

THE IMO PASSENGER SHIP SAFETY INITIATIVE*

BACKGROUND

All too often, domestic and international shipping regulations are developed in reaction to a casualty to prevent a similar accident from reoccurring. The image of a large number of people in distress at sea is very unsettling and rightly results in a public demand for quick action. It should therefore be no surprise that the world's first international convention for addressing safety of life at sea – the SOLAS Convention** - was developed in response to the **Titanic** disaster in 1912.

Although many of the international passenger ship safety regulations in force today were developed in response to passenger vessel tragedies, ensuring that the international regulatory framework retains its relevance in light of technical advancements is a huge and complex undertaking and, contrary to public perception, much of this routine work is *proactive*.

The technological development over the past twenty-five years have effected all sectors of the shipping industry and have literally altered the fundamental nature of passenger shipping. This sector of the industry has witnessed phenomenal growth on all fronts – numbers of passengers, numbers of ships, new destinations and, perhaps most startlingly of all, in ship sizes and the types of amenities on board.

This phenomenal success is largely attributed to the economic growth in many parts of the world and the resulting capital investment in the building of new cruise ships with a trend toward building bigger, more sophisticated ships such as the **Queen Mary 2**. The benefits of the economies of scale have rendered cruises more affordable to the travelling public and contributed the boom in the cruise shipping industry.

It was against these unprecedented developments of the last decade that questions began being asked regarding the safety of these new gigantic cruise ships. In particular, how quickly could these mega-ships be evacuated in an emergency and whether search and rescue (SAR) services were capable of effectively rescuing thousands of persons from survival craft.

The direct recipients of these questions were initially the companies owning these large cruise ships and the States whose flag they flew, and generally they were companies and States with a remarkably high safety record. But increasingly, given its global mandate over safety and environmental protection, such questions began to be asked of the International Maritime Organization (IMO). Consequently, in May 2000, the entire IMO Membership, including the cruise industry, agreed to undertake a holistic consideration of safety issues pertaining to passenger ships, with particular emphasis on large cruise ships.

The outcome of this *proactive* initiative has resulted in an entirely new regulatory philosophy for the design, construction and operation of passenger ships that will better address the future needs of the passenger ship industry.

NEW INTERNATIONAL REGULATIONS ADOPTED BY IMO

From the outset, the Maritime Safety Committee (MSC), the IMO body responsible for the work to be undertaken, decided to establish a *ad hoc* Working Group on Passenger Ship Safety to facilitate the deliberations on the complex issues to be considered. To assist the group in its

* Views expressed in this article are those of the author and should not be construed as necessarily reflecting the views of IMO or its Secretariat.

** The term "SOLAS" refers to the International Convention for the Safety of Life at Sea, 1974.

deliberations, the MSC approved a guiding philosophy and strategic goals to provide unambiguous instructions on the objectives to be achieved.

The following guiding philosophy agreed to guide the group in its deliberations:

- The regulatory framework should place more emphasis on the prevention of a casualty from occurring in the first place.
- Future passenger ships should be designed for improved survivability so that, in the event of a casualty, persons can stay safely on board as the ship proceeds to port.
- The regulatory framework should permit alternative designs and arrangements in lieu of the prescriptive regulations provided that at least an equivalent level of safety is achieved.
- Passenger ships should be crewed, equipped and have arrangements to ensure the safety of persons on board for survival in the area of operation, taking into account climatic conditions and the availability of SAR functions.
- Passenger ships should be crewed and equipped to ensure the health-safety, medical care and security of persons on board until more specialized assistance is available.

The guiding philosophy formed the foundation of the group's work and primarily focused on improving the survivability of future passenger ships. Of course prevention is always the first goal in achieving any safety objective. Nevertheless, casualties will happen and mitigating the consequences is essential to saving lives. In this regard, the MSC agreed that the best way to avoid having thousands of persons in survival craft was to ensure that future passenger ships were robustly designed so that, after a casualty, the passengers and crew would normally be able to evacuate to a safe area on board as the ship proceeds back to port under its own power.

A more detailed explanation of the "casualty threshold", "safety return to port" and "safe area" concepts related to the guiding philosophy is discussed later in the article.

After six years of complex and extensive deliberations, the draft regulations and draft guidelines to supplement their application were adopted at MSC 82 in November 2006 in Istanbul, Turkey. Taking into account the five main pillars of the guiding philosophy (in bold), the following has been achieved:

- **Prevention:** Draft amendments to the Seafarers' Training, Certification and Watchkeeping (STCW) Code and supporting guidelines that focus on navigation safety and resource management were approved.
- **Improved survivability:** Draft amendments to SOLAS chapters II-1 and II-2 adopted and supporting guidelines on essential system redundancy, management of emergencies and casualty mitigation were approved.
- **Regulatory flexibility:** Draft amendments to SOLAS chapters II-1 and III were adopted and supporting guidelines to providing the methodology for the approval of new safety technologies and arrangements was approved.
- **Operations in areas remote from SAR facilities:** Action taken to develop amendments to SOLAS chapter III by 2012 to address the time it takes to recover persons from survival craft and the water. Guidelines were also approved on external support from SAR Authorities as well as guidance to assist seafarers taking part in SAR operations.

