apparatus);
- Extinguishing smaller fires, electrical, oil, etc.;
- Extinguishing fires using jet and spray nozzles with water;
- Extinguish fires using foam, powder and chemical agents;
- Entering and passing through a compartment with high expansion foam using no breathing apparatus;
- Fighting fires in enclosed spaces using breathing apparatus;
- Use fog or steam for fire suppression.

7.3.3 Act according to shipboard fire fighting procedures and organisation

7.3.3.1 Knowledge of on board systems to fight fires

Permanently installed fire fighting systems in accommodation spaces, wheelhouses and passenger spaces

Fire protection in accommodation spaces, wheelhouses and passenger spaces is to be provided only by suitable automatic pressurised water sprinklers as permanently installed fire fighting systems. The systems shall be able to spray water at a rate of at least 5 l/m^2 per minute over the area of the largest room to be protected.

Permanently installed fire fighting systems in engine rooms, boiler rooms and pump rooms

Extinguishing agents

For protecting engine rooms, boiler rooms and pump rooms, the following extinguishing agents may be used in permanently installed fire fighting systems:

- CO_2 (carbon dioxide);
- HFC 227ea (heptafluoropropane);
- Inert Gas-541 (52% nitrogen, 40% argon, 8% carbon dioxide).

Ventilation, air intake

Combustion air for the propulsion engines shall not be extracted from rooms that are to be protected by permanently installed fire fighting systems. This shall not apply where there are two mutually independent and hermetically separated main engine rooms or if next to the main engine room there is a separate engine room with a bow thruster, ensuring that the vessel is able to make way under its own power in the event of fire in the main engine room.

Any forced ventilation present in the room to be protected shall switch off automatically if the fire fighting system is triggered.

There shall be devices available with which all apertures which can allow air to enter or gas to escape from the room to be protected can be quickly closed. It shall be clearly recognisable whether they are open or closed. The air escaping from relief valves in the compressed-air tanks installed in engine rooms shall be conveyed to the open air.

Over- or underpressure resulting from the inflow of extinguishing agent shall not destroy the components of the surrounding partitions of the room to be protected. It shall be possible for the pressure to equalise without danger.

Protected rooms shall have a facility for extracting the extinguishing agent and the combustion gases. Such facilities shall be capable of being operated from positions outside the protected rooms and which would not be made inaccessible by a fire within such spaces. If there are permanently installed extractors, it shall not be possible for these to be switched on while the fire is being extinguished.

Fire alarm system

The room to be protected shall be monitored by means of an appropriate fire alarm system. The alarm shall be noticeable in the wheelhouse, the accommodation spaces and the room to be protected.

Triggering device

Fire fighting systems with automatic triggering shall not be permissible. It shall be possible to trigger the fire fighting system from a suitable place outside the room to be protected.

Triggering devices shall be installed in such a way that they can be operated even in case of a fire and in the event of damage by fire or explosion in the room to be protected that the necessary quantity of extinguishing agent can still be conveyed. Non-mechanical triggering devices shall be powered from two different mutually independent energy sources. These energy sources shall be located outside the room to be protected. Control lines in the room to be protected shall be designed so as to remain functional for at least 30 minutes in the event of fire.

If triggering devices are installed in such a way that they are out of sight the panel covering them shall be identified by the 'fire fighting installation' symbol.

'Fire fighting installation' symbol

If the fire fighting system is intended for the protection of several rooms, the triggering devices for each room have to be separate and clearly identified.

Next to each triggering device operating instructions in one of the languages of the Member States shall be posted up visibly and indelibly. They shall contain, in particular, instructions regarding:

- Triggering of the fire fighting system;
- The need for checking to ensure that all persons have left the room to be protected;
- Action to be taken by the crew when the fire fighting system is triggered;
- Action to be taken by the crew in the case of failure of the fire fighting system.

The operating instructions shall point out that before the fire fighting system is triggered combustion engines drawing air from the room to be protected are to be shut down.

Warning system

Permanently installed fire fighting systems shall be provided with acoustic and optical warning systems. The warning system shall be set off automatically as soon as the fire fighting system is first triggered. The warning signal shall sound for an appropriate time before the extinguishing agent is released and it shall not be possible to switch it off.

Warning signals shall be clearly visible in the rooms to be protected and outside the accesses to them and clearly audible even under operating conditions producing the loudest inherent noise. They shall be clearly distinct from all other acoustic and optical signals in the room to be protected.

The acoustic warning signals shall be clearly audible in the adjacent rooms even when connecting doors are closed and under operating conditions producing the loudest inherent noise.

If the warning system is not self-monitoring as regards short-circuits, wire breaks and voltage drops, it shall be possible to check that it is working properly.

At every entrance to a room that can be supplied with extinguishing agent, a clearly visible notice shall be put up bearing the following text in red lettering on a white background: 'Warning, fire fighting installation! Leave the room as soon as the warning signal sounds (description of signal)'.

CO_2 fire fighting systems – additional requirements

Fire fighting systems using CO_2 as the extinguishing agent shall comply with the following provisions:

- CO_2 containers shall be housed outside the room to be protected in a space or cabinet hermetically separated from other rooms. The doors to these installation spaces and cabinets shall open outwards, be lockable and bear on the outside a symbol for 'General danger warning' together with the marking 'CO_2' in the same colour and with the same height;

- Installation spaces below decks for co_2 containers shall be accessible only from the open air. These spaces shall have their own adequate artificial ventilation system with extraction ducts, completely separate from other ventilation systems on board;
- The co_2 containers shall not be filled to more than 0,75 kg/l. The specific volume of unpressurised co_2 gas is to be taken as 0,56 m^3/kg;
- The volume of co_2 for the room to be protected shall be at least 40% of its gross volume. It shall be possible to supply this volume within 120 seconds, and to check whether supply has been completed;
- Opening the container valves and operating the flood valve shall be separate control operations;
- The warning signal shall sound for an appropriate time before the extinguishing agent is released and it shall not be possible to switch it off. The appropriate time shall be at least 20 seconds. There shall be a reliable device to ensure the delay before delivery of the co_2 gas.

HFC-227ea – fire fighting systems - additional requirements

Fire fighting systems using HFC-227ea as the extinguishing agent shall comply with the following provisions:

- If there are several rooms to be protected, each with a different gross volume, each room shall be provided with its own fire fighting system;
- Each container of hfc-227ea that is installed in the room to be protected shall be equipped with an overpressure relief valve. This shall harmlessly release the contents of the container into the room to be protected if the container is exposed to the effects of fire and the fire fighting system has not been triggered;
- Each container shall be fitted with a device for checking the gas pressure;
- The containers shall not be filled to more than 1.15 Kg/l. The specific volume of the unpressurised hfc-227ea is to be taken as 0.1374 M^3/kg;
- The volume of hfc-227ea for the room to be protected shall be at least 8% of the room's gross volume. This volume shall be supplied within 10 seconds;
- The hfc-227ea containers shall be provided with a pressure monitor which triggers an acoustic and optical alarm signal in the wheelhouse in the event of an unauthorised loss of propellant. If there is no wheelhouse, this alarm signal shall be given outside the room to be protected;
- After flooding, the concentration in the room to be protected shall not exceed 10.5%;
- The fire fighting system shall not contain any parts made of aluminium.

Inert Gas-541 – fire fighting systems - additional requirements

Fire fighting systems using IG-541 as the extinguishing agent shall comply with the following provisions:

- If there are several rooms to be protected, each with a different gross volume, each room shall be provided with its own fire fighting system;
- Each container of ig-541 that is installed in the room to be protected shall be equipped with an overpressure relief valve. This shall harmlessly release the contents of the container into the room to be protected if the container is exposed to the effects of fire and the fire fighting system has not been triggered;
- Each container shall be fitted with a device for checking the contents;
- The filling pressure of the container shall not exceed 200 bar at + 15°c;
- The volume of ig-541 for the room to be protected shall be at least 44% and no more than 50% of the room's gross volume. This volume shall be supplied within 120 seconds.

7.3.3.2 Ability to tackle fire and to take relevant notification measures

In case you discover a fire you should immediately raise the alarm and notify the Boatmaster or the responsible person. The alarm should be raised using the appropriate alarm raising equipment like local push buttons and by shouting "Fire, fire, fire!". Some people, however, are killed or injured as a result of tackling a fire that is beyond their capabilities. Here are some simple rules to help you decide whether you should tackle a fire:

- Only tackle a fire when it is in its very early stages;
- Follow the approved procedures for fire fighting on board;
- Give consideration to your own safety and the safety of other people and make sure you can escape from the fire if you need to. Never let a fire block your exit;
- Think about the position of yourself, the fire and the escape route;
- Remember that fire extinguishers are only for fighting a fire in its very early stages. Never tackle a fire if it is starting to spread (or has spread) to other items in the room or if the room is filling with smoke. More people are killed by the smoke than by the fire (in the order of 70% of fire deaths are caused by smoke and fumes);
- Go to the muster station and follow the instructions given.

7.3.4 Follow instructions concerning: personal equipment, methods, extinguishing agents and procedures during fire fighting and rescue operations

7.3.4.1 Knowledge of procedures to avoid personal danger

Before you tackle a fire

Many people put out small fires quite safely. However, some people die or are injured by tackling a fire which is beyond their capabilities. Here is a simple fire code to help you decide whether to put out or get out:

- Only tackle a fire in its very early stages;
- Always put your own and other peoples' safety first;
- On discovering the fire, immediately raise an alarm;
- Make sure you can escape if you need to and never let a fire block your exit;
- If you cannot put out the fire or if the extinguisher becomes empty, get out and get everyone else out of the space immediately, closing all doors behind you as you go.

Personal equipment

The personal equipment consists of:

- Protective clothing;
- Boots;
- Rigid helmet;
- Electric safety lamp;
- Axe;
- Safety harness;
- Safety lines.

The protective clothing is to be used to protect from heat radiated from a fire and should be used in close proximity to a fire.

Do not use the protective clothing in a fire – they are not fire entry suits. The boots shall be of electrical non-conducting materials.

