

# F20 Inert Gas Systems

(1974)  
 (Rev.1  
 1983)  
 (Rev.2  
 1987)  
 (Rev.3  
 May 1998)  
 (Corr.  
 Sept 2001)  
 (Rev.4  
 May 2004)  
 (Rev.5  
 Nov 2005)  
 (Rev.6  
 May 2012)

## F20.1 General Requirements

F20.1.1 All types of inert gas systems are to comply with the following:

- .1 Plans in diagrammatic form are to be submitted for appraisal and should include the following:
  - details and arrangement of the inert gas generating plant including all control and monitoring devices;
  - arrangement of the piping system for distribution of the inert gas.
- .2 An automatic control capable of producing suitable inert gas under all service conditions is to be fitted.
- .3 Materials used in inert gas systems are to be suitable for their intended purpose in accordance with the Rules of the Classification Society.
- .4 All the equipment is to be installed on board and tested under working conditions to the satisfaction of the Surveyor.
- .5 Subsequent surveys are to be carried out at the intervals required by the Classification Society Rules.

## F20.2 Inert Gas Systems on Tankers Carrying Crude Oil and Petroleum Products

F20.2.1 The following requirements apply where an inert gas system based on boiler flue gas and oil fired inert gas generators is fitted on board tankers intended for the carriage of crude oil and petroleum products in bulk having a flashpoint not exceeding 60°C (closed cup test) as determined by an approved flashpoint apparatus, and a Reid vapour pressure which is below atmospheric pressure, and other liquid products having a similar fire hazard.

F20.2.2 The inert gas system is to comply with the requirements of Ch. 15 of the FSS Code, insofar as they are applicable to new ships only.

Any use of the word "Administration" in the Regulation is to be considered as meaning the relevant Classification Society.

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### NOTES:

1. Rev.6 is to be applied by IACS Societies on ships contracted for construction on or after 1 July 2013.
2. The "contracted for construction" date means the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. For further details regarding the date of "contract for construction", refer to IACS Procedural Requirement (PR) No. 29.

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F20.2.3 In addition to the requirements detailed in Ch. 15 of the FSS Code, the following is to be complied with:

- .1 When two blowers are provided, the total required capacity of the inert gas system is preferably to be divided equally between the two blowers, and in no case is one blower to have a capacity less than 1/3 of the total capacity required.
- .2 In particular those parts of scrubbers, blowers, non-return devices, scrubber effluent and other drain pipes which may be subjected to corrosive action of the gases and/or liquids are to be either constructed of corrosion resistant material or lined with rubber, glass fibre epoxy resin or other equivalent coating material.
- .3 The compartment in which any oil fired inert gas generator is situated is to be treated as machinery space of Category A with respect to fire protection.
- .4 Arrangements are to be made to vent the inert gas from oil fired inert gas generators to the atmosphere when the inert gas produced is off specification, e.g., during start-up or in the event of equipment failure.
- .5 Automatic shut-down of the oil fuel supply to inert gas generators is to be arranged on predetermined limits being reached with respect to low water pressure or low water flow rate to the cooling and scrubbing arrangement and with respect to high gas temperature.
- .6 Automatic shut-down of the gas regulating valve is to be arranged with respect to failure of the power supply to the oil fired inert gas generators.

**F20.3 Inert Gas Systems on Chemical Tankers**

F20.3.1 The following requirements apply where an inert gas system based on oil fired inert gas generators is fitted on board chemical tankers.

F20.3.2 The inert gas system is to comply with the requirements of Resolution A.567(14).

Any use of the word "Administration" in the Resolution is to be considered as meaning the relevant Classification Society.

F20.3.3 As an alternative to the water seal in the inert gas line on deck, an arrangement consisting of two shut-off valves in series with a venting valve in between may be accepted (double block and bleed). The following conditions apply:

- the operation of the valve is to be automatically executed. Signal(s) for opening/closing is (are) to be taken from the process directly, e.g. inert gas flow or differential pressure;
- alarm for faulty operation of the valves is to be provided, e.g. the operation status of "Blower stop" and "supply valve(s) open" is an alarm condition.

F20.3.4 In addition to the requirements detailed in Resolution A.567(14), the requirements for inert gas systems, contained in paragraphs F20.2.3.1 to F20.2.3.3, are to be complied with.

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(cont)**F20.4 Nitrogen Generator Systems**

F20.4.1 The following requirements are specific only to the gas generator system and apply where inert gas is produced by separating air into its component gases by passing compressed air through a bundle of hollow fibres, semi-permeable membranes or adsorber materials.

F20.4.2 Where such systems are provided in place of the boiler flue gas or oil fired inert gas generators referred to in sections F20.2 and F20.3, the following requirements of the FSS Code, Ch. 15 or equivalent requirements of Resolution A.567(14) remain applicable for the piping arrangements, alarms and instrumentation downstream of the gas generator: 2.3.1.3.1, 2.3.1.3.2, 2.3.1.5, 2.3.2, 2.4.2, 2.4.3.1.6, 2.4.3.1.8, 2.4.3.1.9, 2.4.3.3, 2.4.3.4, 2.4.4, as well as SOLAS Reg.II-2/4.5.3.4.2, 4.5.6.3, 11.6.3.4.

