

FIRES ON PASSENGER FERRIES AND RO-PAX VESSELS: HAZARDS AND PRECAUTIONS

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Vehicle/Cargo Deck space on board a typical Ro-Pax vessel

INTRODUCTION

The relatively low-cost transport of people, goods and vehicles by passenger ferries and ro-pax vessels provides the economic life blood for many developing nations such as Indonesia and the Philippines. Unfortunately, this form of sea transport also presents several significant safety challenges, inclusive of fire on board. This Risk Bulletin looks at the principal causes of ferry and ro-pax vessel fires and their prevention through full compliance with flag state regulation and the application of IMO recommended Guidelines.

BACKGROUND

Fires on board passenger ferries and ro-pax vessels are regrettably not uncommon as they carry readily combustible cargo. This includes petrol and now battery powered cars, trucks often laden with ignitable or even dangerous goods and refrigerated container units prone to electrical faults and overheating. Add to this the common construction of a ferry or ro-pax vessel, which (as shown in the photo above) typically features long unsegregated car decks ventilated with forced air, and you have the fuel/oxygen/ignition makings of 'the perfect fire'.

REGULATORY MATTERS

The regulation of the special fire-resistant design, construction and equipment of ferries and ro-pax vessels over 500 GT and engaged in international trade is governed primarily by SOLAS Chapter II/2. The training and certification of their crews, inclusive of firefighting and passenger control training, is governed by the STCW Convention. As such, it is not overly difficult to find the regulations which apply to these vessels and their crews, inclusive of the required content of the flag state approved ISM Code SMS Manuals and Procedures, Fire Plans and Firefighting Manuals which must be carried on board.

NOTE 1: The IMO have recognised that as a consequence of numerous and often serious fires on board ferries and ro-pax vessels that SOLAS Chapter II/1 requires improvement. The IMO's first step has been to issue [MSC.1/Circ.1615](#) – INTERIM GUIDELINES FOR MINIMIZING THE INCIDENCE AND CONSEQUENCES OF FIRES IN RO-RO SPACES AND SPECIAL CATEGORY SPACES OF NEW AND EXISTING RO-RO PASSENGER SHIPS. The second step will be to later amend SOLAS Chapter II/2 based on the experience and feedback from IMO member states.

Members should understand that the Interim Guidelines are currently recommendatory and not mandatory. The IMO also explain that Section 1 applies to both new and existing ro-pax vessels and that Sections 2 through 5, except for 3.2, apply only to new vessels. More importantly, the Interim Guidelines contain both up-to-date and very valuable risk management recommendations. Members are therefore encouraged to review MSC.1/Circ. 1615 and incorporate, both voluntarily and prudently, the recommendations made into their fleet ISM Code SMS Manuals and Procedures, Fire Plans and Firefighting Training Manuals.

Turning now to domestic trade ferries and ro-pax vessels, the compliance process is not so simple when looking for and confirming the regulations which govern the fire design, construction and equipment factors for these vessels. This is because SOLAS and the STCW Convention do not extend to domestic trade ferries/ro-pax unless their flag state has specifically ruled that the IMO Conventions apply.

Examples of the relatively small number of flag states that have made SOLAS Chapter II/2 and the STCW Convention applicable to ferries/ro-pax operating in the domestic trade include Australia, Canada and European Union countries. There are no countries within Asia that appear to have done so. The question then is what regulations and guidelines apply to domestic trade ferries and ro-pax if SOLAS does not apply?

The IMO have long encouraged flag states to create national regulation for domestic trade vessels which refer to the IMO Conventions as the basis for their content. This type of regulation is commonly known as Non-Convention Vessel Regulations or Standards (NCVR or NCVS). Members who operate ferries and ro-pax in the domestic trade should therefore confer with their flag state authority and/or RO to ensure that they have both copies of and are in full compliance with all relevant and current regulation.

NOTE 2: IMO 'Manila Statement' Guidelines

Members need to be aware of the [IMO 'Manila Statement' issued in 2015](#)¹ as TCF 65/INF.12 GUIDELINES ON THE SAFE OPERATION OF COASTAL AND INTER-ISLAND PASSENGER SHIPS NOT ENGAGED ON INTERNATIONAL VOYAGES. The IMO explain that:

"The scope of these Guidelines is intended to be complimentary to all national laws, regulations and other mandatory requirements that may be applicable."

The IMO's intention is to improve and unify existing domestic ferry regulation with the goal of improving safety in a sea transport sector which continues to suffer exceptionally high and often tragic losses.

