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PROCEDURE FOR ASSIGNING SRtP DESCRIPTIVE NOTE

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Section 1: Introduction

Regulations to increase the level of safety in passenger ships were introduced in SOLAS by MSC Resolution 216(82), entering into force on 1 July 2010. These requirements are related to the safe return to port for passenger ships and are goal-based in their design and as such open to much interpretation. In an attempt to limit interpretation, IMO developed MSC Circular 1369, entitled Interim Explanatory Notes for the Assessment of Passenger Ship Systems’ Capabilities after a Fire or Flooding Casualty.

However, it has been LR’s experience, following approval of the initial vessels built to comply with these requirements, that additional guidance in applying these requirements is required and shipyards and designers have requested more prescriptive requirements where possible.

The objective of this guidance is to:
- Illustrate the expected approval process.
- Detail core requirements at different stages.
- Identify high level documentation that should be developed and made available at each stage.
- Provide one possible solution to meet the goal-based requirements for each system.
- Indicate the level and type of testing required to demonstrate compliance.

It is encouraged that all stakeholders follow or take notice of the processes described within this document, in order to ensure that an implementation of these described requirements satisfies all the identified stakeholders.

This procedure is intended to assist in the design appraisal and survey of vessels which are required to comply with Safe Return to Port and Orderly Evacuation and be assigned the SRtP Descriptive Note.

As the application of these requirements may have a substantial impact on the ship’s design and intended operations, it is recommended that these requirements and guidelines be considered at the earliest stage of design.

In order that each stakeholder fully understands and appreciates their involvement in the approval, it is highly recommended that all requirements are discussed and agreed in a multipartite environment with Owner, shipyard, Classification Society and Flag throughout the development lifecycle.
This guidance can be used and applied on vessels which fall outside the regulatory requirements identified in Section 3. In these cases, the requirements and associated guidance should be applied in their entirety as if the vessels were required to comply with International Regulations.

Section 2: Descriptive Note

ShipRight SRtP

The ShipRight SRtP Descriptive Note will be assigned when a ship complies with the requirements of this procedure and Pt 5, Ch 23 of LR’s Rules and Regulations for the Classification of Ships (hereinafter referred to as the Rules for Ships). The Notation will be placed in Column 6 of the Register Book.

Requirements for application of the procedure are given in Section 3.

Section 3: Applicability

This procedure and the SRtP Descriptive Note are applicable to all passenger ships built on or after 1 July 2010 having:
- a length of 120 m or more; or
- three or more main vertical zones.

The following Rules and Regulations are applicable:
- SOLAS II-1 Regulation 8-1 and II-2 Regulations 21 & 22 (as amended).
- Pt 5, Ch 23 of LR’s Rules for Ships.

Consideration should also be given to:
- MSC.1/Circ. 1389 dated 22 June 2010 Interim Explanatory notes for the Assessment of Passenger Ship Systems’ Capabilities after a Fire or Flooding Casualty.
- IACS UR M69.

This is a voluntary descriptive note and will be assigned at the request of the constructing shipyard and/or vessel Owner. It is highly recommended that these guidelines be used for all projects where a vessel is required to comply with SRtP requirements.

Section 4: Goal-Based Guidance

Development stages

In order to ensure a vessel complies with the requirements of SOLAS II-1/8-1 and II-2/21 & 22, a systems-based approach involving expertise from Engineering, Electrotechnical and Passenger Ship Safety disciplines is strongly recommended.

For the successful application of these guidelines to be achieved, all key stakeholders, including the Flag Administration, Owners, Operators, designers, shipyard and Classification Societies, should be in agreement with regard to the requirements for each vessel and the process through which compliance will be demonstrated and verified.

In order to facilitate the successful application of these guidelines, the development lifecycle of the vessel is broken down into a number of key stages, with specific guidance provided at each stage.

A number of different inputs and activities will be required at each stage of the vessel’s development lifecycle.

Development stages are identified as:
- Specification.
- Design.
- Build.
- Commissioning/Test.
- In Service.

See Fig. 4.1.
4.2 Goal-based structure

It should be noted that, although SOLAS Regulations II-2/21 and 22 list 13 and six systems respectively that are required to remain operational after a casualty, a number of these systems require sub-systems to function or rely on a separate system to fulfill SRtP functionality.

This guidance proposes that a key focus of the design phase is to identify the systems which will be used to provide the required Safe Return to Port or Orderly Evacuation and Abandonment (SRtP or EA) functionality.

