

RESOLUTION A.418(XI)

*Adopted on 15 November 1979
Agenda item 10(b)*

**REVISED REGULATION 62 OF CHAPTER II-2 OF
THE INTERNATIONAL CONVENTION FOR THE
SAFETY OF LIFE AT SEA, 1974**

THE ASSEMBLY,

RECALLING Article 16(i) of the Convention on the Inter-Governmental Maritime Consultative Organization concerning the functions of the Assembly,

RECALLING ALSO resolution 5 of the International Conference on Tanker Safety and Pollution Prevention, 1978 which recommends IMCO to re-examine the requirements relating to inert gas systems in Regulation 62 of Chapter II-2 of the International Convention for the Safety of Life at Sea, 1974, and to develop guidelines to supplement the requirements of that regulation,

NOTING WITH SATISFACTION that the 1974 SOLAS Convention will come into force on 25 May 1980,

NOTING ALSO that the Maritime Safety Committee at its forty-first session approved a revised text of Regulation 62 for inclusion in the amendments to the 1974 SOLAS Convention and that supporting guidelines are under development,

1. URGES Governments, under the provisions of Regulation 5 of Chapter I of the International Convention for the Safety of Life at Sea, 1974, to apply the revised Regulation 62 set out in the Annex to the present resolution in place of the existing requirements;
2. REQUESTS the Maritime Safety Committee to continue with all possible speed the development of the guidelines for inert gas systems;
3. AUTHORIZES the Maritime Safety Committee to circulate the completed guidelines to all Governments concerned.

ANNEX

**REVISED REGULATION 62 OF CHAPTER II-2 OF
THE INTERNATIONAL CONVENTION FOR THE
SAFETY OF LIFE AT SEA, 1974**

Inert Gas Systems

(a) The inert gas system referred to in Regulation 60 of this Chapter, as amended by the 1978 SOLAS Protocol, shall be designed, constructed and tested to the satisfaction of the Administration. It shall be designed and operated so as to render and maintain the atmosphere of the cargo tanks* non-flammable at all times, except when such tanks are required to be gas free.

* Throughout this Regulation the term "cargo tank" includes also "slop tanks".

In the event that the inert gas system is unable to meet the operational requirement set out above and it has been assessed that it is impractical to effect a repair, then cargo discharge, deballasting and necessary tank cleaning shall only be resumed when the "emergency conditions" laid down in the guidelines on inert gas systems are complied with.

- (b) The system shall be capable of:
- (i) inerting empty cargo tanks by reducing the oxygen content of the atmosphere in each tank to a level at which combustion cannot be supported;
 - (ii) maintaining the atmosphere in any part of any cargo tank with an oxygen content not exceeding 8 per cent by volume and at a positive pressure at all times in port and at sea except when it is necessary for such a tank to be gas-free;
 - (iii) eliminating the need for air to enter a tank during normal operations except when it is necessary for such a tank to be gas-free;
 - (iv) purging empty cargo tanks of hydrocarbon gas, so that subsequent gas-freeing operations will at no time create a flammable atmosphere within the tank.
- (c) (i) The system shall be capable of delivering inert gas to the cargo tanks at a rate of at least 125 per cent of the maximum rate of discharge capacity of the ship expressed as a volume.
- (ii) The system shall be capable of delivering inert gas with an oxygen content of not more than 5 per cent by volume in the inert gas supply main to the cargo tanks at any required rate of flow.
- (d) The inert gas supply may be treated flue gas from the main or auxiliary boiler(s), from one or more separate gas generators or other sources or from any combination thereof. The Administration may accept systems using inert gases other than flue gas, provided that an equivalent standard of safety is achieved. Systems using stored carbon dioxide shall not be permitted unless the Administration is satisfied that the risk of ignition from generation of static electricity by the system itself is minimized.
- (e) Flue gas isolating valve(s) shall be fitted in the inert gas supply main(s) between the boiler uptake(s) and the flue gas scrubber. These valves shall be provided with indicators to show whether they are open or shut, and precautions shall be taken to maintain them gas-tight and keep the seatings clear of soot. Arrangements shall be made so that boiler soot blowers cannot be operated when the corresponding flue gas valve is open.
- (f) (i) A flue gas scrubber shall be fitted which will effectively cool the volume of gas specified in paragraph (c) of this Regulation and remove solids and sulphur combustion products. The cooling water arrangements shall be such that an adequate supply of water will always be available without interfering with any essential services on the ship. Provision shall also be made for an alternative supply of cooling water.
- (ii) Filters or equivalent devices shall be fitted to minimize the amount of water carried over to the inert gas blowers.
- (iii) The scrubber shall be located aft of all cargo tanks, cargo pump rooms and cofferdams separating these spaces from machinery spaces of Category A.
- (g) (i) At least two blowers shall be fitted which together shall be capable of delivering to the cargo tanks at least the volume of gas required by paragraph (c) of this Regulation.
- (ii) The inert gas system shall be designed so that the maximum pressure which it can exert on any cargo tank will not exceed the test pressure of any cargo tank. Suitable shut-off arrangements shall be provided on the suction and discharge connexions of each blower. Arrangements shall be provided to enable the functioning of the inert gas plant to be stabilized before commencing cargo discharge. If the blowers are to be used for gas freeing, their air inlets shall be provided with blanking arrangements.

