

Technical Standards for the Construction and Equipment of Accommodation on Seagoing Ships

- Edition May 1975 -

The Expert Committee formed in accordance with § 7 of the Order regarding crew accommodation on board merchant ships dated 8th February 1973 (Federal Gazette I p. 66)* has, in connection with the regulations in the Appendix to this Order, decided on the following technical standards for the construction and equipment of accommodation spaces and other accommodation facilities.

In ref. to No. 1.121

Sentence 1

The insulation of the living and sleeping quarters, messes, amenity rooms, sick bays and offices must be so executed that the difference

1. between the surface temperature of the room boundary surfaces and the air temperature in the room,
and
2. between the surface temperatures on various boundary surfaces of the room is not more than 4°C.
Heating surfaces and windows are excepted.

Sentence 2

Sentence 2 lays it down that suitable steps must be taken to prevent any condensation water in the insulating layer from becoming a moisture nuisance in the accommodation spaces.

* Editor's note: See also Arbeitsschutz No. 11/12/73 page 450 ff.

In ref. to No. 1.122

Para. 2

Examples of gases or liquids which are dangerous to health are acetylene, oxygen, carbon dioxide, propane, butane, ammonia, Class 1 and Class 2 liquids.

In propane gas systems for household purposes, it is necessary to lay pipes in spaces in which regularly-used equipment is installed. These pipes must follow the shortest route.

Common mains for the CO₂ fire-extinguishing system may be laid in working passages by the shortest route if no other possibility is structurally practicable. These lines must be marked to identify them.

In ref. to No. 1.123

Para. 1

To obtain a satisfactory temperature, it is necessary to have individual temperature regulation of the accommodation spaces. The minimum temperatures will be:

1. in living and sleeping quarters:
 - a) in ships which must be equipped with an air-conditioning system in accordance with the Order: + 22°C
 - b) in other ships: + 21°C
2. in messes, including pantries and other spaces for general use: as under 1.
3. in sick bays:
 - a) hospital: + 22°C
 - b) treatment room: + 24°C
4. in galleys, including provision rooms:
 - a) galleys: + 19°C
 - b) provision rooms: see No. 1.42
5. in lavatory accommodation and in rooms with washing and other sanitary facilities:
 - a) lavatories: + 20°C
 - b) washrooms, showers and bathrooms: + 24°C
 - c) clothes-washing, ironing and drying rooms: + 19°C
6. in offices: as under 1.

In ref. to 1.131

Air inlet and exhaust openings of mechanical ventilation systems and air-conditioning systems must be so arranged that air contaminated with harmful or offensive substances is not drawn in. Consideration must be given in particular to turbulent concentrations of exhaust gases of all types, and to exhaust air from galleys, sick bays and toilet accommodation under the following operating conditions in calm weather:

1. ship stopped
2. ship at normal speed ahead.

The position of the air intake and exhaust openings must be shown clearly in the ventilation plans submitted.

In ref. to No. 1.132

Para. 1

The requirement that air renewal must be adequate is satisfied if the minimum values in the following table are observed.

Space	Air changes per hour					
	Mechanical ventilation		Air-conditioning system with max. 20 % recirculated air		Air-conditioning system without recirculated air	
	intake	exhaust	intake	exhaust	intake	exhaust
Living/sleeping quarters	10		10		8	
Messes, lounges, offices	15	20	15	20	12	10
Passages		5				
Hospitals	12		12		12	
Galleys	20	40				
Pantries	15	30	15	30	12	25
Sanitary spaces		10				
Laundries	10	15				
Drying rooms	25	30				
Laundries/drying rooms combined	15	20				
Dry provision storerooms	10 and or 10		10 and or 10		5 and or 5	

In galleys in which the characteristic cooking vapours do not occur, e.g. when only instant food is used, the number of air changes required for pantries can be used as the standard.

Air-conditioning plants and mechanical ventilation systems must be so laid out that an air speed of 0.2 m/sec. is not exceeded in the focal accommodation areas of the living and sleeping quarters, messes, amenity rooms, sick bays and offices. Focal accommodation area means the area in which people normally sit or lie.

Para. 2

1. The tropics is the area between the Tropics of Capricorn and Cancer.

Areas with similar climatic conditions include:

the Gulf of California

the Gulf of Mexico and the waters around Florida

the Red Sea,

the Persian Gulf and the northerly part of the Gulf of Arabia,

the East China Sea as far as the south end of the

Japanese islands,

the Northern Pacific as far as 30° north.