Additionally, the failure of non-essential systems is not to impair a vessel’s ability to return safely to port and this should be taken into account during the analysis, e.g., the failure of the vessel’s Emergency Shutdown System (ESD) may result in the loss of the ability to open and close fire dampers.

It is recommended that the shipyard agrees with the Owner as to how the required functions are implemented, and identifies the systems used to fulfill the required function.

As part of this guidance, minimum prescriptive requirements and/or performance requirements will be provided for each function necessary to support safe return to port under the ship’s own propulsion in the event of flooding or after a fire, and to support orderly evacuation and abandonment in the event of a fire. This guidance can be found in Appendix 1. The structure of this Section of the guidance will adhere to the following.

4.2.1 Goals
The vessel should incorporate safe engineering design such that the following is ensured:

- Availability of essential systems after a flooding casualty, according to SOLAS Regulation II-1/8-1;
- Availability of essential systems to support a ship’s safe return to port after a fire casualty, according to SOLAS Regulation II-2/21; and
- Availability of essential systems to support a ship’s evacuation and abandonment after a fire casualty, according to SOLAS Regulation II-2/22.

These goals are achieved through the process of determining the required functionality of the essential systems or functional areas. The functional requirements can be both prescriptive and performance-based and shall be agreed by the Owner and shipyard.

4.2.2 Functional areas
For the purpose of this guidance, the essential systems defined in SOLAS Regulations 21.4 and 22.3 are considered as functional areas. A functional area is a system or group of systems that provides the identified functionality. The Owner and shipyard should determine and agree the required capability of the vessel and identify the ship’s systems required to implement the required functionality.

4.2.3 Performance requirements
For each functional area, functional requirements will define the high level capability and performance required. Where possible, prescriptive requirements and/or performance requirements for each individual function will be defined.

4.2.4 Example solutions
The example solutions are proposed as one way to achieve the identified requirements and if another route is chosen, that will be considered.

4.2.5 Verification
Details activities that can be used to justify that the design meets the functional requirements stated. These activities are in addition to the Assessment of Required Ship Systems’ Capabilities required by MSC Circular 1369, Section 4.

See Fig. 4.2.

![Goal-based structure](image-url)
Personnel required to perform SRtP actions:

In order to return certain systems to working order following a casualty within the threshold, a number of defined manual actions may be required. Consideration should be given to the number of onboard personnel available to perform manual actions to restore systems, such that any manual actions identified can be completed within the required time of 1 hour.

5.1.3 Core requirements

Owners: Define operational profile of vessel.
Shipyard: Identify and define ship’s capability required to support Safe Return to Port and Orderly Evacuation and Abandonment (SRtP and EA) activities.
Class/Flag: Recommend early agreement and confirmation that the scope and criteria have been understood and agreed by all parties.

5.1.4 Deliverables

The following document should be delivered by the designer:
Ship’s Description Document.

5.2 Design

5.2.1 General

The design stage is the realisation of the proposed concept to which the systems will be developed for future implementation. LR’s guidance is goal and function-driven, such that the systems, required to meet the identified goals and fulfil the required function, should be identified and designed accordingly. In order to ensure the vessel holistically meets the required capability to support SRtP and EA activities, the interactions between these systems will need to be analysed.

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**Fig. 5.1 Specification activities**

- Define operational route for vessel
- Define level of service in Safe Areas
- Define number of personnel available for SRtP action
- Determine maximum SRtP Range
- Produce Ship’s Description Document
- Agree Ship’s Description Document
5.2.2 Identification of systems required

It should be noted that, although SOLAS Regulations II-2/21 and 22 list 13 and six systems respectively required to remain operational after a casualty, a number of these systems require additional sub-systems to function or rely on a separate system to fulfil SRtP functionality.

This guidance proposes that a key focus of the design phase is to clearly identify the systems and sub-systems which will be used to provide the required SRtP or EA functionality. It is recommended that the shipyard agrees with the Owner how the required functions are to be implemented and identifies the systems used to fulfil the required function.

Given the diverse range of vessels to which these functional requirements will be applicable, it is essential that they are tailored, defined and agreed by all key stakeholders on a project-by-project basis. It is recommended that the level of service appropriate for the vessel’s operating envelope and acceptable to the eventual ship Owner/Operator be taken into account. Specifically, the method by which functionality is implemented is to be agreed, whether this is by way of redundant systems, system at reduced capacity and, where appropriate, replaced with manual action following a casualty.