Although compliance with the IMO Guidelines is not mandatory, they provide 'best industry practice' recommendations which have been endorsed by flag states, including Indonesia and the Philippines, IACS and the ferry industry organisations InterFerry and the Worldwide Ferry Safety Organisation.

NOTE 3: IMO MSC's Draft 'Model Regulations on Domestic Ferry Safety'

Members also need to be aware that the above referenced Draft Model Regulations were reportedly finalised and approved by MSC 104 during early October 2021. Scheduled for formal adoption at MSC 105 in April 2022, the IMO Model Regulations will provide an IMO recommended framework for domestic ferry regulation for incorporation into national law. This will then likely supercede the IMO's Manila Statement

An internet search of the IMO GSIS database does not yet provide a copy of the finalised MSC 104 Draft Model Regulations. However, reference to [MSC 103/8 Draft Model Regulations](#) provides a useful indication of the scope and content of the now finalised IMO Model Regulations on Domestic Ferry Safety.

A short but informative [IMO video on Domestic Ferry Safety](#) is also available and should be viewed by all Members who operate vessels in this trade.

FERRY/RO-PAX FIRE RISKS AND PREVENTION

The fire risks which may be encountered on board a ferry/ro-pax vessel can be divided into three main categories:

1. **Vehicle/cargo deck spaces** – present the highest level of fire risks which are particular to ferry/ro-pax vessels. This is confirmed by the International Union of Marine Insurers (IUMI) which reports that the ferry/ro-pax cargo deck fire frequency is twice as high as experienced aboard other cargo vessels. These risks include:
 - Fire in the engine of compartment of vehicles parked on the car deck, particularly if the engine has been left running either deliberately or inadvertently.
 - Fire in the cargo compartment(s) of vehicles, especially if the cargo is combustible and prone to self-heating and ignition deck i.e. dangerous cargo.
 - Fire in the compressor units of refrigerated trucks or containers which then quickly spread to the truck cab and body and the cargo itself.
 - Fires started by faults in electrical extension cables run out to power refrigerated trucks or containers during the voyage.
 - Fires started by the overheating of battery units in electric powered cars and trucks.
 - Fires started, either deliberately or accidentally, by passengers who remain on or return to the vehicle deck without authorization.

Fire Prevention in the vehicle/cargo deck spaces should include:

- Checking that all vehicles are properly secured with hand brakes on and engines turned off. If rough weather is anticipated, securing chains may also be required.
- Requiring that all commercial vehicles provide a signed declaration of the cargo being carried and whether it may be prone to self-heating and ignition i.e. dangerous cargo.
- Maintaining a close visual check on any compressor units of refrigerated truck or containers which may be left running during the voyage.
- Pre-use check by ferry/ro-pax technician to ensure that all cables and connectors used to connect vessel power supplies to refrigerated trucks or containers are in good order.
- Electrically powered vehicles can be hazardous if their batteries overheat while being charged. All such vehicles should be identified and flagged when they come on board and their occupants warned that they must not connect any re-charging cable to the vessel's power supply.
- Ensuring that, except for very short voyages on vessels with open car decks, all passengers are required to leave the car deck prior to departure and are not permitted back onto a closed car deck during the voyage unless accompanied by a designated crew security officer.
- Vehicle deck fire detection systems, even if fitted with auto-alarms, should be checked and logged as operational before and at regular intervals during the voyage.
- Vehicle deck CTV systems (as may be required by flag state) should be checked and logged as operational before and at regular intervals during the voyage. CTV footage should be carefully secured for incident investigation purposes.
- Vehicle deck safety and security should be confirmed by regular and physical patrols by crew members who are trained to fully understand their duties and who are equipped with portable VHF radios to be able to report their observations directly to the bridge OOW. All patrols and outcomes to be recorded in the bridge deck log.

2. **Accommodation & Public spaces** – present fire risks which are particular to both ferries and ro-pax vessels and all vessels that carry passengers. These risks include fires in passenger or crew cabins or public spaces resulting from:

- Smoking in bed or the careless discard of smoking materials e.g. cigarette butts into garbage cans.
- The use of defective electrical equipment or the misuse of electrical equipment brought on board by passengers or crew.
- Defective electrical equipment or wiring as installed in cabins or public spaces but not properly checked and maintained by vessel crew.