- (iii) The blowers shall be located aft of all cargo tanks, cargo pump rooms and cofferdams separating these spaces from machinery spaces of Category A.
- (h) (i) Special consideration shall be given to the design and location of scrubber and blowers with relevant piping and fittings in order to prevent flue gas leakages into enclosed spaces.
 - (ii) To permit safe maintenance, an additional water seal or other effective means of preventing flue gas leakage should be fitted between the flue gas isolating valves and scrubber or incorporated in the gas entry to the scrubber.
- (i) (i) A gas regulating valve shall be fitted in the inert gas supply main. This valve shall be automatically controlled to close as required in sub-paragraphs (s)(ii) and (s)(iii) of this Regulation. It shall also be capable of automatically regulating the flow of inert gas to the cargo tanks unless means are provided to automatically control the speed of the inert gas blowers required in paragraph (g) of this Regulation.
 - (ii) The valve referred to in sub-paragraph (i) of this paragraph shall be located at the forward bulkhead of the most forward gas-safe space* through which the inert gas supply main passes.
- (j) (i) At least two non-return devices, one of which shall be a water seal, shall be fitted in the inert gas supply main, in order to prevent the return of hydrocarbon vapour to the machinery spaces uptakes or to any gas safe spaces under all normal conditions of trim, list and motion of the ship. They shall be located between the automatic valve required by paragraph (i) of this Regulation and the aftermost connexion to any cargo tank or cargo pipeline.
 - (ii) The devices referred to in sub-paragraph (i) of this paragraph shall be located in the cargo tank area on deck.
 - (iii) The water seal referred to in sub-paragraph (i) of this paragraph shall be capable of being supplied by two separate pumps, each of which shall be capable of maintaining an adequate supply at all times.
 - (iv) The arrangement of the seal and its associated provisions shall be such that it will prevent backflow of hydrocarbon vapours and will ensure the proper functioning of the seal under operating conditions.
 - (v) Provision shall be made to ensure that the water seal is protected against freezing, in such a way that the integrity of seal is not impaired by overheating.
 - (vi) A water loop or other approved arrangement shall also be fitted to all associated water supply and drain piping and all venting or pressure sensing piping leading to gas-safe spaces. Means shall be provided to prevent such loops from being emptied by vacuum.
 - (vii) The deck water seal and all loop arrangements shall be capable of preventing return of hydrocarbon vapours at a pressure equal to the test pressure of the cargo tanks.
 - (viii) The second device shall be a non-return valve or equivalent capable of preventing the return of vapours and/or liquids and fitted forward of the deck water seal required in sub-paragraph (i) of this paragraph. It shall be provided with positive means of closure. As an alternative to positive means of closure, an additional valve having such means of closure may be provided forward of non-return valve to isolate the deck water seal from the inert gas main to the cargo tanks.
 - (ix) As an additional safeguard against the possible leakage of hydrocarbon liquids or vapours back from the deck main, means shall be provided to permit this section

* Gas-safe space is a space into which the entry of hydrocarbon gases would produce hazards with regard to flammability or toxicity.

of the line between the valve having positive means of closure referred to in sub-paragraph (viii) of this paragraph and the valve referred to in paragraph (i) of this Regulation to be vented in a safe manner when the first of these valves is closed.