The helmet shall provide effective protection against impact. The helmet shall be supplied with a full-face visor and a neck curtain. The safety lamp is operated by batteries, which shall have a duration of at least three hours. The safety lamps shall be of an approved type and shall be electrically safe (on tankers) or explosion proof (if intended to be used in a hazardous atmosphere or area).

Fire blankets are made of fire resistant materials. They are useful for smothering small pan fires or for wrapping round a person whose clothing is on fire. Fire blankets should generally be disposed of after use. Best For: Small pan fires where oil or fat has caught fire and clothing fires.

Danger: If the blanket does not completely cover the fire, it will not be able to extinguish the fire.
While kite marked fire blankets have been successfully tested on deep fat fryers, modern frying fats are difficult to extinguish with a fire blanket. We therefore recommend wet chemicals for deep fat fryers.
How to Use: Place carefully over the fire. Keep your hands shielded from the fire. Do not waft the fire towards you. Make sure that you remove the heat source.

How it Works: Smothers the fire and prevents oxygen getting to the fire.

Breathing apparatus

Safety instructions when using breathing apparatus

A breathing apparatus wearer brings him- or herself in potentially dangerous situations.

Smoke and heat can make tasks difficult and they may also have to deal with stressful situations such as searching for casualties, which increase the problems. A BA-wearer must act decisively but be able to recognise dangerous situations and act accordingly. Your own safety and the safety of your body is of the utmost importance.

In order to increase the safety it is important, when working with BA, to act and work according to predefined and well trained procedures. Procedures are developed for:

- Donning of the face mask;
- The use and control of the face mask;
- Replacing the cylinder.

Preparing breathing apparatus sets (BA-sets) for storage

By preparing the BA-sets in the fire station the first step for a swift intervention is made. By preparing in advance we can prevent loss of time for a BA-team to be ready.

The BA-team can assume that all the equipment is prepared and checked and the cylinders are full. When preparing the BA-sets it is important that a number of actions are taken.

First the cylinder, backpack and mask must be checked for visual flaws. After this visual inspection the cylinder is mounted on the backpack. By opening the valve on the cylinder the pressure in the cylinder can be checked (pressure gauge) and the system can be checked for leakages. When there are no problems the valve can be closed.

The system is still under pressure and the next test that can be executed is the testing of the alarm signal (whistle). To do this the air in the system should be released very slowly.

As soon as the pressure in the system is lower than 55 bars the alarm signal will be activated. The next procedure is adjusting the carrying straps on the backpack to the maximum.

The facemask must be packed in a plastic bag and when dealing with a strap mask the straps must be loosened to the maximum. The BA-sets are now ready to use and can be stored in the fire station.

Preparing BA-sets for use

In case of an incident the fire team must wear BA as soon as possible in order to be ready for duty. Preparing always takes place in a safe environment.

Use of breathing apparatus

Upon donning the BA-set it is possible that the fireman's outfit becomes disarranged. The collar on the helmet may cause problems so in order to protect the fire team members it is important that clothing is checked and where necessary adjusted. Now the plastic protection bag can be removed from the mask and the straps of the mask should be adjusted to the maximum. The mask is hanging around the neck with the carrying strap until the wearer goes into action. Previous to an action the mask is placed on the face and the regulator is clicked onto the mask. Breathing apparatus & working in a hot, humid environment. The connection of the regulator onto the mask needs to be checked. Finally the helmet is placed on the head, the collar is closed and the gloves are put on. When necessary, supplementary clothing can be donned. Due to the fact that it is essential that the fire team is fast but properly dressed operationally, it is wise to use a so-called dress man (with enough personnel available).

A dress man is a person who can help members of a fire team when dressing up and preparing for an action.

Emergency Escape Breathing Devices (EEBD)

In addition to the escape route, the vessels shall be provided with EEBD. Within the accommodation spaces at least two EEBD shall be stored with the rescue party equipment. In machinery spaces the EEBD shall be positioned at the foot of the ladders in the engine room and in control rooms, workshops, etc., in sufficient numbers for the personnel normally present in that area. At least one spare EEBD shall be carried.

The EEBD must not be used for fire fighting, entering oxygen deficient enclosed spaces, but must be used only for escape from a compartment in the event of an emergency.

All vessels shall be provided with a training unit which crew members must be made familiar with during drills. The training unit shall be clearly marked to this effect. The EEBD will have autonomy for at least 10 minutes.

7.3.4.2 Ability to act according to the emergency procedures

Fire fighting organisation

Preparation prior to a fire or incident is vital. The responsible officer and crew members must learn the basic procedures indicated on the Station Bill and any special procedures to cover special loads or hazards. Intimate knowledge of the ship's facilities shown on the ship's fire safety plan is essential to control the fire in the early stages.

The crew must be fully aware of their tasks and use of their equipment and it must be tested during a fire drill.

All the equipment used in controlling a fire must be in a perpetual state of readiness, from the ventilation controls through to the batteries fully charged in the lamps - everything is important. The crew members of the vessel are required to have basic skills and competence for efficient intervention in case of fire.

These requirements are as follows:

- Use of various portable fire extinguishers;
- Use of BA (breathing apparatus);
- Extinguishing smaller fires, electrical, oil, etc.;
- Extinguishing fires using jet and spray nozzles with water;
- Extinguish fires using foam, powder and chemical agents;
- Entering and passing through a compartment with high expansion foam using no Breathing Apparatus;
- Fighting fires in enclosed spaces using Breathing Apparatus;
- Use fog or steam for fire suppression;
- The above standards can be tested during the compulsory fire drill.

Fire drill

The purpose of the fire drill is to test the efficiency of the organisation. The crew must be challenged in order to make it interesting and more importantly to learn from mistakes.

The danger is to make the drill a routine that does not test the organisation. One focused drill is more beneficial than repeating a routine drill many times. Change the drill each time to stimulate and challenge thought.

The drill can also be used to check and test equipment in the drill environment, required in accordance with the certificate - fire pumps, breathing apparatus, fire suits and communications.

A successful meaningful drill requires thought before the drill begins, firstly defining the learning objectives, setting the timing and allocating time to debrief afterwards.

The objectives must reflect key tasks to be performed and must be measurable against a standard, i.e. one objective could be to dress effectively in fire outfits and breathing apparatus within a fixed time frame, effectively means skin is fully protected and the start-up tests are performed on the breathing apparatus.

Once the objectives are set, a scenario can be written, which incorporates specific events and consequences of certain actions, the script should test all of the crew. The drill begins with a report of fire and subsequent sounding of the alarm, indicating that it is a drill, but trying to bring an element of surprise and realism. Occasionally begin the drill by a report of fire from sources other than the bridge. The speed of reaction, mustering, and specific duties performed, setting up of the command and communications should be analysed.

The attack on the fire will depend upon the scenario, however the leadership, assessment of the situation and subsequent decisions should be evaluated. Create chaos to see if the team can control and react to the ever changing situations a fire can create.

Fire fighting intervention

Evaluate the drill; by assessing if the objectives were reached, being critical about actions so that the lessons learned can be incorporated in the procedures. The crew should be encouraged to participate uninhibited, without fear of making mistakes. The drill will go wrong, but then lessons are learned. A drill that is perfectly conducted is not challenging the crew.

The level of competence can be improved through drilling. Specific skills can be identified, taught, demonstrated and practised. Slow down the task and repeat until the person or team demonstrates a set level of competence. Endeavour to share information and experience gained by all members of the crew. Document the fire drill for future reference, to assess improvements in the organisation.

The drill begins with a report of fire and subsequent sounding of the alarm, indicating that it is a drill, but trying to bring an element of surprise and realism. Occasionally begin the drill by a report of fire from sources other than the bridge.

The speed of reaction, mustering, and specific duties performed, setting up of the command and communications should be analysed.

7.4 Environmental protection

Competences:

The Boatman shall be able to:

1. Protect the environment in accordance with relevant regulations;
2. Take precautions to prevent pollution of the environment;
3. Use resources efficiently;
4. Dispose of waste in an environmentally friendly fashion.

7.4.1 Protect the environment in accordance with relevant regulations

7.4.1.1 Knowledge of the national and international regulations concerning the protection of environment

International regulations concerning the protection of the environment

CEVNI – European Code for Inland Waterways

General obligation to exercise vigilance

The Boatmaster, other crew members and other persons on board shall exercise every care required by the circumstances in order to avoid polluting the waterway and to restrict to the maximum the amount of waste occurring on board and to avoid as far as possible any mixing of the various categories of waste.

Prohibition on discharging and dumping

Vessels shall be prohibited from throwing, discharging or allowing to run into the waterway oily or greasy waste occurring during the operation of the vessel or household refuse, sludge, slops and other special waste.

Vessels shall be prohibited from throwing, discharging or allowing to spill into the waterway any parts of the cargo or cargo related waste. Packaging and means of stowage are also included.

Domestic waste water shall not be discharged or allowed to flow into the waterway except in accordance with the respective national regulations.

Discharge into the waterway of water separated by approved oil separator vessels shall be exempted from the prohibition for discharging into the water if the maximum content of residual oil after separation is consistently and without prior dilution in accordance with national requirements.

In the event of the accidental discharge of waste or the threat of such discharge, the Boatmaster shall notify the nearest competent authority without delay, indicating as precisely as possible the nature, quantity and position of the discharge.

On board collection and processing of waste
The Boatmaster shall ensure the separate collection on board of oily and greasy waste occurring during the operation of the vessel in receptacles provided for the purpose and the collection of bilge water in the engine room bilges. The receptacles shall be stored on board in such a way that any leakage of the contents may be noticed in time and easily prevented.

The Boatmaster shall ensure the separate collection on board and delivery to a reception facility of the waste such as household refuse, sludge, slops and other special waste. If possible, household refuse shall be deposited separately according to the following categories: paper, glass, other recyclable materials and other refuse.

Pollution prevention register (used oil log), requirements for delivery to reception facilities
All vessels equipped with an engine, excluding small crafts, shall carry on board a valid pollution prevention register.

The pollution prevention register shall be issued and identified by the competent authorities.

