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Ships and marine technology — Drainage systems on ships and marine structures —

Part 4: Sanitary drainage, sewage disposal pipes

Navires et technologie maritime — Installations de drainage sur navires et structures maritimes —

Partie 4: Drainage sanitaire, tuyaux d'évacuation des eaux usées

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15749-4 was prepared by Technical Committee ISO/TC 8, *Ships and marine techology*, Subcommittee SC 3, *Piping and machinery*.

ISO 15749 consists of the following parts, under the general title *Ships and marine technology — Drainage systems on ships and marine structures*:

— *Part 1: Sanitary drainage-system design*

— *Part 2: Sanitary drainage, drain piping for gravity systems*

— *Part 3: Sanitary drainage, drain piping for vacuum systems*

— *Part 4: Sanitary drainage, sewage disposal pipes*

— *Part 5: Drainage of decks, cargo spaces and swimming pools*

Ships and marine technology — Drainage systems on ships and marine structures —

Part 4: Sanitary drainage, sewage disposal pipes

1 Scope

This part of ISO 15749 applies to the design of sewage disposal pipes within the framework of sanitary drainage on ships and marine structures.

For planning and basic requirements, see ISO 15749-1.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4200, *Plain end steel tubes, welded and seamless — General tables of dimensions and masses per unit length*

ISO 9329-1, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 1: Unalloyed steels with specified room temperature properties*

ISO 9330-1, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 1: Unalloyed steel tubes with specified room temperature properties*

ISO 15749-1, *Ships and marine technology — Drainage systems on ships and marine structures — Part 1: Sanitary drainage-system design*

ISO 15749-5, *Ships and marine technology — Drainage systems on ships and marine structures — Part 5: Drainage of decks, cargo spaces and swimming pools*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15749-1 apply.

4 Disposal

4.1 General

For the disposal of wastewater from sanitary drainage systems, a distinction is made between:

— overboard wastewater disposal via a wastewater storage unit and disposal pipes overboard or to a connection from where it is transferred to an external disposal point (see 4.2);

NOTE Wastewater storage units according to this part of ISO 15749 are collector tanks, sewage treatment plants, or vacuum generating units for the respective facilities

— discharge directly overboard via gravity drain lines (see 4.4).

4.2 Disposal points with storage units

4.2.1 Disposal piping system

Disposal lines from storage units to disposal points shall be designed as pressure lines; for details see Figure 1.

Figure 1 shows a simplified example of routing of disposal lines within the framework of a sanitary drainage system, leading from the storage unit (e.g. collector tank, sewage treatment plant) to the disposal points.

4.2.2 Discharge over the side

4.2.2.1 Closing devices

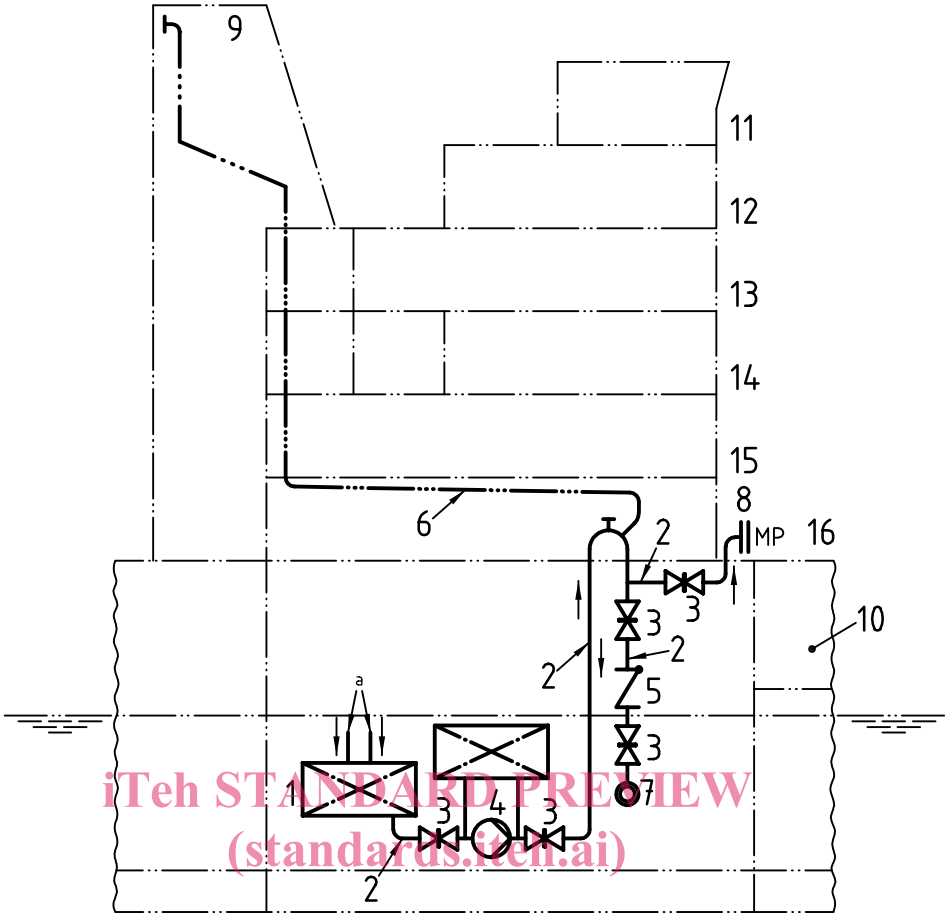
As closing devices, fittings shall be installed in the disposal piping section between the wastewater pump and the wastewater outlet (piping section Z); see Figure 2. Closing devices shall be certified by the classification societies.