- **Health safety and medical care:** Supporting guidelines that focus on establishing medical safety programmes and a revised Guide on Cold Water Survival were approved.

It should be noted that the MSC did not develop the above mandatory and non-mandatory standards in isolation but relied on the expertise and work carried out by other expert bodies within IMO as well by the cruise industry.

The new SOLAS regulations are expected to enter into force on 1 July 2010 and apply to passenger ships having a length of 120 metres or more or three or more main vertical (fire) zones.

NEW PREVENTION MEASURES

The work associated with the new prevention measures focused on matters related to the human element such as operations, management and training. Existing training standards were modified and new guidance developed to support matters primarily related to navigation, resource management and training. To this end, the following prevention measures were approved and/or endorsed by the MSC:

- Guidelines on voyage planning for passenger ships in remote areas, for adoption by the IMO Assembly
- Amendments to the STCW Code on guidance on engine-room resource management
- Amendments to the STCW Code to provide additional guidance to administrations, shipping companies and training institutions regarding training of seafarers of large passenger ships in advanced fire-fighting and damage control
- Revision of the IMO model courses on crowd and crisis management to incorporate the “safe area” concept

IMPROVED SURVIVABILITY PROVISIONS

As previously mentioned, two new concepts related to “casualty thresholds” and “safe areas” were incorporated into the new SOLAS regulations. The new “casualty threshold” provisions specify the design criteria for the extent of damage future passenger ships must be able to withstand and still safely return to port under their own power. If this casualty threshold is exceeded (i.e., the damage is such that return to port under power is not possible), then the ship is to remain viable for a minimum of 3 hours to allow for safe and orderly abandonment.

During the development of the “safe return to port” criteria a number of questions began to surface, such as where the passengers and crew go during such a casualty bearing in mind that the fire and/or flooding may still be active (but contained) as the ship races to the nearest port, which could take more than a day to reach. To deal with the above concern the “safe area” concept was developed. The new “safe area” provisions establish that the persons on board the ship must be protected from hazards to life or health and provided with basic services. Essentially, a safe area is any space which is not flooded or any space outside the main vertical (fire) zone in which a fire has occurred. The basic services, which include such necessities as water, medical care, protection from weather, etc., must be available in the safe areas.

The MSC adopted new draft amendments to SOLAS chapters II-1 and II-2 and associated guidelines to support the above concepts. These new regulations focus on essential system redundancy, management of emergencies and casualty mitigation.

Safe return to port and time for evacuation

The new SOLAS regulation II-2/21 (Casualty threshold, safe return to port and safe areas) establishes the design criteria for a passenger ship's safe return to port under its own propulsion, which includes functional requirements and performance standards for "safe areas".

In the future, new passenger ship's will have to be designed to be capable of safely returning to port after fire or flooding damage that has render any one space or watertight compartment a complete loss (e.g., the main propulsion space, navigation bridge, etc.). To be deemed capable of returning to port, the following essential systems are to remain operational after the casualty:

- Propulsion
- Steering systems and steering-control systems
- Navigational systems
- Systems for fill, transfer and service of fuel oil
- Internal communication between the bridge, engineering spaces, safety centre, fire-fighting and damage control teams, and as required for passenger and crew notification and mustering
- External communication
- Fire main system
- Fixed fire-extinguishing systems
- Fire and smoke detection system
- Bilge and ballast system
- Power-operated watertight and semi-watertight doors
- Systems intended to support "safe areas" as indicated in paragraph 5.1.2;
- Flooding detection systems
- Other systems vital to damage control efforts

For the sake of simplicity, the new regulation essentially requires that all of the above systems must remain operational after the loss of any one space enclosed by "A" class boundaries (e.g., steel bulkheads, etc.). Therefore, for example, if the propulsion space is lost due to a fire, an alternative means of propulsion must still be available on board to bring the ship to the nearest port.

In order to meet the "safe area" requirements, the following basic services are to be available to ensure that the health of the passengers and crew is maintained as the ship proceeds to port:

- Sanitation
- Water
- Food
- Alternate space for medical care
- Shelter from the weather
- Means of preventing heat stress and hypothermia
- Light
- Ventilation

The design criteria for systems to remain operational for supporting the orderly evacuation and abandonment of a ship is based on the loss of one main vertical zone. Thus, if the return to port casualty threshold is exceeded, but the ship has not lost more than one main vertical (fire) zone, then the following essential systems are to remain operational:

- Fire main

- Internal communications (in support of fire-fighting as required for passenger and crew notification and evacuation)
- Means of external communications
- Bilge systems for removal of fire-fighting water
- Lighting along escape routes, at assembly stations and at embarkation stations of life-saving appliances
- Guidance systems for evacuation

Passenger ship designers will now have to design a ship's systems to be operational if any one main vertical zone is lost. A number of additional supporting regulations were adopted as part of this comprehensive package of amendments including, but not limited to, flooding detection systems and enhanced fire safety provisions.