The oil and greasy waste occurring during the operation of the vessel shall be delivered, against a receipt, to the reception facilities at regular intervals, depending on the condition and operation of the vessel. The receipt shall consist of an entry in the pollution prevention register by the reception facility.

Painting and external cleaning of vessels
It shall be prohibited to oil or clean the outside of vessels using products which may not be discharged into water.

Nor shall it be permitted to use anti-fouling systems containing the following substances or preparation thereof:
- Mercury compounds;
- Arsenic compounds;
- Organotin compounds which act as biocides;
- Hexachlorocyclorexane.

As an interim measure, pending complete removal and replacement of an anti-fouling system containing substances indicated above, it shall be permitted to apply to a vessel's hull a coating to inhibit the introduction into the water of the aforementioned substances from the anti-fouling systems under the coating.

CCNR initiatives on environmental protection of inland waterways

Environmental protection is of particular importance for a form of transport that - in part - uses natural infrastructure. Major rivers represent the backbone of a network of waterways that also encompasses estuaries, lakes and canals. Sustainable use of this infrastructure, which is mostly natural, places major demands on its users.

A number of recent studies have shown how environmentally friendly inland navigation is. Targeted measures help strengthen this profile. There is thus a close link between safety-related measures and those relating to environmental protection. In fact, safety and environmental protection go hand in hand in many fields.

General considerations with respect to inland navigation also apply to navigation on the Rhine. These efforts to protect the environment are reflected in practice by an on-going fight against all forms of pollution.

Among the various activities are to be mentioned the protection against pollution resulting from accidents ("accidental pollution") and the protection at the level of working procedures on board vessels as well as the techniques used for the treatment of waste produced ("operational pollution").

Protection against accidental pollution

In inland navigation, accidents may take place as a result of technical faults or human error, just like in any human activity. The risks in question are a major consideration when drafting safety guidelines.
An in- depth analysis of the various potential scenarios, as well as of actual accidents, provides a basis for a coherent set of measures designed to ensure a high level of passive safety in the field of water transportation (technical guidelines and measures regarding the transportation of dangerous goods).

Protection in the context of working practices and everyday operations

Reducing emissions of harmful exhaust fumes:

- Inland navigation almost exclusively uses diesel engines for propulsion, which are obviously fuelled by diesel. The emission of exhaust fumes containing harmful substances is thus inevitable. The Central Commission has introduced rules designed to control these constituent compounds. A type approval is required for new engines installed on board inland vessels (CCNR 1 since 2003 and CCNR 2 since 2007). In this respect, reference is also made to community directives on mobile machinery (Directive 97/68/EC of the European Parliament and of the Council of 16 December 1997);
- Reducing carbon gas emissions:
- The reduction of CO2 emissions is a primary focus of the Central Commission as part of its major climate change project. Accordingly, serious consideration is given to means of achieving major savings in fuel consumption, the use of alternative forms of energy such as natural gas and indeed the use of other combustion technologies, such as fuel cells.
- Handling of waste generated on board vessels: Water transportation, by its very nature, whether involving passengers or cargo, generates waste. This waste must be handled in line with applicable regulations governing temporary storage on board vessels and transfer to recycling and disposal networks. Measures designed to prevent the generation of waste as well as the financing of the collecting, storage and disposal of this material are specific aspects. Given the very nature of inland navigation, including the mobile and international nature inherent in this mode of transport, the States most closely affected have drawn up, with the support of the Central Commission, an international convention known as the CDNI (Convention on Collection, Deposit and Reception of Waste Produced during Navigation on the Rhine and Inland Waterways). This Convention came into force in November 2009. It covers waterways in Belgium, Germany, the Netherlands, part of the waterways in France (Rhine and Moselle), Luxembourg and Switzerland (Rhine). Introducing a ban on surface water discharges, the Convention and its implementing regulation set out detailed rules on waste prevention, how to handle waste generated on board vessels and the procedures governing transfer to land installations. The Convention also details the responsibilities with respect to the disposal of this waste. As the rules vary depending on the type of waste, they have been compiled together into separate annexes of the implementing regulation in accordance with the source of the waste on board vessels.

Convention on Cooperation for the Protection and Sustainable use of the Danube River (Danube River Protection Convention)

This convention, which was signed in 1994 in Sofia by 11 of the Danube Countries (Austria, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, Moldova, Romania, Slovakia, Slovenia and Ukraine) and the EU, forms the overall legal instrument for co-operation and transboundary water management in the Danube River Basin.

One of the main objectives of this Convention is in line with the water management cooperation which shall be oriented on sustainable water management; that means on the criteria of a stable, environmentally sound development, which are at the same time directed to:

- Maintain the overall quality of life;
- Maintain continuing access to natural resources;
- Avoid lasting environmental damage and protect ecosystems;
- Exercise preventing approach.

Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy.

The purpose of this Directive is to establish a framework for the protection of inland waters which:

- Prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems;
- Promotes sustainable water use based on a long-term protection of available water resources;
- Aims an enhanced protection and improvement of the aquatic environment, inter alia, through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation of phasing-out of discharges, emissions and losses of the priority hazardous substances; and
- Ensures the progressive reduction of water pollution.

7.4.1.2 Ability to use available documentation and information systems concerning environmental issues according to instructions

Water Information System for Europe (WISE)- http://water.europa.eu

WISE is a partnership initiative of the European Commission (Directorate-Generals for Environment, Joint Research Centre and Eurostat) and the European Environment Agency. Protection of Europe's water resources is one of the core objectives of the environment policy of the European Union. But how good (or bad) is the quality of our waters in Europe?

Are we making any progress? Are the EU policies effective enough? Now there is one "gateway" to answer these questions and to access all the water-related information and data that are collected by the European Commission and the European Environment Agency. It is called the "Water Information System for Europe" or "WISE".

Practically, WISE is a collective database build around the subject of water management in Europe. It contains all the relevant information on this matter. And thereby constitutes a new, comprehensive, shared EU data and information system for water, including river basins.

ICPDR - International Commission for the protection of the Danube River - www.icpdr.org

Inventories and databases are fundamental requisites to assess the human influences to the environment. The ICPDR has been empowered by the Danube countries to organise data collection and to process the received information to serve the decision making processes.

Inventories and databases are fundamental requisites to assess the human influences on the environment. A multitude of input parameters have to be collected by the Danube countries. This includes also specific investigations based on international reporting requirements covering a diversity of pressures (for pollution from the municipal, industrial, and agro-industrial sector).

Purposes of Databases

The national authorities can share and exchange information and good practices, the scientific community can use the information for research projects to improve approaches and methodologies, and the interested public is able to access data to learn more about the environment of the Danube.

Access to ICPDR Databases

Everybody can access the ICPDR databases.

The Convention on the Protection of the Rhine - www.iksr.org

According to its Preamble, the goal of the Convention is, through the use of a comprehensive approach, to increase multilateral cooperation in the sustainable development of the Rhine's ecosystem.

Data Information Sharing, Exchange, and Harmonisation

Contracting Parties agreed to cooperate and inform one another of actions taken in their territory to protect the Rhine, and have also committed to implementing international monitoring programs and studies of the Rhine ecosystem in their territories and to inform the ICPR - International Commission for the Protection of the Rhine - of the results of those studies and programmes. The ICPR relies on the data collection and monitoring efforts of the Contracting Parties. For example, the Warning and Alarm Plan allows the ICPR to gather information on water pollution levels collected by monitoring stations along the river, with more than 100 substances monitored. For more information on the Warning and Alarm Plan, see Notifications. In addition, the Rhine 2020 programme contains numerous targets designed to improve the health and ecological balance of the Rhine, and which call upon the Contracting Parties to work in collaboration in order to meet the stated goals of the programme.

7.4.1.3 Knowledge of the consequences of possible leaks, spills or release of pollutants into the environment

Environmental effects of oil spills

An oil spill is the release of a liquid petroleum hydrocarbon into the environment, especially the marine and inland ecosystem, due to human activity, and is a form of pollution. The term is usually given to marine oil spills, where oil is released into the maritime and inland waters, but spills may also occur on land. Oil spills may be due to releases of crude oil from tankers, offshore platforms, drilling rigs and wells, as well as spills of refined petroleum products (such as gasoline, diesel) and their by-products, heavier fuels used by large ships such as bunker fuel, or the spill of any oily refuse or waste oil.

When an oil spill occurs, many elements of the environment may be affected. Depending on the magnitude of the spill and its location, the effects can vary, ranging from minimal to serious ones. For instance, oil spills can have a major impact on the temporary animal and fish loss of habitat. Heavy oils may affect several organism functions like respiration, feeding, and thermo-regulation. At the same time, the entire ecosystem can change temporarily because of the chemical components and elements of the spilled oil that are toxic to the environment.

The general fate and transport of spilled oil dictates its environmental effects and mainly involves:

- the ability of oil to accumulate on top of water bodies forming oil slicks or non-aqueous phase liquids which are generally more resistant to degradation and natural attenuation than the dissolved compounds. From such oil slicks evaporation of many volatile components of oil spill is the dominant process when the oil slick is in contact with air, such as in marine spills;
- the dissolution of certain more soluble oil compounds happens in time along with some dispersion, diffusion, and advection;
- the persistence of many individual oil components makes them accumulate in the environment and living organisms.

The effects of oil spills are not limited to the environment. There are immediate effects on humans, fish, animals, birds and wildlife in general, mainly due to:

- Direct contact with the spilled oil including breathing of volatilised oil components (hydrocarbons) from the spill;
- Direct contact with the environment polluted with spilled oil components (some of which may persist a long time), such as drinking polluted water or breathing polluted dust particles;
- Consumption of polluted food - at any level within the food chain, with a higher risk for food pollution at the higher levels of the food chain, i.e. humans and animals.

7.4.1.4 Knowledge of dangerous goods and classification with regard to environmental aspects

European Agreement concerning the international carriage of dangerous goods by inland waterways - ADN

The European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) was signed at Geneva on 26 May 2000 on the occasion of a Diplomatic Conference held under the joint auspices of the United Nations Economic Commission for Europe (UNECE) and the Central Commission for the Navigation of the Rhine (CCNR). It entered in force on 29 February 2008.
ADN consists of a main legal text (the Agreement itself) and annexed Regulations and aims at:

- Ensuring a high level of safety of international carriage of dangerous goods by inland waterways;
- Contributing effectively to the protection of the environment by preventing any pollution resulting from accidents or incidents during such carriage; and
- Facilitating transport operations and promoting international trade in dangerous goods.