The arrangement, number, and type of fittings depends on the vertical distance from the summer loadline/bulkhead deck of the lowest opening (drain).

NOTE Such openings (drains) also include, for example, emergency overflows of sewage treatment plants or openings for dosing of chemicals.

4.2.2.2 Drains

4.2.2.2.1 In the disposal pipe, a screw-down non-return valve shall be installed at the shell. If it is not possible to place the shutoff fitting directly at the shell, the pipe from the shell to the shutoff fitting has to be designed thick-walled, see 6.1 and Figure 3.

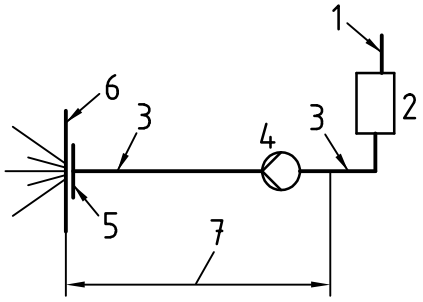


Key

1 sewage treatment plant, collector tank or vacuum generating unit for these installations
2 disposal pipe
3 valve
4 wastewater pump
5 non-return valve
6 vent line
7 wastewater outlet in the shell
8 international wastewater shore connection (MARPOL-flange)
9 funnel
10 cargo space
11 bridge
12 4th superstructure deck
13 3rd superstructure deck
14 2nd superstructure deck
15 1st superstructure deck
16 freeboard/bulkhead deck

[a] Wastewater from accommodation areas and service spaces.

Figure 1 — Example of a sewage disposal system with storage unit upstream of the discharge point

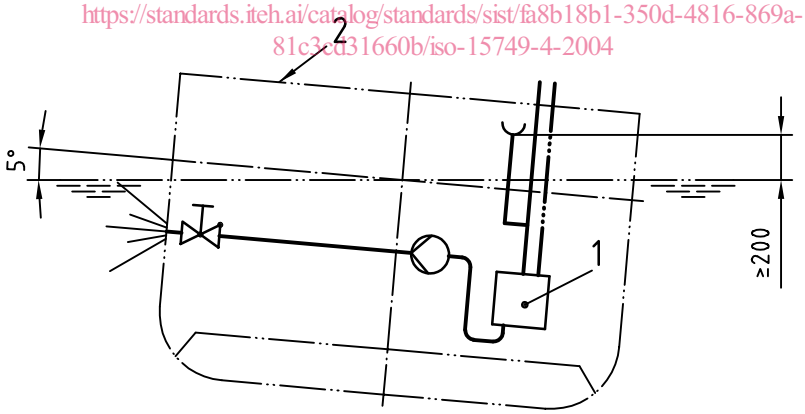


Key

1 drain line
2 storage unit (e.g. collector tank or sewage treatment plant)
3 sewage disposal pipe
4 pump
5 wastewater outlet
6 shell
7 piping section Z