Fire Prevention in the accommodation area should include:

- Posting clear warnings to passengers and crew as to the serious dangers of the improper disposal of smoking materials.
- Providing designated and clearly signed 'No Smoking' areas.
- Providing designated and clearly signed 'Smoking' areas to avoid the risk of passengers and crew smoking covertly and improperly disposing of their smoking materials.
- Posting clear warnings to passengers and crew as to the potential dangers of plugging in any of their own electrical equipment to the vessel's power supply and then leaving it on and unattended.
- Ensuring that all of the electrical systems and equipment in accommodation areas are checked and maintained on a regular basis by the vessel's electro-technical officer or a suitably qualified member of the crew. All such checks and maintenance to be recorded in the vessel's engine room log.
- Ensuring that all of the approved smoke, flame or heat detection systems installed in the accommodation areas are operating and monitored at all times.
- Ensuring that regular accommodation safety and security patrols are conducted by vessel crew who are similarly trained and equipped as described above for vehicle deck space patrols. All accommodation patrols and outcomes to be recorded in the bridge deck log.

3. **Engine Room (ER)/Machinery spaces** – present fire risks which are very similar to other commercial power-driven vessels of comparable size and power risks and which are not particular to ferries and ro-pax vessels. The principal ER fire risks include the following:
- Ignition of fuel or other oil under pressure leaking and spraying on to machinery, exhaust uptakes and piping 'hot spots. This type of fire is reported as being the cause of 70% of all ER fires.
 - Welding and cutting 'hot work' or the use of portable electric grinders in the ER causing hot slag, debris or sparks to come into contact with ER oily bilge water or other flammable materials.
 - Defective ER electric motors and other equipment overheating or sparking and causing ignition of flammable materials.
 - Overheating of defective bearings of ER rotating machinery.
 - Spontaneous combustion within uncovered ER waste containers storing oily used rags or cotton waste.

Fire prevention – in the Engine Room/Machinery spaces should include:

- Ensuring that all pressurised fuel lines are either jacketed or shielded (to SOLAS II/2 or NCVR/NCVS equivalent standards) to prevent oil sprays on to hot surfaces if fuel lines fracture.
- Ensuring that all oil leak detection and alarm systems as fitted to SOLAS Chapter II/2 or NCVR/NCVS standards are fully functioning and are not switched off or re-set before the cause of an alarm sounding is investigated and confirmed by the watch Engineer Officer.
- Ensuring that all intended ER 'hot work', or the use of portable electric tools which may cause sparks, is first subjected to a formal risk assessment and is then completed in strict accordance with the safe work procedures contained in the vessel's ISM Code SMS or NCVR/NCVS equivalent.
- Ensuring that ISM Code SMS or NCVR/NCVS equivalent procedures stipulate that all oil spills are to be cleaned up immediately and ER oily bilges are washed down regularly, with the slop being pumped to the ER slop tank for MARPOL compliant disposal.

- Ensuring that ISM CODE SMS or NCVR/NCVS equivalent Planned Maintenance procedures include the requirement for the regular checking of all electric motors and all machinery bearings for any defects, along with the disconnection and clear labelling of any equipment found to be defective and unsafe to operate. All defects and repairs to be recorded in both the ER log book and as SMS non-conformities and close outs.
- Ensuring that all oily or paint covered rags or cotton waste are stored – for subsequent MARPOL compliant disposal – inside metal bins provided with tight fitting metal covers.

FIREFIGHTING EQUIPMENT AND MAINTENANCE

Ferry/Ro-Pax vessels subject to SOLAS Chapter II/2 compliance are required to carry an up to date Passenger Ship Safety Certificate which is supplemented by a Record of Equipment detailing every item of safety equipment required on board, inclusive of all firefighting equipment. Ferry/Ro-Pax vessels not subject to SOLAS will be required to carry similar certification issued under NCVR/NCVS regulations.

If fire prevention measures fail and a fire starts, the immediate requirement must be to extinguish the fire as quickly as possible. The ability to accomplish this emergency procedure successfully is dependent upon the instant readiness of the firefighting systems and equipment provided on board.

Members must therefore ensure full compliance with SOLAS or NCVR/NCVS regulations which require weekly/ monthly/annual and 5-year checks and tests by the vessel's designated Safety Officer, together with servicing by qualified technicians for fire extinguishers, fixed CO₂, water sprinkler, foam and deluge systems. Members are referred to IMO recommended Guidelines contained in:

MSC.1/Circ.1432 – REVISED GUIDELINES FOR THE MAINTENANCE AND INSPECTION OF FIRE PROTECTION SYSTEMS AND APPLIANCES

MSC.1/Circ.1516 – AMENDMENTS TO THE REVISED GUIDELINES FOR THE MAINTENANCE AND INSPECTION OF FIRE PROTECTION SYSTEMS AND APPLIANCES (MSC.1/CIRC.1432)