The Regulations annexed to the ADN contain provisions concerning dangerous substances and articles, provisions concerning their carriage in packages and in bulk on board inland navigation vessels or tank vessels, as well as provisions concerning the construction and operation of such vessels. They also address requirements and procedures for inspections, the issue of certificates of approval, recognition of classification societies, monitoring, and training and examination of experts.

The last updated version of this European Agreement is that of 2021. The classes of dangerous goods according to ADN are the following:

- Class 1 - Explosive substances and articles;
- Class 2 - Gases;
- Class 3 - Flammable liquids;
- Class 4.1 – Flammable liquids, self-reactive substances, polymerizing substances and solid desensitized explosives;
- Class 4.2 - Substances liable to spontaneous combustion;
- Class 4.3 – Substances which, in contact with water, emit flammable gases;
- Class 5.1 - Oxidizing substances;
- Class 5.2 – Organic peroxides;
- Class 6.1 – Toxic substances;
- Class 7- Radioactive material;
- Class 8 - Corrosive substances;
- Class 9 - Miscellaneous dangerous substances and articles.

Criteria for substances hazardous to the aquatic environment

Environmentally hazardous substances include, inter alia, liquid or solid substances pollutant to the aquatic environment and solutions and mixtures of such substances (such as preparations and wastes). Substances means chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

The aquatic environment may be considered in terms of the aquatic organisms that live in the water, and the aquatic ecosystem of which they are part. The basis, therefore, of the identification of hazard is the aquatic toxicity of the substance or mixture, although this may be modified by further information on the degradation and bioaccumulation behaviour.

The basic elements for classification of environmentally hazardous substances (aquatic environment) are as follows:

- Acute aquatic toxicity;
- Chronic aquatic toxicity;
- Potential for actual bioaccumulation; and
- Degradation (biotic or abiotic) for organic chemicals.

Acute aquatic toxicity means the intrinsic property of a substance to be injurious to an organism in a short-term aquatic exposure to that substance.
Acute (short-term) hazard means the hazard of a chemical caused by its acute toxicity to an organism during short-term aquatic exposure to the chemical.

Chronic aquatic toxicity means the intrinsic property of a substance to cause adverse effects to aquatic organisms during aquatic exposures which are determined in relation to the life-cycle of the organism. Long-term hazard means the hazard of a chemical caused by its chronic toxicity following long-term exposure in the aquatic environment.

Bioaccumulation means net result of uptake, transformation and elimination of a substance in an organism due to all routes of exposure (i.e. air, water, sediment/soil and food).

Degradation means the decomposition of organic molecules to smaller molecules and eventually to carbon dioxide, water and salts.

7.4.2 Take precautions to prevent pollution of the environment

7.4.2.1 Knowledge of general precautions to prevent pollution of the environment

General precautions to prevent pollution of the environment

Pollution prevention is any practice that reduces, eliminates, or prevents pollution at its source. Reducing the amount of pollution produced means less waste to control, treat, or dispose of. Less pollution means fewer hazards posed to public health and the environment.

Specific pollution prevention approaches

Pollution prevention approaches can be applied to all potential and actual pollution-generating activities, including those found in the energy, agriculture, federal, consumer and industrial sectors. Prevention practices are essential for preserving wetlands, groundwater sources and other critical ecosystems - areas in which we especially want to stop pollution before it begins.

In the energy sector, pollution prevention can reduce environmental damages from extraction, processing, transport and combustion of fuels. Pollution prevention approaches include:

- Increasing efficiency in energy use;
- Use of environmentally benign fuel sources.
- In the agricultural sector, pollution prevention approaches include:
- Reducing the use of water and chemical inputs;
- Adoption of less environmentally harmful pesticides or cultivation of crop strains with natural resistance to pests; and
- Protection of sensitive areas.

In the industrial sector, examples of pollution prevention practices include:

- Modifying a production process to produce less waste;
- Using non-toxic or less toxic chemicals as cleaners, degreasers and other maintenance chemicals;
- Implementing water and energy conservation practices;
- Reusing materials such as drums and pallets rather than disposing of them as waste.

Why is pollution prevention important?
Pollution prevention reduces both financial costs (waste management and clean up) and environmental costs (health problems and environmental damage). Pollution prevention protects the environment by conserving and protecting natural resources while strengthening economic growth through more efficient production in industry and less need for households, businesses and communities to handle waste

7.4.2.2 Ability to follow general precautions and to apply safe bunkering procedures

Safe Bunkering operations and procedures

Spillages and leakages during bunkering operations are a primary source of oil pollution. Experience has shown that many of the bunker overflows and spillages that do occur can be attributed to human error.

All bunkering operations should be carefully planned and executed in accordance with applicable regulations.

Personnel involved in the bunkering operation on board should have no other tasks and should remain at their workstations during topping-off. Generally, bunkering during cargo operations is not considered to be best practice owing to the need to avoid conflicts of interest for operational personnel. Spillages often occur when crew members are distracted by another task. Companies should require that all bunkering operations are controlled under procedures that are incorporated in a Safety Management System.

These procedures should ensure that the risks associated with the operation have been assessed and that controls are in place to mitigate these risks. The procedures should also address contingency arrangements in the event of a spill.

The Company should consider the following items when producing the procedures:

- Determining that there is adequate space for the volume of bunkers to be loaded;
- Establishing maximum loading volume for all tanks;
- Controls for the setting of bunker system valves;
- Determining loading rates for the start of loading, bulk loading and topping-off;
- Special precautions when loading into double bottom tanks;

- Arrangements of bunker tank ventilation;
- Overflow arrangements;
- Verification of gauging system operation and accuracy;
- Alarm settings on overfill alarm units;
- Bunker overfill protection (in general, the bunker overfill protection is an emergency stopping device only. It should not be used as a standard method of stopping bunkering);
- Communication between the supplier and receiver must be established before bunkering can be undertaken, including communication procedures for the bunkering operation and emergency stop;
- Manning requirements to execute the operation safely (including e.G. Deck watch);
- Monitoring of the bunkering operation and checking it conforms to the agreed procedure;
- Changing over tanks during bunkering;
- Containment arrangements and clean-up equipment to be available.

Once the procedure is produced, it should be implemented by use of a check-list (model from Appendix 5– ISGINTT - International Safety Guide for Inland Navigation Tank-barges and Terminals).

Prior to commencing the operation, all pre-loading checks should be carried out and communication systems verified as working.

The loading rate should be checked regularly. When changing over from one tank to another, care should be taken to ensure that an excessive back pressure is not put on the hose or loading lines. When topping-off tanks, the loading rate should be decreased to reduce the possibility of air locks in the tank causing mist carry over through the vents, and to minimise the risk of the supplier not stopping quickly enough.

On completion of bunkering, all hoses and lines should be drained to the tank or, if applicable, back to the delivery bunker supplier, prior to disconnection. The practice of blowing lines with air into bunker tanks has a high risk of causing a spillage unless the tank is only part full and has sufficient ullage on completion of loading.

Responsibility and accountability for the safe conduct of bunker operations is shared jointly between the receiver and the supplier. Before the bunkering operation commences, the responsible personnel should:

- Agree in writing the handling procedures, including the maximum transfer rates.
- Agree in writing the action to be taken in the event of an emergency during transfer operations;
- Complete and sign the bunkering safety check-list for bunker delivery to inland ships.

The Check-List is primarily structured for loading bunkers from a barge, a jetty or when loading bulk lubricating oil or gas oil from a road tanker.

7.4.2.3 Ability to take measures according to instructions in the event of collision, for example by sealing the leaks

Prevention of further damage after a collision accident by vessels

It is important while navigating vessel that the crew members understand practical procedures to avoid collision guided by Boatmaster standing orders. These procedures are only indicative, not exhaustive in nature and one must always be guided by practices of good seamanship. Call attention of other vessels that are in adjacent waters by turning on deck lights, putting up the lights or shaped objects to show not under command, using VHF, and other possible means.

Upon collision with another vessel, "Go Astern" as early as possible to limit the damage and to avoid further contact. But if the bow of the vessel has penetrated into the side shell of the other vessel, reverse the engine only after an initial damage assessment as one of the vessels may suddenly lose her buoyancy and sink, or cause/increase oil pollution.

Damage survey and measures against flooding

Survey the degree of damages of the hull by sounding all compartments likely to be affected by the collision. Limit any flooding by using available means on board. If the leakage is small, wooden plugs, blankets, tarpaulin, cement boxes or the like can be used to reduce the flooding rate. An increase in draft due to flooding can cause flooding through openings that are usually above waterlines, to which serious attention must be given.

If high rate flooding is likely to cause the vessel to sink, an intentional stranding should be considered.

In case of a leakage in the fore peak tank, proceed with reduced speed so that excessive pressure on the collision bulkhead is kept to a minimum, and move the vessel to safer waters. Ballast aft tanks if possible to regain freeboard forward.

Salvage contract and evacuation

Follow the Company's instructions to conclude a salvage contract, for which communication must be established between the Company and the vessel as soon as possible after the accident.

When there is imminent danger, there is absolutely no time to wait for the Company's decision, however, the Boatmaster may request salvage using his professional judgment.

If danger is imminent to human lives on board the vessel, every effort should be done to evacuate everyone from the vessel.

Cargo Leakage into Double Hull Tanks

If a cargo leak is discovered, the first step should be to check the atmosphere in the double hull or double bottom tank to establish the cargo content.

It should also be borne in mind that the hazards associated with cargo leakage may also relate to the cargo's toxicity, corrosiveness or other properties and additional measurements may have to be performed to confirm safe conditions for entry.