2. The rooms mentioned in § 2 Nos. 1, 2, 3 and 6 and dry provisions rooms must be connected direct to an air -conditioning system on the ship or must be equipped with air-conditioning systems. The rooms mentioned in 5 2 Nos. 4 and 5 must at least be supplied with air from the air-conditioned rooms, air supply via passages lying within the air-conditioned areas being acceptable.
3. The design of an air-conditioning system must take account of the climatic conditions in the area where the ship is to trade. The target values for all rooms which are directly air-conditioned, with the exception of pantries and dry-provision storerooms are given in the following table:

Outside air temperature	Room air condition	
	Room air temperature	Room R.H.
less than + 25°C	+ 22°0C	35% to 70%
+ 25°C	+ 22°C	35% to 70%
+ 28°C	+ 23°C	35% to 65% *
+ 30°C	+ 23,5 °C	35% to 65% *
+ 32°C	+ 24°C	35% to 60% *
+ 35°C	+ 25°C	35% to 60% *
+ 40°C	+ 26,5°C	35% to 55% *
+ 45°C	+ 28°C	35% to 50%
from + 45°C	+ 30°C	35% to 40%

* Values as given in DIN 1946 - page 3

Para. 3

Accommodation rooms within the meaning of para. 3 are living and sleeping quarters, messes and other amenity rooms, sick bays, galleys, offices.

In ref. to No. 1.14

The requirements for No. 1.14 are satisfied if the current "Guidelines for permissible noise level on sea-going ships", issued by the See-Berufsgenossenschaft are adhered to.

In ref. to No. 1.151

The clear height of at least 2 m is unconditionally obligatory in traffic areas.

In ref. to No. 1.152

Sentence 1

Storerooms (dry provisions rooms, beer stores, customs-sealed room, etc.) need not be lined. They belong to the same group as the galleys. This can be seen from § 2 No. 4 of the Order. The same applies to all rooms named in § 2 No. 5.

The lining with wood or other equivalent material can be dispensed with if the underside of the deck is fitted with heat insulation as prescribed in No. 1.121.

Sentence 2

Until a final ruling is given, this lining can also be dispensed with if insulation to deaden the sound of footsteps is fitted on the underside of the deck, e.g. a sound-insulating ceiling lining with a weight per unit of area of at least 12 kg/m², which, together with the connected wall lining, is flexibly connected to the steel structural parts.

Accommodation rooms within the meaning of sentence 2 which are used by crew members as permanent accommodation include living and sleeping quarters and hospitals.

In ref. to No. 1.153

Sentence 1

In order to eliminate the danger of cuts, sharp edges on floors, ceilings and walls must be broken or rounded off; in the traffic area, all edges without exception must be rounded off.

Sentence 3

Steps must be taken to provide for the drainage of condensation water which may form on or behind linings or bulkheads.

Drain holes are not required if the nuisance of condensation water is eliminated by adequate insulation, heating and ventilation, or by other measures.

Sentence 4

The term "light in colour" does not refer to a particular hue.

Suitable illumination of room surfaces laid down in the rules for lighting, Appendix No. 1 must be ensured.

Sentence 5

The surface of the ceilings and walls must be such that no danger to health can arise through mechanical injuries. It is not intended that unevenness caused by, for example, decoration, be forbidden. The materials must not secrete gaseous, liquid or solid substances in quantities which could be a danger to health.

In ref. to No. 1.156

Sentence 1,

To eliminate the danger of cuts, sharp edges on fittings must be broken or rounded off; in traffic areas, edges must all be rounded off without exception.

Sentence 2

Surfaces will be regarded as smooth when danger to health through mechanical injury is ruled out.

In ref. to No. 1.157

Para. 3

This regulation must always be observed on voyages in the following trading areas and harbours:

harbours and coasts in the tropical zone bounded by the Tropics of Capricorn and Cancer, with the exception of Australia,

and in addition, harbours and coasts in the Gulf of Mexico, in the Red Sea, in the Gulf of Oman and in the Persian Gulf, and in all North African harbours on the Atlantic and Mediterranean coasts.

The mesh width of insect-screening devices must not exceed 0.75 mm.

The openings to be protected include skylights in galleys.

In ref. to No. 1.16

The regulations in Nos. 1.161, 1.162 and 1.23 para. 3 are held to be satisfied when the requirements laid down in Appendix 1 are fulfilled and the illumination values are observed.