F20.4.3 A nitrogen generator consists of a feed air treatment system and any number of membrane or adsorber modules in parallel necessary to meet the required capacity which is to be at least 125% of the maximum discharge capacity of the ship expressed as a volume.

F20.4.4 The air compressor and the nitrogen generator may be installed in the engine room or in a separate compartment. A separate compartment is to be treated as one of "Other machinery spaces" with respect to fire protection.

F20.4.5 Where a separate compartment is provided, it is to be positioned outside the cargo area and is to be fitted with an independent mechanical extraction ventilation system providing 6 air changes per hour. A low oxygen alarm is to be fitted as well.

The compartment is to have no direct access to accommodation spaces, service spaces and control stations.

F20.4.6 The nitrogen generator is to be capable of delivering high purity nitrogen with O<sub>2</sub> content not exceeding 5% by volume. The system is to be fitted with automatic means to discharge "off-spec" gas to the atmosphere during start-up and abnormal operation.

F20.4.7 The system is to be provided with two air compressors. The total required capacity of the system is preferably to be divided equally between the two compressors, and in no case is one compressor to have a capacity less than 1/3 of the total capacity required.

Only one air compressor may be accepted provided that sufficient spares for the air compressor and its prime mover are carried on board to enable their failure to be rectified by the ship's crew.

F20.4.8 A feed air treatment system is to be fitted to remove free water, particles and traces of oil from the compressed air, and to preserve the specification temperature.

F20.4.9 Where fitted, a nitrogen receiver/buffer tank may be installed in a dedicated compartment or in the separate compartment containing the air compressor and the generator or may be located in the cargo area. Where the nitrogen receiver/buffer tank is installed in an enclosed space, the access is to be arranged only from the open deck and the access door is to open outwards. Permanent ventilation and alarm are to be fitted as required by paragraph F20.4.5.

F20.4.10 The oxygen-enriched air from the nitrogen generator and the nitrogen-product enriched gas from the protective devices of the nitrogen receiver are to be discharged to a safe location\* on the open deck.

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F20.4.11 In order to permit maintenance, means of isolation are to be fitted between the generator and the receiver.

F20.4.12 At least two non-return devices are to be fitted in the inert gas supply main, one of which is to be of the double block and bleed arrangement (refer to paragraph F20.3.3). The second non-return device is to be equipped with positive means of closure.

F20.4.13 Instrumentation is to be provided for continuously indicating the temperature and pressure of air:

- .1 at the discharge side of the compressor,
- .2 at the entrance side of the nitrogen generator.

F20.4.14 Instrumentation is to be fitted for continuously indicating and permanently recording the oxygen content of the inert gas downstream of the nitrogen generator when inert gas is being supplied.

F20.4.15 The instrumentation referred to in paragraph F20.4.14 is to 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.

F20.4.16 Audible and visual alarms are to be provided to indicate:

- .1 low feed-air pressure from compressor as referred to in paragraph F20.4.13.1,
- .2 high air temperature as referred to in paragraph F20.4.13.1,
- .3 high condensate level at automatic drain of water separator as referred to in paragraph F20.4.8,
- .4 failure of electrical heater, if fitted,
- .5 oxygen content in excess of that required in paragraph F20.4.6,
- .6 failure of power supply to the instrumentation as referred to in paragraph F20.4.14.

F20.4.17 Automatic shut-down of the system is to be arranged upon alarm conditions as required by paragraphs F20.4.16.1 to .5.

F20.4.18 The alarms required by paragraphs F20.4.16.1 to .6 are to 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.

<sup>\*)</sup> "safe location" needs to address the two types of discharges separately:

1. oxygen-enriched air from the nitrogen generator - safe locations on the open deck are:
  - outside of hazardous area;
  - not within 3m of areas traversed by personnel; and
  - not within 6m of air intakes for machinery (engines and boilers) and all ventilation inlets.
2. nitrogen-product enriched gas from the protective devices of the nitrogen receiver - safe locations on the open deck are:
  - not within 3m of areas traversed by personnel; and
  - not within 6m of air intakes for machinery (engines and boilers) and all ventilation inlets/outlets.

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(cont)**F20.5 Nitrogen /Inert Gas Systems Fitted for Purposes other than Inerting Required by SOLAS Reg II-2/4.5.5.1.1**

F20.5.1 This section applies to systems fitted on oil tankers of less than 20.000 DWT, gas tankers or chemical tankers.

F20.5.2 The requirements of section F20.4 apply except paragraphs F20.4.1, F20.4.2, F20.4.3 and F20.4.7.

F20.5.3 Where the connections to the cargo tanks, to the hold spaces or to cargo piping are not permanent, the non-return devices required by paragraph F20.4.12 may be substituted by two non-return valves.

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