If a leakage is discovered, the tanker's captain should immediately contact the Company for consultation. It is strongly recommended that operators develop guidelines, taking into account the tank structure and any limitations of the available atmosphere monitoring system, which could assist the tanker's personnel to select the appropriate method of rendering the atmosphere safe. The guidelines should also include the process for contacting authorities and/or the tanker's Classification Society.

Filling or partially filling the double hull or double bottom tank with ballast in order to render the atmosphere safe and/or stop any further leakage of cargo into the tank must take into account prevailing stress, trim, stability and load line factors. It must also be borne in mind that all ballast loaded into a tank after a leak has been found, and all tank washings associated with cleaning the tank, will be classed as 'polluted ballast' and must be processed in accordance with legislation. This means that they must be transferred directly to a cargo or slop tank for further processing. The spool piece used to connect the ballast system to the cargo system should be clearly identified and it should not be used for any other purpose.

If the quantity of cargo leaking into the space is determined to be pumpable, it should be transferred to another cargo tank via the emergency ballast/cargo spool piece connection, if available (see above), or other emergency transfer method, in order to minimise contamination of the space and to facilitate subsequent cleaning and gas freeing operations.

7.4.3 Use resource efficiently

7.4.3.1 Knowledge of efficient use of fuel consumption

Measures for reducing fuel consumption and emissions in IWT

Emissions reduction measures in inland shipping can be categorised into three main groups:

- Technical measures: measures related to the propulsion system, vessel design and vessel equipment, exhaust after treatment, engine internal measures, use of alternative fuel/energy (LNG, electricity, hydrogen, biofuel);
- Operational measures: measures related to speed reduction, smart steaming, journey planning, on board information systems, optimal maintenance;
- Traffic and transport management: measures related to the organisation of the logical chain, to the interface between inland waterway vessels and other transport modes, to the interface of inland vessels and infrastructure (locks, terminals in inland seaports, etc.)

Research and development needs in support of greening the IWT fleet

Emission reductions in IWT depend on further R&D, in particular to adopt existing technologies to the specific context and to lower the cost of deployment. The following non-exclusive list of topics has been identified as requiring further R&D efforts:

- Clean technology needs to be developed for using LNG as mono-fuel as well as dual-fuel in the IWT context, and/or gas-electric applications, in order to further reduce fuel costs and to reduce the engine-out performance as regards NOx and PM;
- Stage V diesel engines need to be developed, possibly using a combination of techniques that have been developed for smaller engines but are currently still considered experimental for large engines;
- Research on technical solutions to prevent or reduce methane emissions, for instance by using pressure LNG technologies or methane slip catalysts;
- Capacity building of systems integrators that provide Stage IV and V engines by integrating components from various suppliers;
- Technologies and procedures for monitoring compliance with emission standard.

7.4.3.2 Ability to use materials in an economical and energy saving way

Efficient energy use, sometimes simply called **energy efficiency**, is the goal to reduce the amount of energy required to provide products and services. Improvements in energy efficiency are generally achieved by adopting a more efficient technology or production process or by application of commonly accepted methods to reduce energy losses.

In order to reduce emissions of greenhouse gases from international shipping, the energy efficiency measures have been made compulsory for all new vessels. Several steps in the form of new technologies and efficient design features have already been taken to ensure that the energy efficiency design is met.

Technically, the job under this endeavour is to achieve "greener" vessels through appropriate design and operational measures. Reduction in fuel consumption and carbon emissions by using alternative fuels is one of the many ways to achieve the ultimate green vessel.

Moreover, it's a difficult task to use new technologies efficiently and safely to achieve the desired objectives. Solar and wind power are renewable resources which have been harnessed and utilised efficiently in some projects such as Skysails and Eco Marine Power's wind-solar ship.

The reduction of fuel consumption through imaginative voyage planning should engage attention of management level crew members on board vessels. Voyage planning or continuous route review is an important exercise that should be carried out throughout the voyage. Reduction in speed under governor control during the period when there are head winds and adverse currents/swell is the single most important thing that must always be done by every vessel. It has been noted several times that crew members are not careful about this and actions are taken only when the propeller comes out of the water and the main engine trips on high speed.

A lot of study is also being conducted to improve the hull form and propeller efficiency. Some studies were done in the past on forward side of the vessel and improvements were incorporated, but now, as one example, single propeller twin-rudder system is sought to be used on larger ocean-going vessels, though, of course, several systems are already in use for the same purpose on coastal vessels for quite some years.

Hull cleaning and paint technology to reduce resistance are areas that need to be further explored to increase the overall efficiency of the vessels.

Systems have been developed to achieve optimum trim. We should always be mindful that the vessel is not underway in a head down condition, say, consequent to consumption of fuel from the aft tanks.

The garbage disposal method has been successful only up to certain level as at several places only "convenient" garbage is accepted. On all vessels scavenge under piston space is cleaned and scrapings are collected, but no one accepts this material. If this is burnt in the incinerator, soot would be produced (normal sludge burning does not produce too much smoke), which ultimately defeats the purpose of reducing emissions. Moreover repeated handling of the shovel (it is a very slow process requiring several feeds) spoils the refractory as well.

Greater co-operation from ports is solicited because several port operations need to go green. Also, technology such as Cold Ironing should be implemented on ports.

Ports are not only for making money on berth charges, crane charges, tug charges but also for assisting vessels to carry out maintenance by granting immobilisation as far as practicable .

7.4.4 Dispose of waste in an environmentally friendly fashion

7.4.4.1 Knowledge of applicable regulations concerning waste

Applicable regulations concerning waste

CEVNI – European Code for Inland Waterways

On board collection and processing of waste. The Boatmaster shall ensure the separate collection on board of oily and greasy waste occurring during the operation of the vessel in receptacles provided for the purpose and the collection of bilge water in the engine room bilges. The receptacles shall be stored on board in such a way that any leakage of the contents may be noticed in time and easily prevented.

The Boatmaster shall ensure the separate collection on board and delivery to a reception facility of the waste such as household refuse, sludge, slops and other special waste. If possible, household refuse shall be deposited separately according to the following categories: paper, glass, other recyclable materials and other refuse.

Convention on collection, deposit and reception of waste produced during Navigation on the Rhine and Inland Waterway

Inland waterway transport is deemed to be the most environmentally friendly mode of transport. The treatment of waste that inevitably occurs during the operation of vessels is of particular concern for river operators.

As the management and the disposal of waste is a matter that is being regulated in a land-based context and taken into account through appropriate procedures and infrastructure on a national level, some rules for the various parties concerned by inland waterway transport had to be established in view of the necessary interface.

These rules envisage to:

- Encourage the prevention of waste generation;
- Canalise the disposal to the dedicated waste reception facilities along the waterway network;
- Ensure adequate funding in view of the "polluter-pays principle";
- Facilitate compliance with the prohibitions of discharge of the waste into surface water.

Recommendations relating to the organisation of the collection of waste from vessels navigating g on the Danube.

Vessels are prohibited from throwing, pouring or dropping or flowing in the waters of the Danube, objects, substances and products of a nature to cause an obstruction or danger to navigation or pollute water. Waste on board must be stored and unloaded in reception facilities at ports or other points for reception ship waste. The discharge of bilge water into the waterway is forbidden to vessels. Water bilges must be unloaded at reception facilities approved.

If possible, garbage should be collected and put back, after having been sorted according to whether waste paper, glass (white, coloured), materials, synthetic materials, metals and other wastes, including food waste.

Boatmasters and any other person mentioned in these Recommendations should also observe local rules on the collection of ship waste that is issued by the competent authorities and Special River Administrations for their sectors of river and port basins.

Reception areas must be equipped with:

- A waste collection vessel serving areas of the Danube; and/or
- Astationary-floating or coastal reception installation, for the receipt of vessel waste;
- Unloading and discharge pipe discharge connections bilge water and household slops meeting the European Standard EN 1305.

4.4.4.2 Ability to carry out the collection, delivery and disposal of: craft oil and fat, cargo residues, and other types of waste goods

In the absence of harmonised development plans, Danube riparian countries began constructing a ship-borne waste management system on their own. Certain developments have taken place everywhere. The most advanced waste management systems are in place in highest-traffic Germany and Romania. On board waste, primarily hazardous (oily and greasy) materials, can generally be deposited at ports and bunkering stations, with other types of waste being collected mostly at ports. In addition to the stationary facilities, there are also mobile collection vessels operating in the port areas in most countries.

Bilge water, waste oils and other (solid) oily and greasy ship wastes can be categorised under oily and greasy ship wastes. Their characteristic feature is that they are hazardous wastes with a high hazard potential. Therefore, special attention has to be paid to proper collection and treatment processes and conditions that are taken into account in regulations on both national and supranational level. However, these regulations can be seen as a basis for the development and implementation of waste reception facilities.

Bilge water is oil contaminated water from the bilge of vessels. It is generated by cleaning procedures or leakages of the body shell and gets contaminated with oil, gas oil or grease. The oil content of bilge water averages 14.3% (push boats: 16.7%), the fluctuation range varies from 5%and 15%. The amount of bilge water generated is influenced by the age, construction, equipment and maintenance of the vessels as well as the demanded engine activity, which itself depends on several other factors (upstream or downstream way, cargo load, etc.). For the Danube region, approximations were made in the late 1990s, stating that the average quantity for cargo vessels in the Danube region would be about 4.2 m³/ship/service due to the high age of the fleet. For passenger vessels, floating cranes and other type of working units 2.1m³/service, for pleasure boats and motor yachts 0.05m³/ship/service were stated. Based on the assumption that all vessels included in Danube Commissions statistics were in operation, the total amount of generated bilge water in the Danube Region was about 15,000m³/year .

Waste oils are used oil or other unusable oil from engines, gear or hydraulics. They are produced sporadically, especially at times of oil changes for engines and aggregates. In Germany, the average amount of waste oils, collected by (mobile) bilge water collection vessels together with bilge water, ranges between 100 and 125 litres per ship and service. If the whole amount of oil is changed, the amount can be up to 500 litres in twin-engine vessels.
Other (solid) oily and greasy wastes are used filters (used oil and air filters), used rags (polluted floor clothes and cleaning rags), containers (empty, polluted bins) and packaging materials. In Germany the amount of other oily and greasy ship wastes collected average between 10 and 20 kg/ship service.

