SLOVENSKI STANDARD
SIST EN ISO 15748-2:2004

01-september-2004

Ladje in pomorska tehnologija ï Oskrba s pitno vodo na ladjah in ostalih strukturah na morju ï 2. del: Metoda izraļ una (ISO 15748-2:2002)

Ships and marine technology - Potable water supply on ships and marine structures - Part 2: Method of calculation (ISO 15748-2:2002)

Schiffe und Meerestechnik - Trinkwasser-Versorgungsanlagen auf Schiffen und Seebauwerken - Teil 2: Berechnung (ISO 15748-2:2002)

Navires et technologie maritime - Approvisionnement en eau potable sur navires et structures maritimes - Partie 2: Méthode de calcul (ISO 15748-2:2002)

Ta slovenski standard je istoveten z: **EN ISO 15748-2:2002**

ICS:

47.020.30 Sistemi cevi Piping systems

SIST EN ISO 15748-2:2004 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 15748-2

May 2002

ICS 47.020.30

English version

Ships and marine technology - Potable water supply on ships and marine structures - Part 2: Method of calculation (ISO 15748-2:2002)

Navires et technologie maritime - Approvisionnement en eau potable sur navires et structures maritimes - Partie 2: Méthode de calcul (ISO 15748-2:2002)

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This European Standard was approved by CEN on 2 April 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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CORRECTED 2002-06-19

Foreword

This document (EN ISO 15748-2:2002) has been prepared by Technical Committee ISO/TC 8 "Ships and marine technology" in collaboration with Technical Committee CEN/TC 300 "Sea-going vessels and marine technology", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2002, and conflicting national standards shall be withdrawn at the latest by November 2002.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 15748-2:2002 has been approved by CEN as a European Standard without any modifications.

NOTE Normative references to International Standards are listed in annex ZA (normative).

Annex ZA
(normative)

Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE Where an International Publication has been modified by common modifications, indicated by (mod.), the relevant EN/HD applies.

Publication	Year	Title	EN	Year
ISO 5620-1	1992	Shipbuilding and marine structures - Filling connection for drinking water tanks - Part 1: General requirements	EN ISO 5620-1	1996
ISO 1127	1992	Stainless steel tubes - Dimensions, tolerances and conventional masses per unit length	EN ISO 1127	1996
ISO 15748-1	2002	Ships and marine technology - Potable water supply on ships and marine structures - Part 1: Planning and design	EN ISO 15748-1	2002

INTERNATIONAL STANDARD

ISO 15748-2

First edition
2002-05-01

Ships and marine technology — Potable water supply on ships and marine structures —

Part 2: Method of calculation

Navires et technologie maritime — Approvisionnement en eau potable sur navires et structures maritimes —

Partie 2: Méthode de calcul

Reference number
ISO 15748-2:2002(E)

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Printed in Switzerland

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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 3.

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 part of ISO 15748 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15748-2 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 3, *Piping and machinery*.

ISO 15748 consists of the following parts, under the general title *Ships and marine technology — Potable water supply on ships and marine structures*:

— *Part 1: Planning and design*

— *Part 2: Method of calculation*

Annexes A, B, C and D of this part of ISO 15748 are for information only.

Ships and marine technology — Potable water supply on ships and marine structures —

Part 2: Method of calculation

1 Scope

This part of ISO 15748 applies to the planning, design and configuration of potable water supply systems on ships, stationary or floating marine structures and inland waterway crafts.

This part of ISO 15748 serves to determine the quantity of potable water to be carried on board, the capacity of the pressurized reservoirs and water heaters, the pumping capacity, etc.