- (k) (i) The inert gas main may be divided into two or more branches forward of the non-return devices required by paragraph (j) of this Regulation.
 - (ii) (1) The inert gas supply main(s) shall be fitted with branch piping leading to each cargo tank. Branch piping for inert gas shall be fitted with either stop valves or equivalent means of control for isolating each tank. Where stop valves are fitted, they shall be provided with locking arrangements, which shall be under the control of a responsible ship's officer.
 - (2) In combination carriers, the arrangement to isolate the slop tanks containing oil or oil residues from other tanks shall consist of blank flanges which will remain in position at all times when cargoes other than oil are being carried except as provided for in the relevant section of the guidelines on inert gas systems.
 - (iii) Means shall be provided to protect cargo tanks against the effect of over-pressure or vacuum caused by thermal variations when the cargo tanks are isolated from the inert gas main(s).
 - (iv) Piping systems shall be so designed as to prevent the accumulation of cargo or water in the pipelines under all normal conditions.
 - (v) Suitable arrangements shall be provided to enable the inert gas main to be connected to an external supply of inert gas.
- (l) The arrangements for the venting of all vapours displaced from the cargo tanks during loading and ballasting shall comply with paragraph (a) of Regulation 58 of this Chapter and shall consist either of one or more mast risers, or of a number of high velocity vents. The inert gas supply main(s) may be used for such venting.
- (m) The arrangements for inerting, purging or gas freeing of empty tanks as required in paragraph (b) of this Regulation shall be to the satisfaction of the Administration and shall be such that the accumulation of hydrocarbon vapours in pockets formed by the internal structural members in a tank is minimized and that:
- (i) on individual cargo tanks the gas outlet pipe, if fitted, shall be positioned as far as practicable from the inert gas/air inlet and in accordance with paragraph (a) of Regulation 58 of this Chapter. The inlet of such outlet pipes may be located either at deck level or at not more than 1 metre above the bottom of the tank;
 - (ii) the cross sectional area of such gas outlet pipe referred to in sub-paragraph (i) of this paragraph shall be such that an exit velocity of at least 20 m/sec can be maintained when any three tanks are being simultaneously supplied with inert gas. Their outlets shall extend not less than 2 metres above deck level;
 - (iii) each gas outlet referred to in sub-paragraph (ii) of this paragraph shall be fitted with suitable blanking arrangements;
 - (iv) (1) if a connexion is fitted between the inert gas supply main(s) and the cargo piping system, arrangements shall be made to ensure an effective isolation having regard to the high pressure difference which may exist between the systems. This shall consist of two shut-off valves with an arrangement to vent the space between the valves in a safe manner or an arrangement consisting of a spool-piece with associated blanks;
 - (2) the valve separating the inert gas supply main from the cargo main and which is on the cargo main side shall be a non-return valve with a positive means of closure.

- (n) (i) One or more pressure-vacuum breaking devices shall be provided on the inert gas supply main to prevent the cargo tanks from being subject to:
- (1) a positive pressure in excess of the test pressure of the cargo tank if the cargo were to be loaded at the maximum specified rate and all other outlets are left shut; or
 - (2) a negative pressure in excess of 700 millimetres water gauge if cargo were to be discharged at the maximum rated capacity of the cargo pumps and the inert gas blower(s) were to fail.
- (ii) The location and design of the devices referred to in sub-paragraph (i) of this paragraph shall be in accordance with paragraph (a) of Regulation 58 of this Chapter.
- (o) Means shall be provided for continuously indicating the temperature and pressure of the inert gas at the discharge side of the gas blowers, whenever the gas blowers are operating.
- (p) (i) Instrumentation shall be fitted for continuously indicating and permanently recording when the inert gas is being supplied:
- (1) the pressure of the inert gas supply main(s) forward of the non-return devices required by sub-paragraph (j)(i) of this Regulation; and
 - (2) the oxygen content of the inert gas in the inert gas supply main on the discharge side of the gas blower.
- (ii) The devices referred to in sub-paragraph (i) of this paragraph shall be placed in the cargo control room where provided. But where no cargo control room is provided, they shall be placed in a position easily accessible to the officer in charge of cargo operations.
- (iii) In addition, meters shall be fitted:
- (1) in the navigating bridge to indicate at all times the pressure referred to in sub-paragraph (i)(1) of this paragraph and the pressure in the slop tanks of combination carriers, whenever those tanks are isolated from the inert gas supply main; and
 - (2) in the machinery control room or in the machinery space to indicate the oxygen content referred to in sub-paragraph (i)(2) of this paragraph.
- (q) Portable instruments for measuring oxygen and flammable vapour concentration shall be provided. In addition, suitable arrangement shall be made on each cargo tank such that the condition of the tank atmosphere can be determined using these portable instruments.
- (r) Suitable means shall be provided for the zero and span calibration of both fixed and portable gas concentration measurement instruments, referred to in paragraphs (p) and (q) of this Regulation.
- (s) (i) Audible and visual alarms shall be provided to indicate:
- (1) low water pressure or low water flow rate to the flue gas scrubber as referred to in sub-paragraph (f)(i) of this Regulation;
 - (2) high water level in the flue gas scrubber as referred to in sub-paragraph (f)(i) of this Regulation;
 - (3) high gas temperature as referred to in paragraph (o) of this Regulation;
 - (4) failure of the inert gas blower(s) referred to in paragraph (g) of this Regulation;
 - (5) oxygen content in excess of 8 per cent by volume as referred to in sub-paragraph (p)(i)(2) of this Regulation;
 - (6) failure of the power supply to the automatic control system for the gas regulating valve and to the indicating devices as referred to in paragraph (i) and sub-paragraph (p)(i) of this Regulation;

