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Shipbuilding — Ventilation and air-treatment of galleys and pantries with cooking appliances

Construction navale — Ventilation et traitement de l'air des cuisines et offices avec appareils de cuisson à bord des navires

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Foreword

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International Standard ISO 9943 was prepared by Technical Committee ISO/TC 8, *Shipbuilding and marine structures*.

Annexes A and B of this International Standard are for information only.

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Shipbuilding — Ventilation and air-treatment of galleys and pantries with cooking appliances

1 Scope

This International Standard specifies the design requirements and general considerations for the ventilation and air-treatment of galleys and pantries with cooking appliances on board merchant seagoing ships, when such ventilation and air-treatment is specified by the shipowner.

It applies for normal conditions in all waters except those encountered in extremely cold or hot climates (i.e. with a lower or higher temperature than that stated in clause 2).

For the purposes of this International Standard, pantries with cooking appliances, referred to above, are those which contain appliances consuming more than the small amount of electrical power needed for coffee urns, hot-plates for keeping food warm, electric water boilers, etc.

NOTE 1 Users of this International Standard should note that, while observing the requirements of the Standard, they should at the same time ensure compliance with such statutory requirements, rules and regulations as may be applicable to the individual ship concerned.

2 Design requirements

2.1 General

A separate supply air system shall be provided for the galley: this supply air system shall take in outdoor air only.

A separate exhaust air system shall be provided for the galley, discharging the total airflow to the atmosphere.

The supply and exhaust air fans shall have the capability of being run at reduced as well as full speed in order to be able to operate with a reduced air volume under winter conditions.

The system shall be designed for the conditions in 2.3 and 2.4 and airflow required by clause 3.

For a smaller galley, the supply air system may be connected to an airconditioning system including other spaces. In such a case, reduced air volume shall be achieved by means other than speed reduction of the fans; recirculated air from other spaces may be accepted. The approval of the appropriate authority for such arrangements is a precondition.

2.2 Ordering information

The purchaser shall provide the manufacturer with the following:

a) a plan showing the galley with its appliances, including air-cooled compressors, etc.;

b) rated power, heating medium, heat and humidity dissipation and hood if any, for the different cooking appliances;

c) simultaneity factor for the appliances (see 3.1.1).

2.3 Summer

The cooling power shall have the capability of cooling the supply airflow to 10 °C below the outdoor condition of + 35 °C and 70 % relative humidity.

2.4 Winter

The heating power shall have the capability of heating the supply airflow to + 20 °C at an outdoor air temperature of − 20 °C. This temperature rise of the supply airflow shall be obtained at the reduced speed of the fans.

3 Airflow calculation

3.1 Supply airflow

The supply airflow to the space shall be calculated using whichever of the calculations in 3.1.1 or 3.1.2 gives the highest value.

3.1.1 Calculation based on sensible heat

The sum of the airflow for evacuation of sensible heat emitted from the appliances, V_{qs}, shall be calculated, in cubic metres per second, as follows;

$$V_{qs} = \frac{L \times \sum \phi_{qs}}{c \times \rho \times \Delta t}$$

where

L is the simultaneity factor (see note 2);

ϕ_{qs} is the sensible heat emitted from the appliances, in kilowatts (see note 3);

c is the specific heat capacity of the air, equal to 1,01 kJ/(kg·K);

ρ is the density of air at + 35 °C, 70 % RH and 101,3 kPa, equal to 1,2 kg/m^3;

Δt is the difference between average temperature in the room and the supply air temperature, equal to 10 K.

NOTES

2 Simultaneity factor L means the ratio of operating and installed appliances in a galley: the factor is not to be lower than 0,5.

Where specific data are not available, the following factors may be used for calculation:

L = 1 for pantries;

L = 0,8 for galleys with up to 250 cooked meals served per day (cargo ships);

L = 0,7 for galleys with more than 250 cooked meals served per day.

3 Where specific data are not available, values according to annex B, table B.1, columns 2 and 4, may be used for calculation.

3.1.2 Calculation based on latent heat

The sum of the airflow for evacuation of latent heat emitted from the appliances, V_{ql}, shall be calculated, in cubic metres per second, as follows:

$$V_{ql} = \frac{L \times \sum \phi_{ql}}{c \times \rho \times \Delta t}$$

where

ϕ_{ql} is the latent heat emitted from the appliances, in kilowatts (see note 4);

L, c, ρ and Δt have the same meanings as in 3.1.1.

NOTE 4 Where specific data are not available, values according to annex B, table B.1, columns 3 and 5, may be used for calculation.

3.2 Exhaust airflow

The quantity of the exhaust airflow shall be greater than that of the supply airflow. (See also A.2.3.)

4 Guidance and good practice

In annex A, some guidance and good practice in designing the ventilation of a galley are given.

Annex A
(informative)

Guidance and good practice

A.1 General

Special consideration should be paid to draughts. The planning of the galley and the arrangement of the exhaust and supply air terminal devices should be such that air movement in the areas occupied will, as far as possible, not have a velocity higher than 0,5 m/s.

