SLOVENSKI STANDARD
SIST EN ISO 8861:2000

01-december-2000

Shipbuilding - Engine-room ventilation in diesel-engined ships - Design requirements and basis of calculations (ISO 8861:1998)

Shipbuilding - Engine-room ventilation in diesel-engined ships - Design requirements and basis of calculations (ISO 8861:1998)

Schiffbau - Maschinenraum-Lüftung auf Schiffen mit Dieselmotoren-Antrieb - Grundlagen für Entwurf und Auslegung (ISO 8861:1998)

Construction navale - Ventilation du compartiment machines des navires a moteurs diesels - Exigences de conception et bases de calcul (ISO 8861:1998)

Ta slovenski standard je istoveten z: EN ISO 8861:1998

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SIST EN ISO 8861:2000   **en**

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Shipbuilding - Engine-room ventilation in diesel-engined ships - Design requirements and basis of calculations (ISO 8861:1998)

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This European Standard was approved by CEN on 25 January 1998.

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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 Central Secretariat has the same status as the official versions.

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

Central Secretariat: rue de Stassart, 36   B-1050 Brussels

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Foreword

The text of the International Standard ISO 8861:1998 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of an identical text or by endorsement, at the latest by November 1998, and conflicting national standards shall be withdrawn at the latest by November 1998.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.
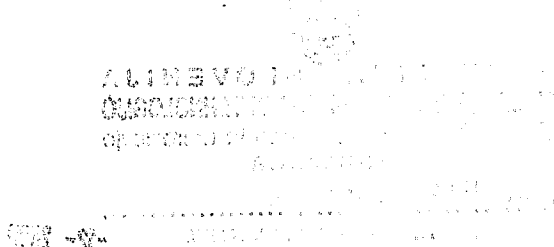
Endorsement notice

The text of the International Standard ISO 8861:1998 was approved by CEN as a European Standard without any modification.

INTERNATIONAL
STANDARD

ISO
8861

Second edition
1998-05-15

Shipbuilding — Engine-room ventilation in diesel-engined ships — Design requirements and basis of calculations

Construction navale — Ventilation du compartiment machines des navires à moteurs diesels — Exigences de conception et bases de calcul

Reference number
ISO 8861:1998(E)

ISO 8861:1998(E)

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.

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.

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International Standard ISO 8861 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 3, *Piping and machinery*.

This second edition cancels and replaces the first edition (ISO 8861:1988), of which it constitutes a technical revision.

Annex A of this International Standard is for information only.

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Shipbuilding — Engine-room ventilation in diesel-engined ships — Design requirements and basis of calculations

1 Scope

This International Standard specifies design requirements and suitable calculation methods for the ventilation of the engine room in diesel-engined ships, for normal conditions in all waters.

Annex A provides guidance and good practice in the design of ventilation systems for ships' engine rooms.

NOTE —   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 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 31-1:1992, *Quantities and units — Part 1: Space and time*.

ISO 31-3:1992, *Quantities and units — Part 3: Mechanics*.

ISO 31-4:1992, *Quantities and units — Part 4: Heat*.

ISO 3046-1:1995, *Reciprocating internal combustion engines — Performance — Part 1: Standard reference conditions, declarations of power, fuel and lubricating oil consumptions, and test methods*.

ISO 3258:1976, *Air distribution and air diffusion — Vocabulary*.

3 Definitions

For the purposes of this International Standard, the definitions given below, together with those in ISO 31-1, ISO 31-3, ISO 31-4, ISO 3046-1 and ISO 3258, apply.

3.1 engine room: Space containing main propulsion machinery, boiler(s), diesel generator(s) and major electrical machinery, etc.

3.2 ventilation: Provision of air to an enclosed space to meet the needs of the occupants and/or the requirements of the equipment therein.

3.3 service standard power: The continuous brake power which the engine manufacturer declares that an engine is capable of delivering, using only the essential dependent auxiliaries, between the normal maintenance intervals stated by the manufacturer and under the following conditions:

a) at a stated speed at the ambient and operating conditions of the engine application;

b) with the declared power adjusted or corrected as determined by the manufacturer to the stated ambient and operating conditions of the engine application;

c) with the maintenance prescribed by the engine manufacturer being carried out. [ISO 3046-1:1995]

See A.1 in annex A of ISO 3046-1:1995.

4 Design conditions

The outside ambient air temperature shall be taken as + 35 °C.

Temperature rise from air intake to air passing from the engine room up to the casing entrance shall be max. 12,5 K.

The capacity of the ventilation plant should be such as to provide comfortable working conditions in the engine room, to supply the necessary combustion air to the diesel engine(s) and boiler(s), and to prevent heat-sensitive apparatus from overheating.

In order to meet these requirements, the air should be distributed to all parts of the engine room, so that pockets of stagnant hot air are avoided. Special considerations should be given to areas with great heat emission and to all normal working areas, where reasonably fresh and clean outdoor air should be provided through adjustable inlet devices.

When arranging the air distribution, all normal conditions at sea and in harbour for in-service machinery shall be taken into account.

5 Airflow calculation

5.1 Total airflow

The total airflow Q to the engine room shall be at least the larger value of the two following calculations.

a: $Q = q_c + q_h$ as calculated according to 5.2 and 5.3 respectively.

b: $Q = 1,5 \times q_c$, i.e. the airflow for combustion + 50 %. The total airflow to the engine room shall not be less than the airflow for combustion [engine(s) and boiler(s)] plus 50 %.