- (7) low water level in the water seal as referred to in sub-paragraph (j)(i) of this Regulation;
 - (8) gas pressure less than 100 millimetres water gauge as referred to in sub-paragraph (p)(i) of this Regulation. The alarm arrangement shall be such as to ensure that the pressure in slop tanks in combination carriers can be monitored at all times; and
 - (9) high gas pressure as referred to in sub-paragraph (p)(i)(1) of this Regulation.
- (ii) Automatic shutdown of the inert gas blowers and gas regulating valve shall be arranged on predetermined limits being reached in respect of sub-paragraphs (i)(1), (i)(2) and (i)(3) of this paragraph.
 - (iii) Automatic shutdown of the gas regulating valve shall be arranged in respect of sub-paragraph (i)(4) of this paragraph.
 - (iv) In respect of sub-paragraph (i)(5) of this paragraph, when the oxygen content of the inert gas exceeds 8 per cent, immediate action shall be taken to improve the gas quality. Unless the quality of the gas improves, all cargo tank operations shall be suspended so as to avoid air being drawn into the tanks and the isolation valve referred to in sub-paragraph (j)(viii) of this Regulation shall be closed.
 - (v) The alarms required in sub-paragraphs (i)(5), (i)(6) and (i)(8) of this paragraph shall be fitted in the machinery space and cargo control room, where provided, but in each case in such a position that they are immediately received by responsible members of the crew.
 - (vi) In respect of sub-paragraph (i)(7) of this paragraph the Administration shall be satisfied as to the maintenance of an adequate reserve of water at all times and the integrity of the arrangements to permit the automatic formation of the water seal when the gas flow ceases. The audible and visual alarm on the low level of water in the water seal shall operate when the inert gas is not being supplied.
 - (vii) An audible alarm system independent of that required in sub-paragraph (i)(8) of this paragraph or automatic shutdown of cargo pumps shall be provided to operate on predetermined limits of low pressure in the inert gas main(s) being reached.
- (t) All existing tankers, as defined in sub-paragraph (a)(v) of Regulation 1 of Chapter II-2 of the 1978 SOLAS Protocol, which are required to have an inert gas system, shall at least comply with the original Regulation 62 of this Chapter as adopted by the International Conference on Safety of Life at Sea, 1974. In addition, they shall comply with the requirements of this Regulation, except that:
- (i) Inert gas systems already fitted on board such tankers or which will be fitted before June 1981 need not comply with the following sub-paragraphs:
(c)(ii); (f)(iii); (g)(iii); (h); (i)(ii); (j)(ii); (j)(vii); (j)(ix); (k)(iii); (k)(iv); (m)(ii); (m)(iv)(2) and (s)(vii);
 - (ii) Inert gas systems which will be fitted on board such tankers on or after June 1981 need not comply with the following sub-paragraphs:
(c)(ii); (f)(iii); (g)(iii) and (m)(ii).
- (u) Detailed instruction manual(s) shall be provided on board, covering the operational, safety and maintenance requirements and occupational health hazards relevant to the inert gas system and its application to the cargo tank system*. The manual(s) shall include guidance on procedures to be followed in the event of a fault or failure of the inert gas system.

* Reference is made to the guidelines on inert gas systems, under development, to be circulated in due course.