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SECTION H CARGO AND BALLAST SYSTEMS

H.1 The vessel **MUST** have on board cargo operation and handling procedures in addition to documentation showing maximum loading rates, venting capacities and maximum permissible pressure and vacuum each tank can withstand.

H.2 A detailed and documented cargo-handling plan written in the language of the Officer's and Crew **MUST** be prepared and available for every cargo or ballast operation undertaken.

H.3 Material Safety Data Sheets (MSDS) for all products being handled **MUST** be displayed. Where applicable, a copy of the USCG Data Guide should be aboard.

H.4 Vessels for seagoing service **MUST** be capable of handling at least 3 grades. Cargo pumps **MUST** have emergency stops located on deck or in the Cargo Control Room. It is **Strongly Preferred** that emergency stops are also located in the Cargo Control Room, at the manifold, and just outside the pump room entrance (if vessel is fitted with a cargo pump room). Ref: OCIMF: An Information Paper on Pump room Safety (September 1993).

[VPQ CH. 8.15]

H.5 If the cargo pumps are centrifugal and located in a pump room, their bearings and casings **MUST** be fitted with high temperature alarms or trips. It is **Strongly Preferred** that all pump drive shaft bulkhead glands are fitted with alarms or trips. **BOTH** alarms and trips are **Strongly Preferred**. It is also **Strongly Preferred** that rotary positive displacement pumps are fitted with this equipment for high flash point cargoes, and **MUST** be so fitted for cargoes with flash points below 60degC.

H.6 The vessel **MUST** have appropriate logbook(s) on board containing an up-to-date record of events.

H.7 Vessels with inherent intact stability are **Strongly Preferred**. Where the vessel does not possess inherent intact stability, the operator **MUST** determine whether there are any possible conditions of cargo and/or ballast operations where IMO stability criteria are not satisfied. Vessels that have large undivided tanks in which liquid free surface may affect vessel stability, (such as double hull, double sides, and OBOs, without a continuous longitudinal bulkhead in the cargo tanks, and/or with "U" shaped ballast tanks), **MUST** have operating instructions that:

1. Indicate the number of tanks which may be slack and still satisfy IMO stability criteria under <u>all</u> possible conditions of liquid (cargo and/or ballast) transfer
2. Are understandable to the officer-in-charge of transfer operations
3. Require no extensive mathematical calculations by the officer-in-charge
4. Illustrate corrective actions to be taken by the officer-in-charge in case of departure from planned values, and in case of emergency situations, such as negative stability causing an angle of loll
5. Are prominently displayed in the approved trim and stability booklet, at the cargo/ballast transfer control station, and in any computer software by which stability calculations are performed.

H.8 Provision of a cargo computer, or equivalent, is **Strongly Preferred**, to enable stability calculations to be made, prior to and at any stage of the cargo operation and to calculate hull stresses. If fitted, the operator **MUST** ensure that this computer program has been independently verified. It is **Strongly Preferred** that this computer program be Class approved as an IACS URL5 Type 2 or Type 3 stability computer.

[VPQ CH. 8.16 & 8.17]

H.9 Vessels **MUST** be fitted with bilge alarms in pump rooms, including ballast pump rooms, bow and stern thruster rooms and emergency fire pump room.

H.10 Vessels carrying low flash cargo **MUST** be fitted with a fixed system capable of continuously monitoring for flammable atmosphere in cargo pump rooms.

[VPQ CH. 8.112]

H.11 The flammable gas detection system **MUST** be fitted with an alarm to indicate the presence of significant concentrations of flammable vapour. It is **Strongly Preferred** that sensors/sampling points for monitoring flammable atmospheres are distributed throughout pump rooms. Ref: OCIMF Information Paper on Pump room Safety.

[VPQ CH. 8.113]

H.12 It is **Strongly Preferred** that pressure gauges with valves or cocks be fitted outboard of cargo manifold valves. This requirement may be waived upon application and justification for chemical carriers and multi-product carriers, which have an excessive number of manifolds, and where acceptable alternate arrangements are in place.

H.13. The vessel **MUST** have on board appropriate documentation for the vessel's portable hoses showing that:

1. All hoses are inspected prior to each use to ensure they are free of kinks or any other material defects
2. All hoses are pressure tested annually to 1.25 times the design working pressure (in the USA hoses **MUST** be tested to 1.5 times the maximum working pressure)
3. All hoses are retired in accordance with manufacturer's instructions
4. Flange markings match certificates for ease of identification.

H.14 Cargo tank venting **MUST** be through approved systems that expel vapours clear of the tank deck area in accordance with ISGOTT. The vessel **MUST** have secondary means of providing protection against tank over/under pressurisation. This can be provided by full flow independent P/V valves and/or pressure monitoring system fitted to each tank. Full flow P/V valves **MUST** be so fitted that they cannot be isolated from the tanks they protect and **MUST** be capable of flowing sufficient volume of gas to prevent damage at the tank's maximum loading/discharge rates. Where fixed cargo tanks pressure monitoring equipment are fitted, the display unit **MUST** be installed in the cargo control room with alarm settings. This alarm should sound an audible and visual alarm in the CCR if the set limits are exceeded.