5. EFFECT OF THE HUMAN ELEMENT ON SUSTAINABLE SHIPPING

The human activities of deck crew members on board of vessels have a direct relation with the sustainability in Inland Shipping. Due to the uniformization of training and conformity with Directive (EU) 2017/2397 on the recognition of professional qualifications in inland navigation, there will be an increase of navigational safety.

Different factors affect the development of sustainability in shipping, from regulatory to socio-economic factors, market related aspects and human factors, which all together contribute in different ways to the development of these three pillars.

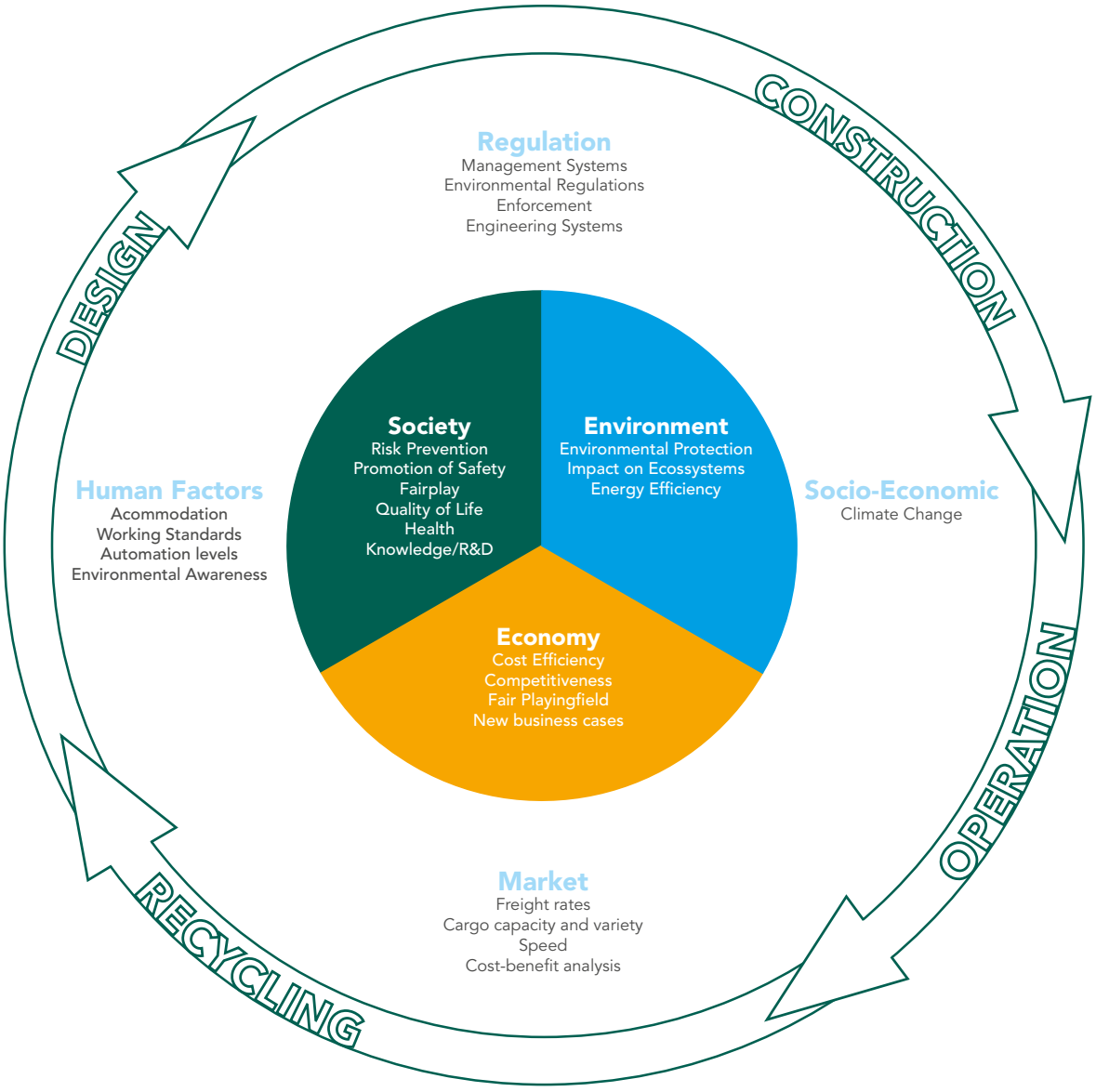

Figure 1 http://www.emsa.europa.eu/implementation-tasks/environment/sustainable-toolbox.html?start=10

Since many different stakeholders are involved in the process, it follows that one of the main factors in supporting Sustainable Shipping is the understanding of all parties' concerns, needs and expectations.

The shipping industry is run by people, for people. People design ships, build them, own them, crew them, maintain them, repair them and salvage them. People regulate them, survey them, underwrite them and investigate them when things go wrong. While these people vary in all sorts of ways, they are all, nevertheless, people – with the same basic set of capabilities and vulnerabilities.

Humans are not simply an element like the weather. They are at the very centre of the shipping enterprise. They are the secret of its successes and the victims of its failures. It is human nature that drives what happens every day at work – from the routine tasks of a ship's rating, right through to policy decisions.

6. REFERENCE TO NQF, EQF, ECTS

Nowadays, the European Union (EU) consists of 27 member states, and each state has a different education system. Therefore, the European Commission (EC) prepared the **European Qualifications Framework (EQF)** because it wanted to:

- Make national qualifications more readable across Europe;
- Harmonise national qualification systems of different countries to a common European reference framework;
- Promote workers' and learners' mobility between the countries of the EU and to facilitate their life long learning.

The EQF system has eight reference levels (Figure 1), each level describes what a learner has to know, understand and be able to do.[1] Figure 2 EQF levels compared with achieved education and maintenance personnel positions

Inland waterway transport (IWT) plays a relevant role in the EU in cargo exchange, especially in the international scale on the network of the European waterways. On one hand the transport is still more economical than any other mode of transport for many types of cargo, particularly such as bulk, general, liquid cargo and containers.

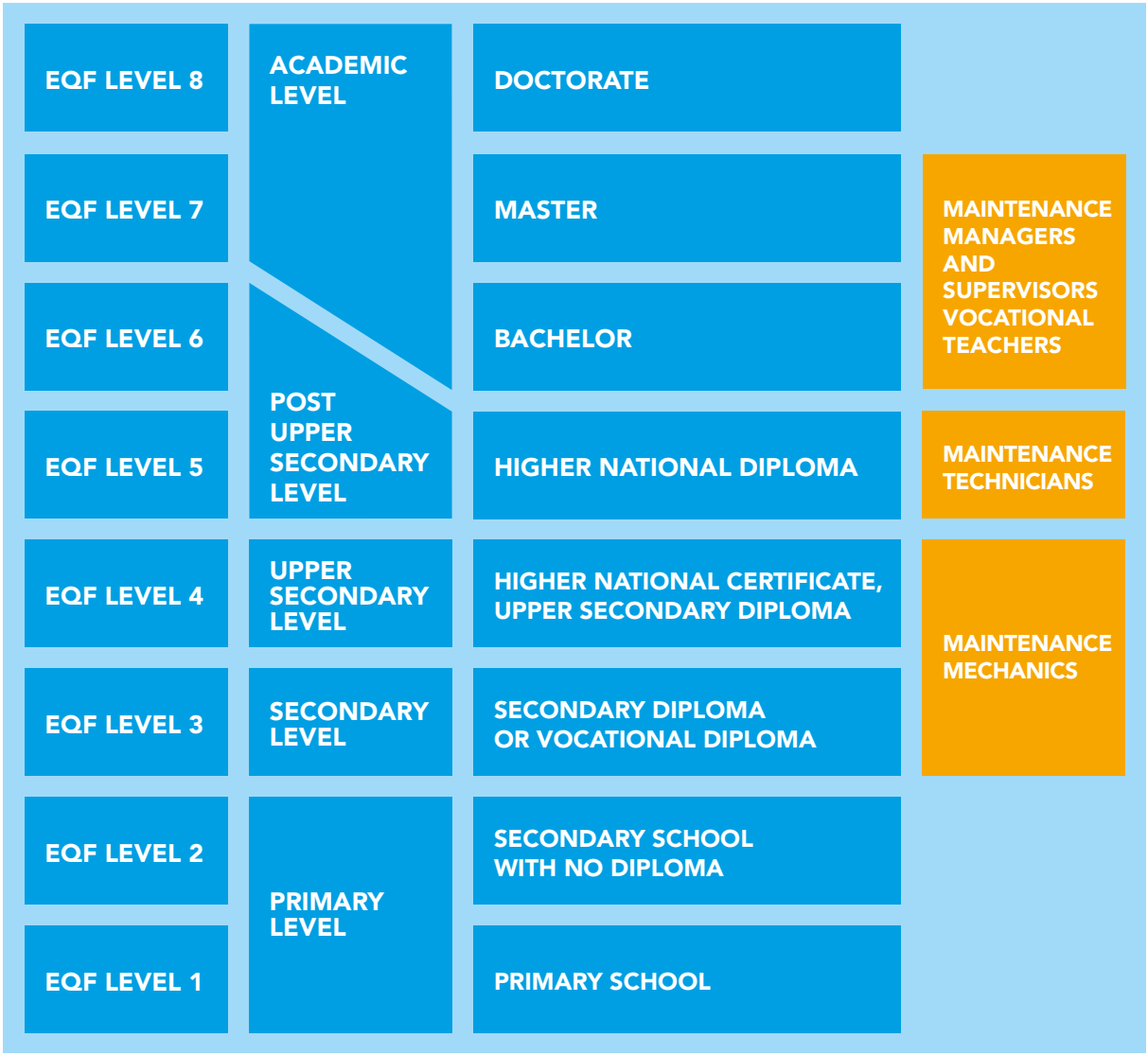

Figure 2 EQF levels compared with achieved education and maintenance personnel positions

1 http://www.maintworld.com/R-D/Application-of-European-Qualification-Framework-EQF-in-Maintenance, 1 December 2016

On the other hand, it is the friendliest mode for the environment. The field of IWT includes various job positions that are related to its segments such as vessels, ports and waterways. Project IWTCOMP focused on EQF and the job qualifications in IWT in 4 countries (Germany, the Netherlands, Romania and Slovakia) because each country uses a different education system.