In ref. to No. 1.21

Para. 1

"Amidships" means the total space between the collision bulkhead and the stern, or, if the collision bulkhead is stepped, the space between the imaginary line from the furthest aft part of the bulkhead and the stern.

Para. 3

"Gastight" here means a seal which effectively prevents the passage of odours. This formulation does not mean that the current national and international fire-prevention regulations must be bettered.

In ref. to No. 1.22

Para. 1

The dimensions given for bunks refer to internal measurements.

Para. 3

The minimum distances given must in each case be measured from the top edge of the base of the bunk.

Para. 4

Sentence 1 is to be taken as meaning that the danger of falling out owing to a seaway can be avoided not only by front slide-in boards, but by other methods.

In sentence 4 "spring mattress" means an "interior-spring mattress". Interior spring mattresses must be provided with a cover which is removable and easy to clean. Equivalent mattresses are those made of latex foam or polyether foam. Latex foam mattresses must have a minimum hardness of hardness number 1 in accordance with DIN 7790. Polyether foam mattresses must have a minimum bulk density (weight per unit volume) of 28 kg/m³ according to RAL-RG 441.

The dimensions of the mattresses must conform to those laid down in No. 1.22 para. 1 and No. 1.272 respectively, and the thickness must be at least 10 cm.

The drill covers of foam mattresses and spring-interior mattresses must meet the requirements for the cover laid down in DIN 13014, No. 4.2. The ship must be supplied with cleaning directions for all mattresses and covers.

Sentence 5 refers only to the filling of mattresses.

In ref. to No. 1.23

Para. 1

Clothes lockers must have an internal measurement of at least 55 cm in one direction. The height of the clothes-hanger bar above the inside floor of the locker must be not less than 140 cm. The clothes-hanger bar can be fitted lengthwise or crosswise, depending on which direction has a measurement of 55 cm or more.

There must also be facilities for the proper storage of underclothes, hats, shoes etc. Lockable facilities must also be provided for keeping personal property in normal use.

Para. 2

The table or the desk may either be a fixture or be of the fold-down or pull-out type. A table will be regarded as fixed when it is securely fixed by suitable devices so as to maintain its function under all sea conditions. The table or desk must be of such a size and so arranged that it can be used for writing in comfort.

The cupboard for toilet requisites belonging to the crew member must be above the wash-basin or in its immediate vicinity. If the wash-basin is in a shower room or bathroom next to the living compartment, the cupboard can be fitted in that room.

In ref. to No. 1.23

The common aerial is meant for the reception of radio programmes.

Seating is comfortable when it is, for example, upholstered or provided with an equivalent padding.

Instead of a drawer with a capacity of at least 0.10 m³ for each member of the crew, two drawers or another lockable case can be provided for each person, provided the total required capacity is observed.

It is a basic requirement that living compartment windows be fitted with curtains, but other devices can be provided, for example, adjustable louvres of the decorative type, provided they fulfil all the functions of a curtain (preventing people from looking in, reduction of light admission and emission, decorative function).

In ref. to No. 1.24

Paragraph 4 does not specify whether officers must be provided with separate living and sleeping quarters.

Common rooms, e.g. messes, day rooms, ship's offices, etc. are not separate living rooms or workrooms within the meaning of this paragraph.

In ref. to No. 1.25

Para. 1

Junior ratings are: boys; young men; ordinary seamen; cook's assistants in their first year; inexperienced cook's mates - with the exception of skilled butchers, bakers or cooks -; mess stewards – with the exception of regular barmen -; deckhands and cadet officers.

In ref. to No. 1.26

Para. 2

The fitment for the accommodation of the articles named can also be located in a room used for other purposes. It must, however, be lockable, ventilated and dry.

In ref. to No. 1.271

Permission to locate living compartments beneath the load line implies at the same time the foregoing of lighting by means of daylight in accordance with No. 1.161, if this is structurally not practicable. A decision will be taken in each individual case.

In ref. to No. 1.31

Para. 2

A minimum width of 60 cm will be provided for each dining place.

In ref. to No. 1.32

Para. 2

1. A washhand-basin must be installed in pantries. The washhand-basin can be dispensed with if there is a passage between the pantry and the galley.
2. The equipment for disposal of towels must include a waste basket.

In ref. to No. 1.341

If living and mess rooms are combined, the floor area specified in No. 1.273 must be increased by 1 square metre per person for this combined room.

In ref. to No. 1.41

The equipment for disposable towels must include a waste basket.

In ref. to No. 1.42

The shipowner must provide storerooms and cold rooms sufficient for the anticipated requirements, having regard to the size of the ship's company and the trading area or type of service.