Sensible heat higher than 130 W/m^2 emitted in the space will generally result in a galley with a less satisfactory working environment.

A.2 Air distribution and equipment

A.2.1 Distribution of exhaust airflow

Equipment which emits heated and contaminated air (cooking appliances, griddle-plates, frying-pans) should be equipped with a hood-type exhaust air terminal device.

These hoods should be equipped with grease drip-trays and grease filters which are easy to clean and change: the hoods should be so designed that they will collect and evacuate the air before it has diffused.

Other exhaust air terminal devices should be easy to clean.

A plate with cleaning instructions for all exhaust air terminals should be displayed in the vicinity of hoods and other exhaust air terminals.

A.2.2 Distribution of supply airflow

The supply airflow should be distributed with consideration to the crew's working areas. The air supply devices should be of types which can operate with no inconvenience to the crew.

The supply airflow should be arranged so that the exhaust air will not be affected and that mixing between supply and exhaust terminals is avoided.

The system shall be so designed that the room temperature can be controlled during heating periods.

A.2.3 Pressure considerations

The intention is that there should be a lower pressure in the galley than in adjoining accommodation spaces.

The ducts for supply and exhaust air should each have a preset damper to ensure a proper air balance between the galley and the adjoining spaces. In some cases, it may be necessary to install transfer air device(s), for example in connection with serving hatches.

An excess airflow, which compensates filter and duct fouling, should be considered.

A.3 Fans and outdoor air filters

It should not be possible to run the supply air fans alone or at a higher capacity than the fans for exhaust air. The supply and exhaust air fans should be switched jointly.

The motors for the exhaust air fans should be placed outside the air stream in order to prevent grease deposits and fire risk.

The casing of the exhaust air fans should have inspection covers and be provided with drain outlets at the lowest part.

The air supplied from outside should be filtered by an appropriate filter, for example in accordance with EUROVENT, class EU-3[1].

The use of more efficient filters should be considered for ships with dusty cargoes.

A.4 Exhaust air ducting

Exhaust ducts should wherever possible be positioned outside accommodation areas. Where this is not possible, they should be fire-proofed to the ap-

1) This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.

propriate fire protection standard and be under negative pressure.

Horizontal exhaust air ducts should have inspection covers, be as short as possible and be provided with drain outlets at the lowest part.

If exhaust air ducting is led through cold zones of the ship, heat insulation should be provided to eliminate the possibility of condensation in the ducting.

Additional exhaust air flows for dishwashing machines with direct exhaust should be fitted.

The levels and positions of the exhaust air discharge opening and of the air intake for the accommodation and engine room should be such that mixing is not possible.

The pollution to the environment under the influence of different winds should be considered.

A.5 Sound

The A-weighted sound pressure level from the air distributing system measured 1 m from the air terminal device should not exceed 75 dB(A).

Annex B
(informative)

Sensible and latent heat emission of galley appliances to room

The sensible and latent heat emission from each appliance in the galley is obtained by multiplying the value[2] given in columns 2, 3, 4 and 5, as appropriate, in table B.1, by the rated power of the appliance.

Table B.1

Type of appliance	Electrically heated appliances		Appliances heated by steam and hot water	
	Sensible heat emission ϕ_{qs} kW/kW	Latent heat emission ϕ_{ql} kW/kW	Sensible heat emission ϕ_{qs} kW/kg	Latent heat emission ϕ_{ql} kW/kg
1	2	3	4	5
Cooking kettle (lid movable)	0,041	0,07	0,026	0,044
Cooking kettle	0,05	0,029	0,038	0,02
Steamer	0,029	0,052	0,017	0,029
Pressure steamer	0,046	0,07	0,029	0,041
Pressure pass-through steamers	0,041	0,052	0,026	0,033
Hot air steamers	0,058	0,267	0,035	0,162
Pressureless steamer	0,105	0,302		
Tilting frying-pan	0,377	0,337		
Griddle-plates (ranges)	0,377	0,337		
Grill unit	0,732	0,174		
Baking and roasting ovens	0,383	0,157		
Convection oven	0,105	0,302		
Continuous boiling ovens	0,256	0,232		
Paternoster boiling ovens	0,198	0,035		
Cooking kettle with mechanical stirrer	0,18	0,163		
Deep fat fryers	0,093	0,715		
Continuous deep fat fryers	0,041	0,523		
Ranges	0,418	0,081		
Stock pot	0,418	0,081		
Microwave oven	0,279	0,012		
Continuous microwave oven	0,116	0,024		
Bain-marie	0,106	0,314		
Hot food distribution counters	0,562	—	0,343	
Warming cabinet	0,349	—		
Refrigerator	0,726	—		
Kitchen machines	0,174	—		
Conveyors	1	—		
Cafeteria hot food distribution appliances	0,075	0,215		
Cafeteria cooled food distribution appliances	0,726	—		
Lowerator	0,296	—		
Hot drink urns	0,099	0.099		

2) Values are mean values for the cooking period, not for the start-up of the cooking period.

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