NOTE In accordance with ISO 15748-1 plastic pipes are permitted but are rarely used at present due to the restrictive conditions laid down by the classification societies. Pressure losses in plastic pipes have not yet been included in ISO 15748 owing to their limited applicability.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 15748. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 15748 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 65, *Carbon steel tubes suitable for screwing in accordance with ISO 7-1*

ISO 161-1, *Thermoplastics pipes for the conveyance of fluids — Nominal outside diameters and nominal pressures — Part 1: Metric series*

ISO 274, *Copper tubes of circular section — Dimensions*

ISO 1127, *Stainless steel tubes — Dimensions, tolerances and conventional masses per unit length*

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

ISO 5620-1, *Shipbuilding and marine structures — Filling connection for drinking water tanks — Part 1: General requirements*

ISO 15748-1, *Ships and marine technology — Potable water supply on ships and marine structures — Part 1: Planning and design*

3 Potable water consumption

3.1 General

The consumption of potable water depends on the type of ship, underway time (time the crew and passengers are embarked), number of potable water dispensing and supply points and the cruising area.

Rough calculations of the daily potable water requirements should be based on the guide values in Table A.1.

Determination of potable water consumption with respect to the planned/existing dispensing points should be based on the guide values in Table A.2 for cargo ships and in Table A.3 for passenger ships.

3.2 Potable water requirements of technical equipment

The quantity of potable water required by other technical facilities including air conditioning equipment/plants for air humidification is to be taken from the information supplied by the manufacturer of the respective facility and added to the potable water consumption determined in accordance with 3.1.

3.3 Potable water consumption of commissary equipment

The following guide values for water consumption have been determined; detailed values shall be supplied by the manufacturer. The determined quantity shall be added to the values determined in accordance with 3.1.

— garbage grinders for food disposal = 20 l/min

— dishwashing machines = 3 l/rack up to 8 l/rack

— coffee and tea machines = 18 l/h to 120 l/h

— vegetable peeling and cleaning machines = 5 l/filling

— washing machines = 25 l/kg dry laundry

4 Potable water storage

Potable water storage and potable water distilling plants shall be provided in consultation with the contractor.

5 Determination and sizing of system components

The sizes of system components shall be determined taking into account:

— the pipe material to be used;

— the configuration of the potable water installations (pipelines, fittings, service devices);

— the calculation plans for cold water, hot water and circulation lines.

The sizing of components is calculated based on to the expected volume flow at the time of the maximum water comsumption = peak flow.

The values and information required for the calculations are listed in Tables A.4 to A.11 and in Figures A.1 to A.4.

The use of the forms supplied in annex B has proved helpful for the calculation process.

6 Flow rates

In order to prevent flow noises and pressure surges, flow rate limitations should be considered.

NOTE Two examples of flow rate limitation are given below.

Example 1

— 2,5 m/s in engine rooms and machinery trunks;

— 2,0 m/s in commissary spaces;

— 1,4 m/s in accommodation decks;

— 1,0 m/s in the hospital and close vicinity;

— 1,0 m/s in pump suction lines;

— 0,5 m/s in circulating lines.

Example 2

— 2,5 m/s for CuNi pipes with DN $\leqslant$ 65 (delivery);

— 2,0 m/s for CuNi pipes with DN 50 and steel pipes with DN $\leqslant$ 65 (delivery);

— 1,4 m/s for CuNi pipes with DN $\leqslant$ 25 and steel pipes with DN $\leqslant$ 32 (delivery); any material pipe with DN $\leqslant$ 65 (suction);

— 1,0 m/s for pipes with DN $\leqslant$ 15 (delivery); any material pipe with DN $\leqslant$ 32 (suction);

— 0,7 m/s for any material pipe with DN $\leqslant$ 15 (suction).

7 Supply pressure

The minimum system supply pressure (pump, water reservoir) is determined by adding the pressure losses due to:

— geodetic differences in altitude;

— pressure losses in the apparati;

— pressure losses from pipe friction and individual resistances;

— minimum flow pressure of 1,5 bar or, following greater demands at the highest dispensing point, plus 10 %. The pressure losses at the suction side shall be taken into consideration.