Ceilings and walls must be smooth and easily cleaned and the floors must be non-slip.

Wood gratings are not permitted in the walkways of cold rooms.

The storage surfaces for food must be smooth and easily cleaned. Storage surfaces and trays must not be made of galvanised steel; but the racking for shelves and boards may be made of this material. The use of wood as storage surfaces and rack structures in cold rooms and storerooms is only permissible if the wood is sealed by means of a suitable surface coating.

Deep-freeze rooms must be so equipped that they can maintain minimum temperatures of -18°C .

Since temperatures in cold rooms depend solely on the type of goods, no detailed temperatures are prescribed; but it must be possible to set and maintain temperatures from $+15^{\circ}\text{C}$ to $-0,5^{\circ}\text{C}$.

In ref. to No. 1.51

a) Washing stands and wash-basins made of the following materials are permissible:

1. Stainless steel
2. Impact-proof enamelled metals.
To demonstrate that the enamel is impact-proof, it must be tested according to DIN 51155 - testing of enamel, impact test. In the DIN 51 155 test with a spring tension of 1 kp, no damage to the enamel surface greater than 1 mm \emptyset must be visible to the naked eye after testing for 24 hours.
3. Sanitary ware, provided the following requirements are satisfied:
 - a) The front edge of the bowl of a wash-basin or washing stand must be able to bear a static load of 150 kp on an edge 10 cm long in the middle of the bowl. For the test, the wash-basin or washing stand must be fitted ready for use. Side support is permissible when the test is carried out.
 - b) Wash-basins and washing stands must be fitted into brackets, bracket frames or the equivalent. Brackets and their wall mountings must be able to withstand a static load of 150 kp exerted on the middle of the wash-basin (washing stand). Wash-basins and washing stands

must be fitted to the brackets in such a manner that it is not possible to lift them out unintentionally.

- c) Baths must meet the requirements of the appropriate DIN standards.

Showers must be fixed. In the case of detachable hand shower roses, an effective shower holder must be provided. The user must not be obliged to hold the shower with one hand when washing.

A practical hand-hold must be fitted in the shower.

A soap holder must be fitted in a suitable position.

Showers must deliver warm water. A temperature of 45° C must not be exceeded. This must be ensured by means of suitable technical devices.

- d) 1. Lavatory cubicles with outer washroom containing washand-basins and devices for drying hands must measure at least
- a) if door opens outwards, 800x1200 mm width/length
 - b) if door opens inwards, 800x1400 mm width/length.

In both cases, the free space in front of the WC-bowl must be at least 600 mm long.

2. In lavatory cubicles without outer washroom, the washhand-basin and equipment for hand drying being fitted in the cubicle itself, the floor areas given in 1 a and b above must be increased by 0.25 m², the additional space in each case being added to the free space in front of the WC-bowl.

Each lavatory cubicle must be fitted with a coat -hook, a toilet-roll holder and an ashtray suitably positioned. Each lavatory cubicle must be lockable from the inside, but, in emergency, it must be possible to open it from the outside by means of a special key.

- d) It is a fundamental requirement that a separate room be available both near the bridge and near the engine-room. The changing room required by No. 1.53 does not replace the special room for engine-room personnel.

In ref. to No. 1 .512

Lavatory cubicles for female members of crew must be marked with an appropriately worded sign.

In ref. to No. 1.513

Para. 1 No. 1

The term "suitable drain" means that the water flows off even at a tilt up to 3°. The durable material for the floors must be watertight and non-slip.

Para. 1 No. 2

Any material which is water-repellent will be regarded as equivalent to steel. The construction of the room must completely prevent the passage of water, steam and odours. Further requirements in accordance with other regulations, especially regarding fire protection, are not affected.

Measurement 0.23 m is measured from the steel deck. In rooms with sanitary equipment set aside for the use of the occupants of a cabin, a door sill, 0.05 m high must be fitted over the deck covering in the wet area. In the case of communal rooms with sanitary equipment, the door sill must be 0.10 m high.

Para. 2 , sentence 1

Where this is not possible in the case of messes and living quarters, in these areas only welded pipe connections are permissible.

In galleys, pantries and provisions rooms, these pipes must be laid in pipe ducts. In addition there must be effective drainage of the pipe duct to a point outside these rooms which can be inspected. Pipes running vertically through these rooms must also be made of steel and be strongly welded. In addition, sections of pipes in the rooms named will be subjected to a pressure test.