Figure 2 — Piping section Z

Dimensions in millimetres



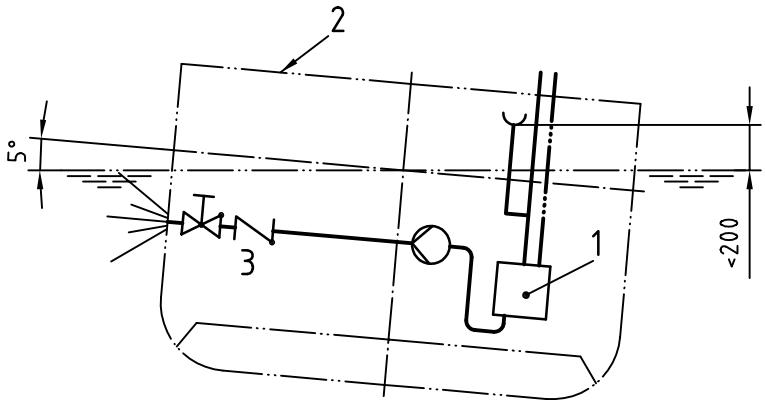
Key

1 wastewater storage unit
2 freeboard deck

Figure 3 — Example to 4.2.2.2.1

4.2.2.2.2 When, in the case of a 5° list of the ship to port or starboard, the lowest inner opening of the drainage system is less than 200 mm above the summer load line, then a further non-return fitting shall be provided in the suction or pressure line of wastewater pumps of wastewater tanks or sewage treatment plants (see Figure 4).

Dimensions in millimetres



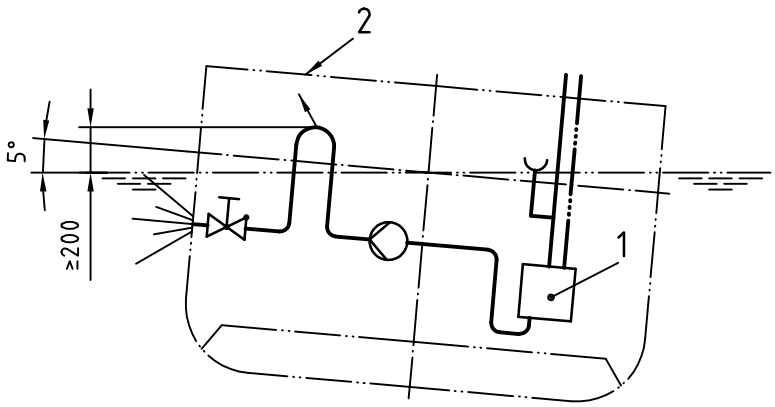
Key

1 wastewater storage unit
2 freeboard deck
3 to be installed upstream or downstream of the pump

Figure 4 — Example to 4.2.2.2.2

4.2.2.2.3 A pipe loop can be applied as a second non-return fitting, provided that its crest overflow is at least 200 mm above the waterline with the ship on summer loadline draft and when the ship has a 5° list (see Figure 5).

Dimensions in millimetres

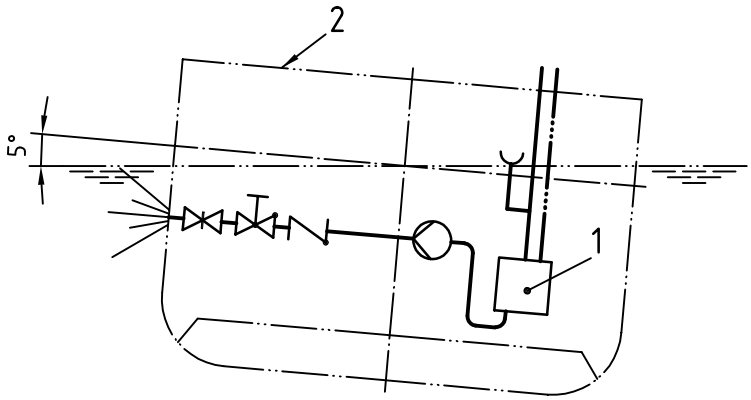


Key

1 wastewater unit
2 freeboard deck

Figure 5 — Example to 4.2.2.2.3

4.2.2.2.4 When, in the case of a 5° list of the ship loaded to the summer loadline, the deepest inner opening of the drainage system lies on the waterline or lower, a gate valve at the outlet of the pipe at the shell shall be provided in addition to the second non-return fitting mentioned in 4.2.2.2.2. In this case, the non-return valve need not be provided with a means of closing (see Figure 6).