MSC.1/Circ.1318/Rev.1 – REVISED GUIDELINES FOR THE MAINTENANCE AND INSPECTIONS OF FIXED CARBON DIOXIDE FIRE-EXTINGUISHING SYSTEMS

NOTE 4: Internet research shows that numerous crew death accidents have occurred during CO2 control room inspection and maintenance processes. The most recent appears to have occurred on board the car carrier SANG SHIN on 21 Sept 2021. Three ER crew died and two were injured when a CO2 control room operating error was made during a system inspection and test. This resulted in the ER space being flooded with CO2, without any prior warning and crew evacuation of this area.

FERRY/RO-PAX FIRE FIGHTING TRAINING AND DRILLS

Successful firefighting also requires crew training and regular drills. All operational crew are required by the STCW Convention to complete an approved Basic Safety Training course which includes a one-day Fire Prevention and Firefighting element. All ship's officers holding a STCW Certificate of Competency (COC), or ratings who have designated firefighting duties, must also obtain an STCW (4 – 5-day) Advanced Training in Firefighting certificate. Members should ensure that all crew firefighting certificates comply, inclusive of the requisite STCW 5-yearly re-validation.

In order to optimise STCW firefighting training and optimise crew skills on board ferry/ro-pax vessels regular drills are essential. SOLAS or NCVR/NCVS regulations require that drills must be held monthly or when 25% or more of the crew are changed. SOLAS also provides that *'drills shall, as far as practicable, be conducted as if there were an actual emergency.'* As such, these drills should include:

- Vehicle space fires involving ship and vehicle electrical equipment, dry combustible material, flammable liquids and dangerous goods.
- Accommodation fires involving galleys, cabins, public spaces and storage areas.
- ER/Machinery space fires involving pressurised fuel leaks or other sources and rapid extinction using fixed CO2 or water mist systems.
- Mustering and control of passengers in readiness for early evacuation.
- Operation and closure of all fire doors.
- Radio communications testing with shore-based emergency services.

All fire drills should be recorded in the bridge log book and also entered into the vessel's official log by the Master. Any deficiencies in firefighting equipment or drill outcomes or procedures should be recorded as ISM Code or NCVR/NCVS SMS 'non-conformities' and rectification and 'close out' accomplished as a matter of priority.

CONCLUSION AND TAKEAWAY

There are a range of significant fire risks presented by the hazards which often exist within the vehicle/cargo decks, the accommodation areas and the engine rooms of ferries and ro-pax vessels. Regrettably, these risks are often ineffectively identified and controlled. In turn, this has led to a substantial number of ferry and ro-pax fires and vessel losses together with crew and passenger injuries and deaths.

MM encourages its Members to review the mandatory requirements of the firefighting equipment, fire drills and training regulations that apply to their vessels, as prescribed by SOLAS Chapter II/2 and the STCW Convention or equivalent NCVR/NCVS regulation. This review should be accomplished in conjunction with a careful reading of the IMO's associated MSC Circulars and recommendations, as referred to earlier in this Risk Bulletin. These recommendations have all been created and published by the IMO to augment and improve existing international and domestic ferry regulation and safety on a voluntary basis.

MM urges its Members to not only ensure full compliance with flag state minimum regulatory requirements and certification but to also voluntarily and prudently upgrade these requirements to the higher standards advised by the published IMO recommendations. These upgraded requirements should then be implemented by their incorporation into each ferry or ro-pax vessel's ISM Code or NCVR/NCVS equivalent SMS Manual and Procedures as well as into their approved Fire Plan and Firefighting Training Manual.

MM encourages all Members who operate ferries and ro-pax vessels to share and discuss this Risk Bulletin with their ship managers, their DPAs and their Masters.

FOOTNOTE

1. How to obtain the IMO Manila Statement

- Go to <https://webaccounts.imo.org/Common/WebLogin.aspx>
- Click on the 'Log in' link (small text at top right of page in the blue header area).
- Enter your login details OR if you do not already have a user account do the following:
 - Select 'Register' found under the Public Account heading and complete the registration process. You will shortly receive an email confirming your account has been created.
 - Return to the login URL provided above and log in.
- From your account page click on the 'IMODOCS Public Area' link (<https://docs.imo.org/>).
- Use the search box and enter **TC 65/INF.12** (exactly).
- The document titled TC 65/INF.12 –WORK OF OTHER BODIES AND ORGANISATIONS should now appear.
- Use the download button to download a copy of the document.