In ref. to No. 1.514

Para. 1

WC's may be made of porcelain. Only siphon-type WC's may be used with the reservation that so-called flap-plate WC's or similarly modified siphon-type WC's are not permitted. WC's must be stable, which in the case of floor-mounted WC's means that they must be secured by four screws. Wall-mounted WC's securely fixed are also permissible.

Toilet seats with or without lid must be made of solid rigid plastic or soft plastic.

Only the following hand-drying equipment is considered to be completely hygienic:
disposable towel dispensers with suitable waste bin and
hot-air dryers.

For individual WC flushing both cistern-type and pressure flushing are permissible. Urinals must be to the standard of DIN 18 228.

In ref. to No. 1.52

A washing machine with a capacity of at least 8 kg must be provided for every 40 persons, with the reservation that on ships carrying up to 10 persons, smaller washing machines of at least 3 kg capacity are permissible.

At least one ironing set must be provided for every 40 persons. An ironing set comprises an ironing board, an iron and a suitably positioned electric socket.

In ref. to No. 1.8

Within the meaning of the Order, solid waste consists of solid waste material produced by the persons on board. The removal of solid waste from engine, deck and loading operations is not subject to the regulations of this Order.

Liquid waste consists of the following heavily-contaminated effluent:

1. Effluent and other liquid waste of every type from toilets, urinals and WC scuppers;
2. Effluent from the hospital area (pharmacy, sick bay, treatment room etc.);
3. Other liquid waste contaminated with food residues.

The capacity of the containers for collecting solid and liquid waste will be calculated for the time the ship is in harbour, taking account of the following aspects:

- a) Number of persons regularly on board,
- b) Anticipated regular quantity of waste,
- c) Trading or operational area,
- d) Anticipated average number of lay days or duration of voyages in waters and their vicinity where dumping of waste is not permitted,
- e) Possibility of unloading waste to land.

Containers for solid waste can be either fixed compartments or transportable containers.

It must always be possible to deliver the waste material to port receiving equipment. The containers mentioned above must be sealable so that odour nuisance is eliminated.

National or international regulations regarding protection of the environment or refuse disposal are not affected by these rules.

In ref. to No. 2.1

No. 1

The shipowner must obtain proof from the manufacturer that the corrosion protection in the drinking water tanks will not adversely affect the smell, taste or quality of the water.

No. 2

The cofferdams required must be arranged on all sides of the drinking-water tank, i.e. drinking water tanks must not have any tops, bottoms or walls which they share with any other tanks. The walls and bottoms do not include the shell plating of the ship.

No. 3

Double-bottom drinking water tanks can only be authorised in cases where special factors exist which do not allow of any other solution.

No. 5

Since dipsticks are not a hygienic method of determining the stock of drinking water, only sight glasses or remote indicators may be used for that purpose.

In ref. to No. 2.2

Para. 1

Pipes will be regarded as drinking-water lines when they carry only drinking water in the inlet and return system and through the pumps. Fully hygienic separation of the drinking-water system from other water systems is not achieved by non-return valves, but, for example, an air-filled stretch of pipe and indirect connection to DIN 1988, mechanical vacuum breaker or backflow preventers.

If, exceptionally, it is not possible for structural reasons to avoid either taking drinking water lines through tanks containing another liquid, or lines containing other media through drinking water tanks, then this is permissible if the pipes in question are taken through such tanks inside pipe ducts. In addition, there must be effective drainage of the pipe duct to a position where it can be inspected. This does not apply to heating coils.

If drinking water tanks are equipped with a heating system, this system must be completely separate from all other tank-heating systems. The heating medium or additives to the heating medium must not adversely affect the drinking water from the health point of view should a leak occur. The shipowner must obtain proof of this from the manufacturer.

Drinking water lines must be marked with a suitable coloured adhesive tape/foil or by lettering at all branching points and every 5 m. The same applies to drinking water hoses.

In compliance with DIN 2403 - marking of pipes with -the medium carried - the marking must be green in colour and with the figures 1.0, or the marking must be green in colour and with the words "Drinking water". It is recommended that identification by means of the words "Drinking water" be preferred.

Para. 2

It is strongly recommended that toilet flushing systems and the taps used for cleaning purposes in washrooms or lavatory accommodation be connected to the drinking water system. In every case where such taps are connected to the sea water or general-purpose water system, they must be clearly and permanently marked.

