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AS 2387—1980
UDC 697.92:629.12.011.562.1:621.436

WITHDRAWN:
19990701

Australian Standard 2387—1980

VENTILATION OF ENGINE ROOMS IN DIESEL-ENGINE DRIVEN SHIPS



STANDARDS ASSOCIATION OF AUSTRALIA
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American Bureau of Shipping
Australian Chamber of Shipping
Australian Shipbuilders Association
Bureau Veritas
Department of Defence
Department of Industry and Commerce
Department of Transport
Institute of Marine Engineers
Lloyds Register of Shipping

This standard, prepared by Committee MS/22, Shipbuilding, was approved on behalf of the Council of the Standards Association of Australia on 30 July 1980, and was published on 1 October 1980.

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This standard was issued in draft form for public review as DR 78185.

AUSTRALIAN STANDARD

VENTILATION OF ENGINE ROOMS IN DIESEL-ENGINE DRIVEN SHIPS

AS 2387—1980

First published1980

**PUBLISHED BY THE STANDARDS ASSOCIATION OF AUSTRALIA
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY, N.S.W.**

ISBN 0 7262 2022 1



PREFACE

This standard was prepared by the Association's Committee on Shipbuilding at the request of the Department of Transport.

The standard has been based on Swedish Standard VIS 725 Engine Room Ventilation, Diesel Ships—Conditions and Calculation Fundamentals.

The standard is intended to apply to new ships, and to ships that are to be extensively modified or converted.

Users of the standard should note that while observing the requirements of the standard, they should at the same time ensure compliance with such statutory and classification society requirements, rules and regulations as are applicable to the individual ship concerned.

For requirements for ventilation of engine rooms of turbine driven ships, reference should be made to—

AS 2388 Ventilation of Engine Rooms in Steam-turbine Driven Ships.

AS 2389 Ventilation of Engine Rooms in Gas-turbine Driven Ships.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for

VENTILATION OF ENGINE ROOMS IN DIESEL-ENGINE DRIVEN SHIPS

1 SCOPE. This standard specifies conditions and calculation fundamentals for ventilation plant for an engine room of a diesel-engine driven ship. It covers normally occurring conditions in all waters.

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

3 GENERAL CALCULATION FUNDAMENTALS. The plant shall be positively balanced, i.e. the sum of the exhaust air flow and the combustion air requirements of the plant shall not exceed the intake flow rate.

The total air requirements shall be based on the combined requirements of combustion air for diesel engines and boilers, and the requirements of air for heat dissipation. Standby plant shall not be considered.

The air requirements for motor generators housed in a separate room shall not be considered as part of the engine-room plant but shall be subject to a separate plant design.

NOTE: Where combustion air for the main engines is drawn directly from atmosphere, an air allowance in addition to the requirements of air for heat dissipation may be required to maintain an acceptable rate of air change.

The air requirement for heat dissipation shall be calculated for an average temperature rise of 12.5°C.

4 COMBUSTION AIR REQUIREMENTS. The combustion air requirements of diesel engines and boilers shall be calculated by the following formula:

$$q_t = \frac{N_{bm} \times q_a + N_{ba} \times q_a + W_s \times q_{ms} \times q_m}{\rho}$$

where

q_t = combustion air requirement, in cubic metres per second

N_{bm} = brake power of the main engines at maximum power output, in kilowatts

N_{ba} = brake power of the diesel driven auxiliaries at maximum output at sea, in kilowatts

q_a = combustion air requirements for diesel engines in accordance with manufacturer's data, in kilograms (air) per kilowatt second

NOTE: Where specific data are not available, the following values of q_a may be used for calculations:

(a) For a 2-stroke engine—0.003 kg/kW.s.

(b) For a 4-stroke engine—0.0023 kg/kW.s.

W_s = total steam consumption, in kilograms per second (where steam is generated by oil firing)

q_{ms} = fuel consumption, in kilograms (fuel) per kilogram (steam)

NOTE: For fuel oil, where specific data are not available, $q_{ms} = 0.07$ kg/kg may be used for calculations.

q_m = combustion air requirement for fuel, in kilograms (air) per kilogram (fuel)

NOTE: For fuel oil, where specific data are not available, $q_m = 17.7$ kg/kg may be used for calculations.

ρ = density of the air at 35°C, in kilograms per cubic metre
= 1.15 kg/m³.

5 AIR REQUIREMENT FOR HEAT DISSIPATION.

5.1 Air Requirement. The air requirement for heat dissipation shall be based on the total heat emitted to the engine room from all heat sources in the engine room, and shall be calculated by the following formula:

$$q_v = \frac{P_d + P_p + P_r + P_g + P_e + P_a + P_s}{\rho \times c \times \Delta t}$$

where

q_v = air requirement for heat dissipation, in cubic metres per second

P_d = heat emitted from diesel engines, in kilowatts (see Clause 5.2)

P_p = heat emitted from boilers, in kilowatts (see Clause 5.3)

P_r = heat emitted from steam and condensing pipes, in kilowatts (see Clause 5.4)

P_g = heat emitted from alternators, in kilowatts (see Clause 5.5)

P_e = heat emitted from the electrical installation, in kilowatts (see Clause 5.6)

P_a = heat emitted from exhaust pipes, in kilowatts (see Clause 5.7)

P_s = heat emitted from hot tanks, in kilowatts (see Clause 5.8)

ρ = density of the air at 35°C, in kilograms per cubic metre
= 1.15 kg/m³

c = specific heat capacity of the air, in kilojoules per kilogram kelvin
= 1.01 kJ/kg.K

Δt = temperature rise in the engine room, in kelvin
= 12.5 K (see Clause 3).

5.2 Heat Emitted from Diesel Engines. The heat emitted from diesel engines shall be calculated by the following formula:

$$P_d = N_b \times \frac{U_d}{100}$$

where

P_d = heat emitted from diesel engines, in kilowatts

N_b = brake power of diesel engines, in kilowatts

U_d = heat loss in accordance with engine manufacturer's data, percent

NOTE: Where specific data are not available, heat loss values from Fig. 1 may be used for calculations.

5.3 Heat Emitted from Boilers. The heat emitted from boilers shall be based on the maximum power