

protected against freezing, in such a way that the integrity of the seal is not impaired by overheating.

(6) A water loop or other arrangement approved by the Chief Surveyor shall also be fitted to all associated water supply and dry 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.

(7) 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.

(8) The second non-return device mentioned in sub-clause (1) of this clause shall be a non-return valve or equivalent capable of preventing the return of vapours or liquids or both and fitted forward of the deck water seal required by sub-clause (1) of this clause. It shall be provided with either positive means of closure or an additional valve having such means of closure located forward of the non-return valve to isolate the deck water seal from the inert gas main to the cargo tanks and slop tanks.

(9) As an additional safeguard against the possible leakage of hydrocarbon liquids or vapours back from the deck main, means shall be provided to permit the section of the line between the valve having positive means of closure referred to in sub-clause (8) of this paragraph, and the valve referred to in clause 8 of this Performance Standard to be vented in a safe manner when the first of these valves is closed.

**10. Piping and distribution arrangements**—(1) The inert gas main may be divided into two or more branches forward of the non-return devices required by clause 9 of this Performance Standard.

(2) (a) The inert gas supply main shall be fitted with branch piping leading to each cargo tank and slop 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.

(b) In combination carriers, the arrangements 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.

(3) Means shall be provided to protect cargo tanks and slop tanks against the effect of overpressure or vacuum caused by thermal variations when such tanks are isolated from the inert gas main.

(4) Piping systems shall be so designed as to prevent the accumulation of cargo or water in the pipelines under all normal conditions.

(5) Suitable arrangements shall be provided to enable the inert gas main to be connected to an external supply of inert gas.

**11. Ventilation of vapours displaced from cargo tanks**—The arrangements for the venting of all vapours displaced from the cargo tanks during loading or ballasting shall comply with the provisions of the Codes of Practice issued under The Shipping (Construction) Regulations 1989 and shall consist of either one or more mast risers, or a number of high velocity vents. The inert gas supply main may be used for such venting.

**12. Arrangement for inerting, purging or gas freeing of empty tanks**—The arrangements for inerting, purging or gas freeing of empty tanks as required in clause 1 of this Performance Standard shall be approved by the Chief Surveyor and shall be such that the accumulation or hydrocarbon vapours in pockets formed by the internal structural members in a tank is minimised and that:

(1) On individual cargo tanks or slop tanks the gas outlet pipe, if fitted, shall be positioned as far as practicable from the inert gas/air inlet and in accordance with the provisions of the

Codes of Practice issued under The Shipping (Construction) Regulations 1989. The inlet of such outlet pipes may be located at either deck level or at not more than 1 metre above the bottom of the tank;

(2) The cross sectional area of such a gas outlet pipe referred to in sub-clause (1) of this clause shall be such that an exit velocity of at least 20 metres per second 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;

(3) Each gas outlet referred to in sub-clause (2) of this clause shall be fitted with suitable blanking arrangements;

(4) (a) If a connection is fitted between the inert gas supply main 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;

(b) The valve separating the inert gas supply main from the cargo main shall be a non-return valve with a positive means of closure.

**13. Pressure relief and vacuum breaking devices**—(1) One or more pressure-vacuum breaking devices shall be provided to prevent the cargo tanks from being subject to:

(a) A positive pressure in excess of the test pressure of the cargo tank if the cargo were to be loaded at the maximum rated capacity and all other outlets were left shut; and

(b) 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 were to fail.

Such devices shall be installed on the inert gas main unless they are installed in the venting system required by the Codes of Practice issued under The Shipping (Construction) Regulations 1989 or on individual cargo tanks.

(2) The location and design of the devices referred to in sub-clause (1) of this clause shall be in accordance with the provisions of the Codes of Practice issued under The Shipping (Construction) Regulations 1989.

**14. Temperature measurement**—Means shall be provided for continuously indicating the temperature and pressure of the inert gas at the discharge side of the gas blowers, whenever those gas blowers are operating.

**15. Instrumentation (permanent)**—(1) Instrumentation shall be fitted for continuously indicating and permanently recording when the inert gas is being supplied:

(a) The pressure of the inert gas supply main forward of the non-return devices required by sub-clause (1) of clause 9 of this Performance Standard and

(b) The oxygen content of the inert gas in the inert gas main on the discharge side of the gas blowers.

(2) The devices referred to in sub-clause (1) of this clause shall be placed in the cargo control room where provided. Where no cargo control room is provided, they shall be placed in a position easily accessible to the officer in charge of cargo operations.

(3) In addition, meters shall be fitted:

(a) In the navigating bridge, to indicate at all times the pressure referred to in sub-clause (1)(a) of this clause and the pressure in the slop tanks of combination carriers, whenever those tanks are isolated from the inert gas supply main; and

(b) In the machinery control room or in the machinery space, to indicate the oxygen content referred to in sub-clause (1)(b) of this clause.

**16. Instrumentation (portable)**—Portable instruments for