It is essential that the Owner and shipyard agree, and recommend with classification confirmation, the level of capability the vessel will provide and the method by which this capability is provided. Manual control of certain functions can be permitted, but the scope and amount of manual actions may be limited due to manning constraints. See Fig. 5.2(a) and Fig. 5.2(b).
5.3 Build and commissioning

5.3.1 General
The build and commissioning stage is the implementation of the SRtP design into a vessel that complies with the provisions set out. At this stage it is important to verify that the as-built arrangements and systems meet the design and verify that the required capability following a damage scenario is available.

In order to ensure the vessel as a whole meets the required capability to support SRtP and EA activities, the system will be required to be capability tested individually but also interactions between these systems will need to be demonstrated.

5.3.2 Inspection during construction and commissioning
Scope: Verification of strict consistency of systems as designed with onboard installation.
(a) Pipes of substantial thickness – verify locations and built in accordance with requirements.
(b) Fire-resistant cables – verify fitted as required and of the control type.
(c) Verification of location of individual components (e.g., pumps, valves, motors, fans, etc.,) and routing of connecting elements (pipes, cables).
(d) Confirmation that spaces required to be protected by fixed fire-fighting systems are consistent with scenario.

5.3.3 System capability testing
Scope: Verification of the ability of each essential system to provide capabilities in line with design criteria and performance characteristics stated in individual approved plans/analysis/documentation (this testing is carried out with no consideration being given to the interactions of a system with the other essential systems, which may be different in different casualty scenarios/cases, e.g., full availability, partial availability, no availability of relevant inputs).
(a) Testing to be completed during harbour acceptance trials and sea trials.
(b) Testing to demonstrate system remains operational in line with performance requirements under damage scenarios.

5.2.3 Failure of non-essential systems
Systems which on failure can prevent correct operation of the identified systems will require some additional analysis to ensure that the required level of functionality can be maintained. For example, these can include an ESD system which includes fire damper control. Continued functionality of the ESD system after a casualty is not required, but following a failure, if the fire dampers cannot be re-opened and left in a usable condition, the vessel is unlikely to operate correctly.

5.2.4 Essential information
Safe areas and the location from where navigation is to be performed following a casualty should be defined, agreed and documented.

Design Stage Core Requirements:
Owners Agree and define Owner preference in operating SRtP systems.
Shipyard 1. Agree and define systems and their associated capability.
2. Determine assessment route to demonstrate compliance.
3. Consider methods through which design will be implemented and verified during commissioning.
Class Agree system capability.

5.2.5 Deliverables
The following document should be delivered by the designer:
(a) List of essential systems and safe areas.
(b) System functional assessments.
(c) Overall assessment.
5.3.4 Scenario testing
Scope: Verification of the ability of all the essential systems to provide required capabilities in selected casualty scenarios, taking full account of interaction and dependencies between them:
(a) Tests can be performed alongside. However, certain scenarios will be required to be tested under sea-going conditions, as performance can only be properly verified during trials at sea (e.g., navigational systems, manoeuvrability).
(b) Purpose of testing is to demonstrate that the interactions and interdependences of systems operate correctly under damage scenarios, in addition to the system capability testing.
(c) Shipyards are to justify which scenario requires to be tested. Suggestions include:
   (i) Loss of a Main Vertical fire Zone (MVZ).
   (ii) Scenario that results in the highest number of manual actions.
   (iii) Scenario with the highest fire risk/load.
   (iv) Scenario with the greatest number of essential systems affected/degraded.

5.3.5 Essential information
The process through which the shipyards are to demonstrate the built vessel complies with the design criteria to be defined, agreed and documented.

5.3.6 Build and commissioning core requirements
Owners: Confirm installation in line with operational procedures.
Shipyard: 1. Provide inspection procedure.
        2. Complete system capability testing in line with inspection and testing plan.
        3. Complete scenario testing line with inspection and testing plan.
Class: Witness and survey system capability in accordance with developed inspection and testing plan.

5.3.7 Deliverables
The following documents should be delivered by the designer:
(a) Inspection Procedure.
(b) System Capability Test Plan.
(c) Scenario and Sea Trials Test Plan.

Section 6: Assessment Process
6.1 Fig. 6.1 illustrates what is required from a SRtP assessment submission.