In all the EU countries involved in the project there are organisations dedicated to the use of EQF in the national context. The IWTCOMP project outlined the fact that regarding international sectoral qualifications there is (still) not an agreement on the approach and international process of comparing the EQF levels via the National QF's (NQF's). Some member states do not want to adjust their procedures and this means all member states all still have their own NQF procedure.

In conclusion, although the EQF system in the field of inland water transport has been accepted in all EU countries, this system EQF is not used by all countries. This is due to the reason that some institutes have to focus on the professional competences based on national and international legislation. The curricula at schools, universities and training centres are prepared according to the international or national standards and these curricula are approved/or not by national designated authorities in each country. The educational programmes developed in COMPETING project can be considered to fit the level 2 for Operational level and 3 for Management level.

ANNEX 1

Reference documents

- Code of Safe Working Practices for Merchant Seafarers - Maritime Coastguard Agency - edition 2016;
- Accident prevention on board ship at sea and in port - International Labour Office Geneva - Second edition 1996;
- IMO Model course 1.21 - Personal Safety and Social Responsibilities - Edition 2000;
- Safety at Sea magazine, Vol. 51, Issues 583, September 2017;
- https://ro.wikipedia.org;
- https://pixabay.com/ro/;
- Medical Handbook for Seafarers - Finnish Institute of Occupational Health - Ministry of Social Affairs and Health and Ministry of Labour - Helsinki - Edition 2007;
- IMO Model Course and Compendium 1.13 – Elementary First Aid – IMO - Edition 2000;
- IMO Model Course and Compendium 1.15 - Medical Care – IMO - Edition 2000;
- International Medical Guide for Ships - 3rd Edition - World Health Organization - edition 2007;
- Introduction to emergency first aid - Qualified First Aid - Minister of Health Romania - Edition 2009;
- Guidelines for Resuscitation – Section 2 - Adult basic life support and automated defibrillation - Edition 2015 - European Resuscitation Council;
- Consolidated text of SOLAS - The International Convention for Safety of Life at Sea, 1974, incorporating all amendments in effect from 1 July 2014, IMO 2014;
- International Life - Saving Appliances Code, LSA Code, IMO 2010;
- European Standard laying down Technical Requirements for Inland Navigation vessels - ES-TRIN, CESNI 2019
- Model of the Search and Rescue operations in Republic of Serbia, University of Defence, Military Academy of the Republic of Serbia, June 2015;
- A proposal for the models and measures of search and rescue on inland waterways, University of Split, Maritime Science Academy, Croatian Hydrographic Institute, Faculty of Traffic Science, Croatia, May 2010;
- Guidelines on the Service of Radiocommunication in Inland Waterways - General Part, Edition 2017, approved by Danube Commission, Moselle Commission and Central Commission for the Navigation on the Rhine;
- Fire prevention and fire fighting, IMO Model Course 1.20, 2000 Edition;
- Advance Fire fighting, IMO Model Course 2.03, 2000 Edition;
- First edition © 2002 Maritime Training Centre B.V;
- Seagull Version B 2001, Basic Fire Fighting, Advanced Fire Fighting;
- CEVNI – European Code for Navigation on Inland Waterways - fourth revised edition 2009;
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, UNEP and Basel Convention, 2014;
- Convention on Co-operation for the Protection and Sustainable Use of the River Danube, ICPDR, 1994;
- Belgrade Convention 1948 – Convention regarding the Regime of Navigation on the Danube;
- Recommendations Relating to the organisation of the collection of waste from vessels navigating on the Danube - Danube Commission - 2011;
- Contribution to impact assessment of measures for reducing emissions of inland navigation - Panteia Research to Progress, 2013;
- ISGINTT - International Safety Guide for Inland Navigation Tank-barges and Terminals, CCNR and OCIMF, First Edition 2010;
- Inland Navigation in Europe- Market Observation - Annual report, CCNR 2017;
- https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32017L2397

ANNEX 2

Exercises, case studies, practical scenarios

I. Exercises

1. Course Manual on Health and Safety and Environmental Protection was developed based on ES-QIN. ES-QIN was adopted by an EU Directive? If yes, indicate the EU Directive?

ES-QIN means European Standards for Qualifications in Inland Navigation, and was approved by the Delegated Directive (EU) 2020/12 supplementing Directive (EU) 2017/2397 of the European Parliament and of the Council as regards the standard for competences and corresponding knowledge and skills, for the practical examinations, for the approval of simulators and for medical fitness.

2. List some duties of the crew members at Operational level for safety of work. Give few examples of good practices from the own vessel.

Crew members should:

- Cooperate as closely as possible with the vessel owner in the application of the prescribed safety and health measures;
- Take care of their own safety and health and of other persons who may be affected by their acts or omissions at work;
- Use and take care of personal protective equipment and clothing at their disposal and not misuse any means provided for their own protection or the protection of others;
- Report forthwith to their immediate supervisor any situation which they believe could pose a hazard and which they cannot properly deal with themselves;
- Comply with the prescribed safety and health measures; and
- Participate in safety and health meetings.

3. Which of the following hazards is most common on board the vessels?

- Slips, trips and falls due to slippery surfaces (oil, grease, garbage, water, ice, etc.) Or obstructions (pipelines, welding cables, lashing eyes, wires, ropes, etc.);
- Head injuries due to low doorway entrances,
- Overhead loads, falling equipment or material;
- Falls through open manholes, unfenced 'tween decks;
- Loose or missing gratings;
- Clothing, fingers getting caught in moving machinery such as grinding wheels, winch drums, gears, flywheels, etc.;
- Burns from steam pipes, hot machinery, welding sparks;
- Eye injuries through chipping, welding, chemicals;
- Hazards of extreme weather, e.g. cold temperatures can cause frost bite.

Slips, trips and falls due to slippery surfaces (oil, grease, garbage, water, ice, etc.) or obstructions (pipelines, welding cables, lashing eyes, wires, ropes, etc.) is the most common hazard on board the vessel.

4. In order to prevent dangers for the following operations:

- Movements of the craft
- Safe embarkation and disembarkation of the craft
- Safely stowing movable objects
- Working with machinery
- Recognising electric hazards
- Fire precautions and fire fighting
- Professional use of hand tools
- Professional use of portable power tools
- Removal of slip, fall and tripping hazards, should be elaborated working procedures? If yes, should the working procedures be elaborated based on working practices or based on the regulations?

Working procedures must be elaborated based on working practices and on the regulations as well.

5. Exercise: Each trainee to list some specific national regulations applicable by the owner company on board the vessels on which they work.

6. List the PPE used on board the vessels during various vessel's operations

- Head protection - Safety helmets, bump caps, hair protection
- Hearing protection - Earmuffs, earplugs
- Face and eye protection - Goggles and spectacles, facial shields
- Respiratory protective equipment - Dust masks, respirators, breathing apparatus
- Hand and foot protection - Gloves, safety boots and shoes
- Body protection - Safety suits, safety belts, harnesses, aprons, high visibility clothing
- Protection against drowning - Lifejackets, buoyancy aids and lifebuoys
- Protection against hypothermia - Immersion suits and anti-exposure suits

7. List some hazards associated with entering in enclosed spaces

- Toxic Atmosphere
- Oxygen Deficiency
- Oxygen Enrichment
- Flammable or Explosive Atmospheres
- Flowing Liquid or Free Flowing Solids
- Excessive Heat

8. List the duties of the Boatman during Fire emergency on board the vessel.

- INFORM your owner and/or manager
- NOTIFY the local correspondent
- INVESTIGATE the accident or incident
- COLLECT and retain any evidence or documentation ASK witnesses to write down what happened
- KEEP detailed records of all relevant facts
- TAKE photographs wherever possible

9. From the following causes of fire:

- Smoking and naked lights
- Spontaneous combustion and auto ignition
- Electrical circuits and electrical equipment
- Radio transmitting antenna
- Flammable liquids used on board vessels, name the most common one.

Spontaneous combustion and auto ignition.

10. The causes of fire listed above are not exhaustive. Can you name other causes of fire?

11. The following documents are in line with the protection of the environment in inland waterways:

- CEVNI – European Code for Inland Waterways
- CDNI - Convention on Collection, Deposit and Reception of Waste Produced during Navigation on the Rhine and Inland Waterways
- Convention on Cooperation for the Protection and Sustainable use of the Danube River (Danube River Protection Convention)
- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy
- European Agreement concerning the international carriage of dangerous goods by inland waterways – AND.

Name any other legal document or initiative in the field of the protection of the environment in inland waterways.

12. What documents are used on board of your vessel for the protection of the environment?

13. What is the meaning of the risk assessment matrix ?

		Impact			
		Minor	Moderate	Major	Extreme
Probability	Rare	Low	Low	Low	Medium
	Unlikely	Low	Medium	Medium	Medium
	Moderate	Medium	Medium	Medium	High
	Likely	Medium	Medium	High	High
	Very likely	Medium	High	High	High

14. What is an enclosed space and what are its characteristics?

Any enclosed spaces may have an atmosphere deficient in oxygen, and/or contain flammable or toxic fumes, gases or vapours, thus presenting a major risk to health or life for anyone entering it.

II. Role play

1. Using the sound of the emergency alarm, ask the trainees to recognise the emergency situation.

2. If you have been able to provide first aid, briefly explain and demonstrate how you intervened.

3. Using Riverspeak vocabulary, trainer practices with the trainees, the communication on board the vessel during emergency situations.

III. Case studies

1. Death in the Forward Locker

Months prior to the incident, unauthorised alterations were done to the bulk carrier's ventilation systems which had created a situation where air from the ship's holds could enter the forward locker. No one had ever reported such alterations.