SAFETY CENTRES ON PASSENGER SHIPS

To assist with the management of emergency situations, new regulations have been adopted to require safety centres on or adjacent to the navigation bridge. These new provisions were based on best cruise industry practices. The operation, control and monitoring of the following safety systems will be available from the safety centre:

- All powered ventilation systems
- Fire doors
- General emergency alarm system
- Public address system
- Electrically powered evacuation guidance systems
- Watertight and semi-watertight doors
- Indicators for shell doors, loading doors and other closing appliances
- Water leakage of inner/outer bow doors, stern doors and any other shell door
- Television surveillance system
- Fire detection and alarm system
- Fixed fire-fighting local application systems
- Sprinkler and equivalent systems
- Water-based systems for machinery spaces
- Alarm to summon the crew
- Atrium smoke extraction system
- Flooding detection systems
- Fire pumps and emergency fire pumps

REGULATORY FLEXIBILITY

From the very outset of this passenger ship safety initiative, the MSC was of the view that any future requirements should incorporate mechanisms to allow for the approval of new technologies and concepts in ship design, which was deemed essential for addressing future safety challenges. Examples of similar regulatory regimes include the philosophies used in the development of the revised SOLAS chapter II-2 (fire safety) and the revision of High-Speed Craft Code (2000). New "alternative design and arrangements" regulations and guidelines were developed to provide a methodology for approving designs that do not strictly meet the prescriptive requirements in SOLAS chapters II-1, II-2 and III, but still provide an equivalent to or greater level of safety than that required in the prescriptive requirements.

This new approach will require significantly more time in calculation, testing and documentation than a typical “prescriptive” design because of the increased engineering rigor required by the new regulations. The potential benefits include more design flexibility to address safety issues, cost effective designs for unique applications, promotion of the latest safety technologies and an improved knowledge of loss potential.

OPERATIONS IN AREAS REMOTE FROM SAR FACILITIES

One of the most difficult issues that had to be addressed as part of the passenger ship safety initiative were matters dealing with search and rescue. Rescuing a large number of persons at sea is difficult even under ideal conditions, not to mention the growing industry trend to take large passenger ships into remote areas with scarce shipping traffic and varying weather conditions.

From the outset, the MSC and the IMO Sub-Committee on Radiocommunications and Search and Rescue vigorously debated what constituted a “remote area of operation”. The basic consensus was that it depends on the number of people at risk, the capacity and capability of SAR facilities (additional SAR facilities in particular) and/or other assistance available, and the weather and sea conditions, which affect both survival times and recovery capability. It also depends on the effectiveness of possible mitigation strategies.

Therefore, the solution was multi-faceted and covered a wide range of issues. The work on this issue resulted in the approval of the following recommendations and guidelines by MSC 81:

- Voyage planning for passenger ships operating in remote areas
- Amendments to the IAMSAR Manual
- Guidance on recovery techniques
- External support provided to ships by SAR Authorities
- Contingency planning for ships operating in areas remote from SAR facilities
- Guidance on cold water survival
- Training of SAR service personnel

The work on this initiative has prompted the develop of standards to also address the some aspects of the safety of other types of ships. Bearing in mind that all ships are required to assist in SAR efforts, it only makes sense that such ships be appropriately equipment to recover people from survival craft. Therefore, in addition to the above guidance, the MSC agreed to develop mandatory performance standards for recovery systems for all types of ships. The new performance standards, once adopted, will require that all types of ships be equipped with an efficient means for rapidly recovering people from survival craft and safely transferring them to the ship.

This new work will be undertaken by the IMO Sub-Committee on Ship Design and Equipment with a view to preparing mandatory performance standards for implementation by 1 July 2012 for all types of new and existing ships.

HEALTH SAFETY AND MEDICAL CARE

Last, but not least, was the approval by the MSC of guidelines to address health safety programmes and a revised Guide on cold water survival, which had not been updated since 1992. The new medical safety guidelines provide for the establishment of medical and sanitation-related programmes for all passenger ships.

CONCLUSION

There is more consequential work that remains to be accomplished, not the least being the completion of the mandatory performance standards for recovery systems for all types of ships. However, it is safe to say that cruise ship passengers, and the passenger ship industry as a whole, are better served today than ever before. Whilst not allowing ourselves to indulge in any complacency, we can feel proud of the transformation of this vibrant sector of the shipping industry into a safer and cleaner one than ever before.