[VPQ CH. 8.67]

H.15 All vessels **MUST** be able to undertake cargo operations under controlled venting, closed gauging and sampling techniques; that is, vessels will have facilities to enable venting of tank atmospheres and ullage monitoring without need to open hatches/ullage ports.

[VPQ CH. 8.51]

H.16 A vapour recovery system is required at certain terminals. If fitted on board, it **MUST** be Class approved. Manifolds **MUST** comply with the OCIMF "Recommendations for Oil Tanker Manifolds and Associated Equipment" and vessel personnel conducting cargo operations **MUST** be familiar with the safety implications of its use.

[VPQ CH. 8.65]

H.17 Tank level measuring devices **MUST** be available for all cargo tanks, slop tanks and bunker tanks. Automatic tank gauges are **Strongly Preferred**. Where fitted, these **MUST** have remote readings in the Cargo Control Room.

[VPQ CH. 8.51]

H.18 Vapour locks with sonic tapes are only acceptable as a substitute for automatic tank gauges provided that the vessel is equipped with a minimum of one sonic tape for each cargo tank which is loading or discharging. Pneumatic tank level gauging systems **MUST** be supplemented by such a vapour lock system. Vessels not fitted with vapour locks may not be accepted at all terminals. The vessel **MUST** have vapour locks for custodial measurement of low flash point and toxic cargoes.

[VPQ CH. 8.61.2]

H.19 When vapour locks are fitted, the vessel **MUST** have sonic tapes capable of measuring ullage, temperature, and interface (e.g. UTI) and a sampling device.

H.20 When vapour locks are fitted they **MUST** be independently calibrated and certified so that measurements taken through them can be used with the vessel's original ullage tables.

H.21 Use of portable measuring equipment, including sonic tapes and sampling devices, when loading products in non-inerted tanks, **MUST** be in accordance with the precautions to prevent electrostatic ignition recommended in ISGOTT. Except where tanks are fitted with perforated full depth sounding pipes - portable measuring and sampling devices **MUST** not be introduced into non-inerted tanks until 30 minutes after cargo flow to the tank stops. Vessels **MUST** be able to safely top off in full compliance with these requirements. If sounding pipes are fitted, they **MUST** be perforated, constructed so as to extend the full depth of the tank and be effectively bonded. Full depth sounding pipes **MUST** be fitted to the vapour lock if the vessel has no automatic tank gauging equipment, has no IG system and carries static accumulating cargoes.

H.22 Independent high level alarms **MUST** be fitted for all cargo tanks, slop tanks and bunker tanks. They **MUST** be utilised during all cargo and bunker transfer operations and suitably located to alert personnel conducting the operations. Independent high level alarms **MUST** be tested prior to cargo operations and tests properly recorded.

[VPQ CH. 8.54]

H.23 Vessel cargo and bunker manifolds and associated valves, reducers and spool pieces **MUST** be fabricated of steel. Flexible hose connections **MUST** be via bolted steel flanges, unless the connection system is supplied and designed for a specifically designated purpose. Grey cast iron and aluminium are **NOT** permitted. Ductile iron may be used if of appropriate strength, yield strength and elongation.

H.24 It is **Strongly Preferred** that all vessels to be utilised in the carriage of more than one grade of cargo should be capable of maintaining a two valve or equivalent separation between grades at all times during the execution of the voyage including loading and discharging operations.

[VPQ CH. 8.15]

H.25 Vessels having conventional pump rooms **MUST** be equipped with at least two operational main cargo pumps.

[VPQ CH. 8.18]

H.26 The vessel **MUST** have onboard documented maintenance procedures and test records that relate to critical systems. Critical systems include the cargo pumps, piping, valves, inert gas system and cargo instrumentation. (See also TMSA Element 4)

H.27 It is **Strongly Preferred** that vessels are fitted in their Cargo Control Room with a device capable of monitoring and recording the load / discharge manifold pressure.

H.28 All the cargo equipment such as pressure gauges, vacuum gauges, thermometers etc. **MUST** be checked annually and certified.

H.29 Vessels **MUST** have fixed cargo tank pressure monitoring equipment fitted, with a visual display unit installed in the cargo control room. The system shall include manufacturers set high and low pressure alarms as detailed within OCIMF SIRE 4 VIQ CH. 8.30, and additionally a further minimum two adjustable, user defined, alarms limits which can be set as required. These alarms should sound an audible and visual alarm in the CCR if the set limits are exceeded.

[SIRE 4 VIQ CH. 8.30]

H.30 It is **Strongly Preferred** that vessels are fitted with a cargo tank pressure monitor display and alarm unit on the bridge in addition to the display and alarm unit installed in the cargo control room (H.29)