In ref. to No. 2.3

Para. 1

Drinking water obtained by means of distillation or other suitable process must meet the requirements of § 11 of the Federal Law on Infectious Disease. It must contain no substances which are not authorised under the drinking -water preparation Order of 19th December 1959 (Federal Gazette I p. 762; amended Federal Gazette 1960 I, p. 479); this means that agents added to the sea water and to the heating systems of sea-water evaporators must not reduce the quality of drinking water from the health

point of view even if a leak occurs. The shipowner must obtain proof of this from the manufacturer of the additives.

Para. 2

Ships which are not obliged to keep a ship's log must record the result of the examination and the measures taken in some other suitable way. A copy of the record of the examination findings and of any measure which may have been taken must be sent without delay to the See-Berufsgenossenschaft.

Appendix 2, Guidelines for the chlorination of drinking water and drinking-water tanks on sea-going ships, contains instructions for disinfecting.

In ref. to No. 3.1

The arrangement and distribution of the recreation spaces must be carried out according to the deck surfaces available.. As far as possible they should form a continuous area and should provide a basic minimum area of 2 square metres per person for 50 % of the crew.

In ref. to No. 3.2

Swimming pools must have a minimum area of 12 m² and minimum water depth of 1.60 m. They should, as far as possible, be fixed installations. If this is not possible, a transportable swimming pool - rigid or collapsible - will be provided. It must be equivalent to a fixed installation in arrangement, construction, strength, secure attachment and mounting. This must be demonstrated.

The rules set forth in Appendix 3 for water quality in swimming baths on board merchant ships apply for the use of swimming pools.

In ref. to No. 3.3

Fixed or detachable sun protection devices must be fitted above the minimum areas of recreation spaces laid down in No. 3.1.

Sun protection devices on the upper decks over crew accommodation rooms need not be erected if there is an air-conditioning system and the decks are insulated in accordance with No. 1.121.

Regulations for Lighting

Electric lighting and illumination by daylight in accommodation rooms, including passages and stairways on merchant ships.

1. Legal basis

These technical regulations supplement the regulations on lighting in § 9 para. 1 No. 2 of the "Order regarding crew accommodation on board merchant ships" and those in No. 1.15 and 1.23 para. 3.

2. Lighting

2.1 General

- 2.1.1. The lighting equipment must conform to VDE regulations or regulations of equal standing. Industrial medicine and ergonomic considerations and knowledge must be taken into account.
- 2.1.2. Light sources/fittings are more and more being included in the total architectural concept. This integrated type of lighting must also conform to technical lighting requirements. In particular, it is necessary to ensure that an adequate level of illumination, a good incidence of light at the workplace, good three-dimensional visual perception of objects, freedom from glare, adequate brightness distribution, etc. are provided.

Since in discharge lamps, unlike filament lamps, the spectral distribution of the light can vary greatly from the ideal of a thermal radiator, the colour of the fluorescent lamps should be chosen bearing in mind the construction material used in the integrated lighting. Especially in rooms where colours must be distinctly recognisable and which must be pleasant to live in, e.g. workrooms, recreation rooms, examination rooms, etc. lamps with a high "colour-rendition index", i.e. good rendering of colour (as, for example, warm tone de lux, white de lux or daylight de lux fluorescent lamps) must be fitted. Since the colour of the rooms also has a great influence on comfort and wellbeing, the room colours should be matched to the light sources used.

- 2.1.3. It must be easy and safe to change the parts which are subject to wear (light sources, starters). When fluorescent lamps are used, the colour of light in the room must be uniform.

Noises generated owing to the construction of parts, such as ballasts, must be reduced to a minimum, especially when these fittings are used in rooms with a low noise level.

2.2. Electric lighting

2.2.1. The lighting on board must

- contribute to the prevention of accidents;
- enhance safety on board ship;
- maintain and promote the general welfare of all on board, both at work and in recreation activities;
- ensure the maintenance of human efficiency and preparedness, especially in relation to work;
- make working easier, so as to produce maximum performance;
- help to prevent mistakes.

Lighting is a factor in the maintenance of full efficiency.

Therefore lighting requirements must be taken into account as early as the planning stage.

All possibilities should be exploited in order to create and maintain the best lighting system for all spheres of activity, etc. on board.

2.2.2. The intensity of illumination in the various rooms, insofar as it affects the electric lighting, is laid down in the following table (Supplement to Appendix 1).