Key

1 storage unit or sewage treatment plant
2 freeboard deck

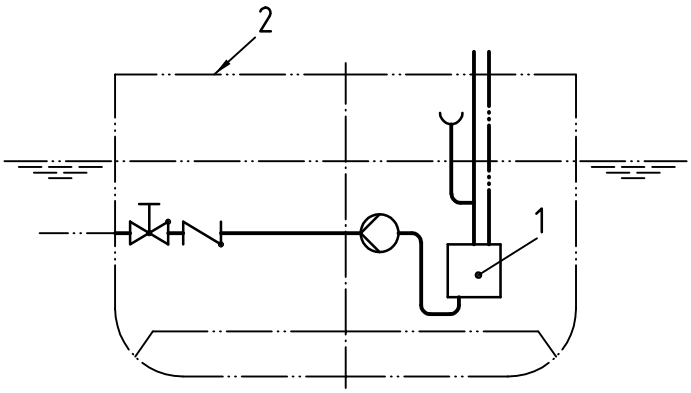
Figure 6 — Example to 4.2.2.2.4

4.2.2.2.5 When, on passenger ships, the deepest inner opening of the wastewater system is below the bulkhead deck, a shutoff non-return valve and a second non-return fitting shall be provided in the disposal pipe of sewage treatment plants (see Figure 7). In such a case, a gate valve, as well as two non-return fittings, shall be provided for the disposal pipe of wastewater collector tanks (see Figure 8).

A second non-return fitting may be substituted with a pipe loop, the crest of which shall be at least 200 mm above the bulkhead deck.

On condition that, on passenger ships, drains are located above the bulkhead deck only, and on condition that no wastewater can leak from the collector tank or the sewage treatment plant into spaces below the bulkhead deck, Figure 7 may be followed. Piping section Z shall be fitted with a shutoff fitting at the shell and a self-closing non-return valve.

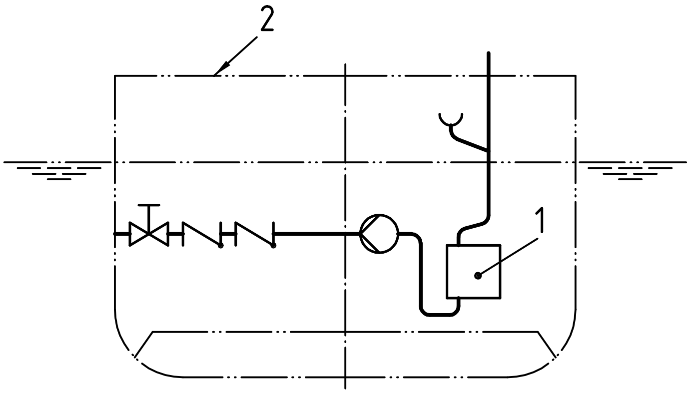
In the case of pumps installed in parallel, a shutoff fitting shall be provided at the discharge side of each pump.



Key

1 sewage treatment plant
2 bulkhead deck

Figure 7 — Example 1 to 4.2.2.2.5



Key

1 wastewater unit

2 bulkhead deck

Figure 8 — Example 2 to 4.2.2.2.5

4.2.3 Discharge to an external disposal point (shore connection)

4.2.3.1 General

The wastewater disposal pipe shall be routed to wastewater discharge connections that are sited on deck such that the wastewater can be disposed of over the port or starboard side.

4.2.3.2 Wall thickness of piping

Type N steel pipes according to Table 1 are sufficient for the disposal piping in the entire area.

4.2.3.3 Wastewater discharge connection

The wastewater discharge connection shall have a flange for the international wastewater shore connection (MARPOL flange).

4.3 Discharge via a bypass line

4.3.1 General

In areas where the disposal of sewage to sea is permitted, it may be discharged directly overboard through a by-pass line. Figure 9 shows an example of such an arrangement.