Combustion air to, and heat emission from, all equipment installed within the casing and funnel shall not be taken into account.

The calculations shall be based on simultaneous maximum rating of main propulsion diesel engine(s), diesel generator engine(s), boiler(s) and other machinery under normal sea conditions, and on a temperature increase of 12,5 K.

The calculations should, to the greatest possible extent, be based on information from the manufacturers. Guidance values given in this International Standard should be used only when manufacturers' information is not available.

In order to ensure satisfactory air distribution, combustion air to, and heat emission from, main propulsion diesel engine(s), diesel generator engine(s), generator(s), boiler(s), and possibly other machinery with considerable heat emission, shall be calculated separately including other conditions as necessary.

Spaces separated from the main engine room, such as individual auxiliary engine rooms, boiler rooms and separator rooms, shall also be calculated separately.

5.2 Airflow for combustion

5.2.1 Sum of airflow for combustion

The sum of the airflow for combustion, q_c, shall be calculated, in cubic metres per second, as follows:

$$q_c = q_{dp} + q_{dg} + q_b$$

where

q_{dp} is the airflow for combustion for main propulsion diesel engine(s), in cubic metres per second (see 5.2.2);

q_{dg} is the airflow for combustion for diesel generator engine(s), in cubic metres per second (see 5.2.3);

q_b is the airflow for combustion for boiler(s), in cubic metres per second (see 5.2.4), if relevant under normal sea conditions.

5.2.2 Airflow for combustion for main propulsion diesel engine(s)

The airflow for combustion for the main propulsion diesel engine(s), q_{dp}, shall be calculated, in cubic metres per second, as follows:

$$q_{dp} = \frac{P_{dp} \times m_{ad}}{\rho}$$

where

P_{dp} is the service standard power of the main propulsion diesel engine(s) at maximum continuous power output, in kilowatts;

m_{ad} is the air requirement for combustion for diesel engine(s), in kilograms per kilowatt second;

NOTE — Where specific data for m_{ad} are not available, the following values may be used for calculation:

m_{ad} =   0,002 3 kg/(kW·s) for 2-stroke engines,

              0,002 0 kg/(kW·s) for 4-stroke engines.

ρ = 1,13 kg/m^3 (i.e. the density of air, at + 35 °C, 70 RH and 101,3 kPa).

5.2.3 Airflow for combustion for diesel generator engine(s)

The airflow for combustion for diesel generator engine(s), q_{dg}, shall be calculated, in cubic metres per second, as follows:

$$q_{dg} = \frac{P_{dg} \times m_{ad}}{\rho}$$

where

P_{dg} is the service standard power of the diesel generator engine(s) at maximum power output, in kilowatts;

m_{ad} is the air requirement for diesel engine combustion, in kilograms per kilowatt second;

NOTE — Where specific data for m_{ad} are not available, the following values may be used for calculation:

m_{ad} =   0,002 3 kg/(kW·s) for 2-stroke engines,

              0,002 0 kg/(kW·s) for 4-stroke engines.

ρ = 1,13 kg/m^3 (i.e. the density of air, at + 35 °C, 70 % RH and 101,3 kPa).

5.2.4 Airflow for combustion for boilers and thermal fluid heaters

The airflow for combustion for boiler(s), q_b, shall be calculated, in cubic metres per second, as follows:

In a case where the total steam capacity of a boiler is known, the following formula is used:

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$$q_b = \frac{m_s \times m_{fs} \times m_{af}}{\rho}$$

In a case where the capacity of a boiler or a thermal fluid heater is known in kilowatts, the following formula is used:

$$q_b = \frac{Q \times m_{fs} \times m_{af}}{\rho}$$

where

Q is the maximum continuous rating of the boiler(s), in kilowatts;

m_s is the total steam capacity (maximum continuous rating) of the boiler(s), in kilograms per second;

m_{fs} is the fuel consumption, in kilograms of fuel per kilogram of steam, or in kilograms of fuel per second per kilowatt of thermal capacity;

NOTE — Where specific data are not available, $m_{fs} = 0,077$ kg/kg may be used for the calculation if the steam capacity is known. If the thermal capacity is known, $m_{fs} = 0,11$ kg s^{-1} kW^{-1} may be used.

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m_{af} is the air requirement for combustion, in kilograms of air per kilogram of fuel;

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NOTE — Where specific data are not available, $m_{af} = 15,7$ kg/kg may be used for calculation.

$\rho = 1,13$ kg/m^3 (i.e. the density of air, at $+35$ °C, 70 % RH and 101,3 kPa).

5.3 Airflow for evacuation of heat emission

The sum of the airflow necessary for heat evacuation, q_h, shall be calculated, in cubic metres per second, as follows:

$$q_h = \frac{\phi_{dp} + \phi_{dg} + \phi_b + \phi_p + \phi_g + \phi_{el} + \phi_{ep} + \phi_t + \phi_o}{\rho \times c \times \Delta T} - 0,4\,(q_{dp} + q_{dg}) - q_b$$

where

ϕ_{dp} is the heat emission from main propulsion diesel engine(s), in kilowatts (see 6.1);

ϕ_{dg} is the heat emission from diesel generator engine(s), in kilowatts (see 6.2);

ϕ_b is the heat emission from boilers and thermal fluid heaters, in kilowatts (see 6.3);

ϕ_p is the heat emission from steam and condensate pipes, in kilowatts (see 6.4);

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