Supplement to Appendix 1Electric Lighting in the Accommodation Rooms

Visual requirements Application examples	Illumination intensity (E) Lux (lx) *)	General notes	To receive special attention
Low visual requirements: Storerooms Toilet rooms	50-75 (to 120)		
Low visual requirements: Passages Companionways		Arrangement of light sources to avoid shadows and glare.	Try to arrange lights to take account of differences in brightness between the interior and exterior of rooms.
Medium requirements: Rooms with washing equip- ment, including equipment for washing, drying and ironing of clothes, living and sleeping quarters	100-150 (to 250)	In living rooms and similar rooms which contain workplaces, the general illumination should be basically work place oriented. Lighting intensity at workplace at least 200 Lux.	With reflected lighting, ensure that the light sources do not cause glare and are not reflected in the mirror.
Medium requirements: (permanent lighting) Galleys		General lighting must always be provided.	
Various visual requirements (living accommodation lighting) Messes, incl. pantries and other amenity rooms	150-250	Mostly accentuated lighting required	Observe general requirements for lighting fittings even when ornament fixtures are fitted

High requirements: Offices, Hobby rooms, do-it-yourself rooms	(to 500)	General lighting as far as possible. Lighting must be uniform but not comparatively shadow-free. Avoid Unfavourable shadow effects (e.g. heavy shadows)	Light sources must not cause glare, even through reflection. Use screens, shutters or optical means.
Special lighting: Sick bays	200 and above (to 1000)	Match general lighting to special lighting equipment.	Sick bays should be equipped in accordance with hospital lighting practice.

*) The values given must, in all cases, be obtainable by switching on all the light sources in the room. Individual brightness regulation by means of several light sources or brightness regulators is permissible.

2.2.3. Lighting of living compartments on fishing vessels

When living compartments on fishing vessels are occupied by more than 3 men, subdued orientation lighting must be provided.

2.2.4. The bunk light must be fitted at a practical height and must permit comfortable glare-free reading. Undesirable, annoying development of heat must be prevented by a suitable construction.

2.3. Emergency electric lighting

2.3.1. Definition

The emergency lighting consists of light fittings connected to the emergency electricity source. The regulations for the emergency electricity source are laid down in the International Agreement for the Protection of Human Life at Sea.

2.3.2. Emergency lighting in accommodation rooms

Emergency lighting is not necessary in accommodation rooms if two independent sources of electricity are available. Two independent sources of electricity are available within the meaning of this regulation when two main electric generators are available by means of which the operation of the drive engines and the auxiliary machinery which is absolutely essential for the safety of the ship is ensured, even if one of the generators is out of service.

2.4. Daylight illumination

The illumination with daylight of the accommodation, with the exception of the rooms named in § 2 No. 5 of the Order, must be adequate. Every opportunity must be taken to illuminate the accommodation rooms with daylight, taking advantage of all the structural possibilities.

In addition, a judicious choice of the interior colours should add to the comfort of the rooms.

Normally, two portholes or windows must be built into living compartments in accordance with the accident prevention regulations. Deviations from this rule on the two light openings

are only permissible when there are compelling structural or safety reasons for not installing them.

3. Standards and regulations

In planning and installing the lighting, the following standards and regulations must be observed:

- DIN standards
DIN 5035, room interior lighting with artificial light Page 1, general guidelines Page 2, special recommendations for various lighting duties

DIN 5034, room interior lighting with daylight, guiding principles.
- Ergonomics Technical Standards Committee in the "Deutsches Institut für Normung" (DIN)

FN Erg DIN 31.000 (in preparation).
- See-Berufsgenossenschaft, Hamburg
Accident prevention regulations for merchant ships.
- German Lloyd, Hamburg
Regulations for classification and building of steel, sea-going ships, vol. 2, chapter 4, section 1.Q.

4. Plans

The plans to be submitted in accordance with § 9 para. 1 No. 2 must contain the following information:

- Electrical output of the lamps.
- Type of lighting fittings (narrow-angle, uniform, semi-indirect/indirect).
- Type of lamps (filament lamps, fluorescent lamps with coloured light).
- Arrangement of lighting fittings
- Colouration of rooms. Reflection factor: high (0.55), medium (0.4-0.55), low (0.4).

As far as possible, the See-Berufsgenossenschaft checks by reference to the plans submitted whether the illumination intensities specified in No. 2.2.2. of these rules will be achieved by the proposed lighting arrangements.

5. Measuring procedure, measuring instruments and measured values

If the intensities of illumination cannot be definitely determined by checking the plans, the See-Berufsgenossenschaft will determine the illumination intensities by measurement.