8 Generation and maintenance of pressure

8.1 General

Potable water may either be supplied directly, or indirectly, via pressurized water reservoirs. Direct supply is appropriate if large quantities of potable water per hour are consumed, e.g. on passenger ships. In all other cases mostly pressurized water reservoirs are used.

The decision as to which method of potable water supply is suitable depends on the peak demand for potable water and is also influenced by the arrangement, space requirements, weight etc. of the components or component groups within the entire supply system.

The limit for deciding between pressurized water reservoirs of direct pump supply lies between 30 m^3/h and 40 m^3/h.

Minimum supply pressure in accordance with clause 7 shall be ensured.

The design temperature for the system is 10 °C.

8.2 Pressurized water reservoirs

In order to keep the available quantity of water, i.e. the quantity between pump cut-ins and cut-offs, as great as possible, and to prevent frequent switchings of the pump, the water stored in the pressurized reservoirs is sufficiently pre-compressed with air.

This pre-compression shall be 0,3 bar less than the pump cut-in pressure. The pressure difference between cut-in and cut-off pressure shall be between 1 bar and 2 bar.

The switching frequency is usually between 6 and 8 switching events h^{-1}; however, 12 switching events h^{-1} shall not be exceeded.

The required reservoir capacity is to be determined in accordance with Figure A.4.

8.3 Supply pumps

8.3.1 General

The capacity of centrifugal pumps shall be such that when the cut-off pressure is reached the capacity corresponds to 110 % of the calculated maximum consumption (10 % margin). Reciprocating pumps shall be dimensioned for 120 % to 130 % of the maximum consumption rate determined.

Pumps with flat characteristic curves shall be selected. If several pumps are used, the cut-in and cut-off pressures of each pump shall be stepped with respect to each other, e.g. 4 bar, 3,5 bar, 3 bar.

Provisions shall be made for quantities of water supplied from continuous-action pumps but remaining unused to be fed back to the potable water reservoirs.

8.3.2 Pump suction lines

The guide values listed in Table A.4 are valid for steel pipes and do not include losses caused by pipe elbows, fittings, etc. These losses shall be taken into consideration.

8.3.3 Pump discharge lines

The pump discharge line connects the supply pump with the water reservoir via a shut-off fitting. The nominal width shall be determined in accordance with Table A.5.

9 Pipe diameters of distribution lines

The pipe diameters shall be determined as follows:

— ascertain the calculation flow at service points of pipe sections (for guide values see Table A.12);

— determine the sum flows for these pipe sections and allocate to the pipes;

— determine the peak flow for these pipe sections in accordance with Figure A.3;

— determine pipe diameters and pressure losses provisionally with the help of Figure A.1; if pressure losses are too high, larger diameters shall be selected;

or

by means of a more simple procedure by determining nominal widths from Table A.11 on the basis of the respective maximum flows.

10 Hot water requirements

The volume of hot water to be provided or to be kept in store shall be determined from the peak demand for mixed water using the following equations:

$$V_M = V_C + V_H \quad (1)$$

$$\frac{H}{C} = \frac{t_M - t_C}{t_H - t_M} \quad (2)$$

$$V_H = \frac{V_M}{H + C} \times H \quad (3)$$

where

V_M is the mixed water volume;

V_C is the cold water volume;

V_H is the hot water volume;

C is the cold water portion;

H is the hot water portion;

t_M is the mixed water temperature;

t_C is the cold water temperature;

t_H is the hot water temperature.

11 Water heaters

11.1 Determination of the necessary water heater volume

a) Continuous-flow water heaters

They shall be sized with respect to the peak demand for hot water.

b) Storage heaters

The size of storage heaters shall be selected so that the peak demand for hot water:

— on passenger ships can be heated in 4 h;

— on other ships can be heated in 2 h.

An additional heating facility which may be required for emergency use or during docking may be smaller in capacity. For passenger ships, it is recommended that the necessary hot water volume be divided between two or more water heaters.

The supply of hot water shall also be ensured in port.