While at port the Boatmaster had already been concerned about the amount of vapour coming off the cargo when it was being loaded but accepted the assurances of others that it was okay. During the voyage, two crew members entered the forward locker that had never really been regarded as a hazardous area.

They had not told anyone where they were going because they did not regard the locker as a danger and neither did they take any precaution. The vessel was carrying a cargo of damp steel turnings that resulted in the oxygen levels in the hold falling to dangerously low levels which caused the forward locker to become a death trap. The seafarers who were inside the locker died as a result.

Questions for Discussion:

- What factors caused the accident? Could these factors be related to communication culture, operational atmosphere, procedures, stress/ workload or sleep/fatigue?
- What could have been done to avoid the accident?
- What can we learn from this?

2. Report on the investigation of the fatal accident of a crew member on the Woolwich ferry Ernest Bevin

London City Council operates a toll-free ferry service between the north (N) and south (S) banks of the River Thames in the parish of Woolwich, which is the primary connecting link between London's inner orbital roadways (N and S Circular).

In its heyday, the ferry was a major transport link in the capital city for both foot commuters and vehicles. Improved infrastructure within the city had since caused a decline in foot passengers, with vehicles now the major user of the service.

The provider of the service was Transport for London (TfL), operating through its wholly owned subsidiary, London River Services (LRS). In 2008 LRS awarded management and operation of the ferries to Serco Limited Marine Services (SLMS) after the previous operator of the service exercised its option to not renew its contract.

The service usually comprised two vessels plying between the N and S terminals.

For several months prior to the accident, Woolwich Free Ferry had been operating an extended service to provide additional crossing capacity while the nearby Blackwell Tunnel was undergoing repairs. This extended service consisted of a single ferry operating for an extra 2 hours from 2000 until 2200 hours. Since this extra service required both N and S berths to be available, the ferry not in use from 2000 (Ernest Bevin) was secured overnight to river mooring buoys about 250m upriver from the S terminal. Once the last run of the day was complete, the ferry that had been conducting the extended service moored overnight at her normal berth on the S side terminal.

It is most likely that Benjamin Woollacott was dragged violently against Ernest Bevin's bulwark prior to being carried overboard by a mooring rope which had become entangled in the vessel's propeller and was being wound in at a speed in excess of 20 mph. He suffered severe facial injuries and was almost certainly unconscious when he entered the water. Benjamin subsequently drowned, despite his lifejacket bringing him to the surface and the quick actions of his colleagues. A diagrammatic representation of the likely accident sequence is shown.

In the absence of a written procedure, the five ferry crews had each developed their own systems for unmooring which, although similar, were not identical:

- Some mates positioned themselves by the car deck barriers where they could oversee the mooring deck and also have clear line of sight to the master; others preferred to be on the mooring deck closer to the deckhands;
- Some deck crews worked as a unit with all hands letting go the down-tide end before moving to the up-tide end; others would split into a down-tide and up-tide team. This could result in the number of crewmen participating in the release and recovery of a slip rope varying between one and four. On the morning of the accident, the deck crew on Ernest Bevin had split themselves between the fore and aft mooring decks, but once the down-tide rope had been recovered, Benjamin quickly made his way to the up-tide end to assist. This might have been a result of his general eagerness, or he might have been aware that the deck crew was without a mate and therefore shorthanded at the more critical up-tide station.

Other aspects of the unmooring operation that varied across the fleet included:

- The method of bringing the slip rope on board: some crews brought the rope over the bulwark, others recovered the rope through the fairlead;
- The means of hauling the ropes in: some crews hauled hand over hand, others put the ropes over their shoulder and "walked" them towards the bulkhead;
- Releasing the mooring ropes and insurance wire from the buoy: this task was recognised by all as needing at least two men on the workboat, but in practice varied between two and three.

3. Report on the investigation of a barbecue fire in the galley of Pride of Bath

Shortly after starting a pleasure cruise on the River Avon in Bath, Pride of Bath suffered a galley fire, which required the evacuation of her passengers and crew. The gas-fired barbecue in the galley, located at the forward end of the enclosed well deck, was lit when the vessel left her berth at 1230 on 20 July 2002.
At about 1245, hot fat, from the greasy food, dripped on to the hot coals of the barbecue and ignited. Although the gas to the barbecue was turned off, the flames continued to flare up, and eventually reached the overhead extract filters. They were drawn through the filters by the extractor fan located further along the galley exhaust duct. The flames ignited residual grease in the ductwork.

The crew smothered the barbecue flames with damp tea towels, but attempts to extinguish the duct fire were unsuccessful. A considerable amount of smoke built up in the well deck.

At about 1300, the vessel was brought alongside the riverbank, and the 52 passengers and eight crew members evacuated without injury. The fire brigade was called. It extinguished the fire and ventilated the well deck.

The well deck of the vessel was extensively damaged, and required a complete refit. Fortunately, there was no structural damage.

IV. Practical scenarios

1. Fill in the permit below to enter a ballast tank for a structural inspection job:

Reason for entry: This permit is valid	**Yes**	**No**
From: hrs To: hrs Date:		
Has the space been thoroughly ventilated?		
Has the space been segregated by blanking off or isolating all connecting pipelines or valves and electrical power/equipment?		
Has the space been cleaned where necessary?		
Has the space been tested and found safe for entry?		
Pre-entry atmosphere test readings:	**Yes**	**No**
Oxygen % by volume (21%) By Hydrocarbon % LFL (Less than 1%) Toxic gases ppm (Specific gas and PEL) Time.		
Have arrangements been made for frequent atmosphere checks to be made while the space is occupied and after work breaks?		
Have arrangements been made for the space to be continuously ventilated throughout the period of occupation and during work breaks?		
Are access and illumination adequate?		
Is rescue and resuscitation equipment available for immediate use by the entrance to the space?		
Has a responsible person been designated to be in constant attendance at the entrance to the space?		
Has the officer of the watch (bridge, engine room, cargo control room) been advised of the planned entry?		
Has a system of communication between all parties been tested and emergency signals agreed?		
Are emergency and evacuation procedures established and understood by all personnel involved with the enclosed space entry?		
Is all equipment used in good working condition and inspected prior to entry?		
Are personnel properly clothed and equipped?		

2. Using different types of fire extinguishers, create scenarios to extinguish different types of fires like class A, B, C or electrical fires.

ANNEX 3

Draft model examination at operational level safety, health and environmental protection (annex to cesni (21) 25)

The draft standard for the practical examination OL sets the framework for practical examinations at OL. To provide guidance to authorities on how to conduct an exam in this regard, the CESNI/QP working group has decided to develop a model examination in accordance with ES-QIN.

In this draft standards practical examination for OL, knowledge and skills elements that shall be tested during the practical examination are specified. Listed are all elements described as described in the tables of competence standards on OL as "ability". Skills are usually tested during a practical examination. However, some abilities have knowledge elements. In this model examination, the term "examination element" is used to indicate both skills and knowledge.

The model examination is carried out on the assumption that the applicant has passed the knowledge elements (theoretical examination) from the standards for competence on OL as well as the assessment of the skills that for practical reasons were not assessed on board the craft during this practical part prior to the model examination.

For practical reasons, the exam is divided into four parts:

Part 1: Navigation
- Part 1a Steering the craft (including applicable regulations)
- Part 1b Assisting with anchor operations
- Part 1c Mooring, unmooring and docking operations for pushed convoys / coupled convoys from deck, including operation and maintenance
- Part 1d Loading and unloading

Part 2: Sailing the craft

Skills shall be demonstrated on an approved simulator or a craft. Experts recommend the use of a craft of more than 38 meters length.

Part 3: Security and communication
- Part 3a Safety and environment
- Part 3b Communication

Part 4: Technology and maintenance
- Part 4a Propulsion engine / machines
- Part 4b Marine engineering, electricity, electronics, measurement and control technology
- Part 4c Maintenance and repair

For this Course Manual, Part 3 has to be taken into account.

The examination elements are listed in the table below:

▼ Fire fighting exam elements, marked with a red triangle, consist of 7 exam elements, all of category I.

No.	Competence	Examination elements	Part	Category
61	7.1.3 (3+4)	take required precautions before entering enclosed spaces;	3a ▼	I
66	7.2.5 (1)	use emergency escape routes;	3a ▼	I
67	7.2.6 (1)	use internal emergency communication and alarm systems;	3a ▼	I
68	7.3.1 (6)	distinguish the elements of fire and types and sources of ignition;	3a ▼	I
69	7.3.2 (2)	use different types of fire extinguishers;	3a ▼	I
70	7.3.3 (2)	act according to shipboard fire fighting procedures and organisation;	3a ▼	I
71	7.3.4 (2)	follow instructions concerning personal equipment, methods, extinguishing agents and procedures during fire fighting and rescue operations.	3a ▼	I

- Applicants may provide certificates demonstrating that they have sufficient swimming skills to assist in rescue operations as required for the marked category I examination element:

No.	Competence	Examination elements	Part	Cat.
65	7.2.4 (1+2)	provide assistance in the case of rescue operations and swim;	3a ●	I

Applicants may provide certificates attesting the successful completion of a first aid course that covers the skills required of the marked category I examination element:

No.	Competences	Examination elements	Part	Category
63	7.2.2 (2+3+5+6)	perform medical first aid;	3a	I

Other examination elements that shall be tested during a practical exam which do not belong to any of the aforementioned groups:

No.	Competence	Examination elements	Part	Cat.
59	7.1.1 (3+6+7)	work according to instructions and rules for safety at work and prevention of accidents;	3a	I
60	7.1.2 (2)	use personal protective equipment to prevent accidents;	3a	I
62	7.2.1 (4)	act in the case of emergencies according to applicable instructions and procedures;	3a	I
64	7.2.3 (2+3+5)	use and maintain personal protective equipment and shipboard life saving equipment;	3a	I
72	7.4.1 (2)	protect the environment in accordance with relevant regulations;	3a	II
73	7.4.2 (2+3)	take precautions to prevent pollution of the environment;	3a	II
74	7.4.3 (2)	use resources efficiently;	3a	II
75	7.4.4 (2)	dispose of waste in an environmentally friendly fashion.	3a	II

COMPETING

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