The intensity of illumination will be measured in accordance with DIN 5035. The minimum requirements of the table in No. 2.2.2. must be met, i.e. the mean intensity of illumination must lie within the ranges specified, and the minimum intensity of illumination must not be less than

50 % of the mean value. The measurements will be carried out with a luxmeter. The luxmeter will be checked for reliability every two years by an official testing station.

Appendix 2

Guidelines for the Chlorination of Drinking Water and Drinking Water Tanks on Sea-going Ships

The purpose of chlorination is to remove known or unknown bacteriological impurities.

The following materials are usually used for chlorination:

1. Paracaporit (powder)
Paracaporit contains about 35 % active chlorine.

Application:

Warning! Some powder may puff out when the package is opened. Use eye protection. Pour warm water, if possible 40°C , over the premeasured quantity of Paracaporit in a plastic bucket. Stir well with a stick or plastic rod. Then wait for the insoluble white part to settle.

When it has settled, the clear liquid on top, which contains all the effective chlorine, is carefully decanted into the tank. The tank should not be completely empty, so that immediate dilution is ensured. The tank is then filled to the point of overflowing. The quantity to be added and further process details will be found under paras. I-III.

2. Hypochloride solution (liquid)

Hypochloride solution contains about 15 % active chlorine.

Application:

Hypochloride solution can be added directly to the tank. Better distribution is, however, achieved if it is first diluted with water in a plastic bucket. The solution or dilution should be added to the tank when it is not quite empty. The tank is then filled to the point of overflowing. Further procedure under paras. I-III.

Various chlorination procedures

- I. When water of unknown or unreliable quality has had to be taken over to be used as drinking water, or when contamination is suspected and it is not possible to discontinue the use of the water, comparatively little can be done. In order to keep within the limit values specified in the

Order relating to impurities, either 1 g Paracaporit or 2 g hypochloride solution per m³ water must be added by the methods described above. This small quantity of chlorine does not adversely affect the quality of the water. At the same time, it is not enough to sterilise water which is heavily contaminated. If heavy contamination is suspected and if procedures II and III cannot be used because the water must be used for drinking purposes, then all the water used for drinking or for making or preparing food must be boiled.

- II. If it is known that the degree of bacterial contamination is low (Number of general water germs in 1 millilitre = 1 cc higher than 1000 and/or 0 to 3 Escherichia coli bacteria in 100 millilitres = ccs) chlorination of the drinking water tank with 10 g Paracaporit or 20 g hypochloride solution per m³ water is adequate. After the chlorine solution has been added through the filling pipe, the tank must be filled up to the top with drinking water. After 10 hours reaction time, the tank must be emptied through all the lines and taps. The tank can then be filled with drinking water of satisfactory quality and brought into use.
- III. When contamination is heavy (more than 3 Escherichia coli bacteria in 100 millilitres) or after each time the tank is entered (see note) the following procedure will be carried out:
- A. Empty tank, clean sediment from bottom and swill out.
 - B. Scrub down the tank walls by hand with a 1:5 chlorine solution and, if necessary, apply fresh preservative.
 - C. Again fill up the tank with water and add 100 g Paracaporit or 200 g hypochloride solution per 1 m³ water. Take particular care that air pockets do not remain in the tank.
 - D. Leave this chlorine solution at least 10 hours in the tank and the pipes.
 - E. Drain the tank, allowing the chlorine solution to run out through all lines and taps. Then swill out the tanks and lines liberally with drinking water.
 - F. Drain the swilling water and fill up the tank with good quality drinking water.

If there are cross-connections to other drinking water tanks (tank coupling), these must also be disinfected in accordance with guidelines I to III. To avoid fresh infection or re-infection, the drinking water tank must not be entered or dipped after chlorination.

Note:

After a tank has been entered, only points C., D., E. and F. in group III are carried out if no bacterial contamination has been detected.

Appendix 3

Rules governing quality, of water in swimming pools on board merchant ships

1. Installations without disinfecting equipment

Either drinking water or sea water can be used to fill the pool.

Sea water may be taken on only outside of polluted waters.

In order to maintain the quality of the water, the total water content of the pool must be changed at least once every 24 hours. The change will be made by the introduction of fresh water at the bottom of the pool and free overflow (runoff) at the top of the pool.

Water change is always necessary when the pool is available for use by bathers.

2. Installations with disinfecting equipment

If, in order to save water, pools are provided in which the water is not to be changed daily, then the pools with the associated disinfecting equipment will be designed and operated according to the "Guidelines for the construction and operation of pools" issued by the Coordination Committee.