A SRtP submission is actively to demonstrate the process through which the shipyard has designed the vessel under consideration to comply with the requirements.

In the first stage of the approval, the individual systems will be investigated to ensure that the required and allocated capability is met.

The second stage of the approval is to investigate that all systems survive the identified damage scenarios to ensure all systems can support the goals identified in 4.2.1.

It is recommended where possible that the functional assessments be combined with the normal class submissions to reduce the amount of approval required.
Section 7: Requirements

7.1 See Appendix 1 and Appendix 2 for the following:
Appendix 1 – Functional and Performance Requirements.

Section 8: References

1. MSC.1/Circ. 1369 dated 22 June 2010 Interim
Explanatory notes for the Assessment of Passenger
Ship Systems’ Capabilities after a Fire or Flooding
Casualty.
2. IACS UR M69.
Section 1: Introduction

Regulation

Safe Return to Port under ship’s own propulsion after a casualty that does not exceed the casualty threshold (SOLAS II-1/8-1 and II-2/21)

[SOLAS Ch II-2, Reg 21.2] The purpose of this Regulation is to establish design criteria for a ship’s safe return to port under its own propulsion after a casualty that does not exceed the casualty threshold stipulated in paragraph 3 and also provides functional requirements and performance standards for safe areas.

Goal

When fire damage does not exceed the casualty threshold, the ship shall be capable of returning to port while providing a safe area for passengers.

Functional Areas

To be deemed capable of returning to port, the following systems shall remain operational in the remaining part of the ship not affected by fire:

1. propulsion;
2. steering systems and steering control systems;
3. navigational systems;
4. systems for fill, transfer and service of fuel oil;
5. 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;
6. external communication;
7. fire main system;
8. fixed fire-extinguishing systems;
9. fire and smoke detection system;
10. bilge and ballast system;
11. power-operated watertight and semi-watertight doors;
12. systems intended to support ‘safe areas’;
13. flooding detection systems; and
14. other systems determined by the Administration to be vital to damage control efforts.
Appendix 1

Performance and Prescriptive Requirements

Orderly Evacuation and Abandonment of a ship after a casualty that exceeds the casualty threshold (SOLAS II-2/22)

■ Regulation

[SOLAS Ch II-2, Reg 21.2] The purpose of this Regulation is to provide design criteria for systems required to remain operational for supporting the orderly evacuation and abandonment of a ship, if the casualty threshold, as defined in Regulation 21.3, is exceeded.

■ Goal

In case any one main vertical zone is unserviceable due to fire, the ship’s systems are to remain available in all other main vertical zones, to allow the safe orderly evacuation and abandonment of the ship.

■ Functional Areas

To facilitate the orderly evacuation and abandonment the following systems shall be so arranged and segregated as to remain operational for three hours outside of the unserviceable main vertical zone:

1. fire main;
2. internal communication (in support of fire-fighting as required for passenger and crew notification and evacuation);
3. means of external communication;
4. bilge systems for removal of fire-fighting water;
5. lighting along escape routes, at assembly stations and at embarkation stations of life-saving appliances; and
6. guidance systems for evacuation shall be available.
Table 1  Safe Return to Port (see continuation)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Functional area</th>
<th>Functional requirements</th>
<th>Performance requirement or minimal prescriptive requirements</th>
<th>Example solutions</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Propulsion</td>
<td>Propulsion machinery and auxiliary machinery essential for the propulsion of the ship should remain operable. The auxiliary systems take into account the type of fuel used and associated support services. Where systems are run interconnected, consideration is to be given to restoration of undamaged service following isolation.</td>
<td>1. Sufficient propulsion power to be available to return the ship safely to port whilst maintaining a minimum speed of 6 knots while heading into Beaufort 8 weather and corresponding sea condition.</td>
<td>Redundant propulsion systems. At least: Two main engine driven shafts or Two propulsion motor driven shafts or Two pods. Services to be operable: Cooling water, Lubrication oil, Compressed air, Fuel oil, Feed water, steam and condensate.</td>
<td>Components, equipment and tanks for services are to be duplicated and located in separate spaces.</td>
</tr>
<tr>
<td>2</td>
<td>Steering systems and steering control systems</td>
<td>Steering systems and steering control systems should be capable of manoeuvring the ship following a casualty. or Steering systems and steering control systems sufficient to provide manoeuvring capability acceptable to the National Administration for return to port under its own propulsion.</td>
<td>1. Manoeuvring to be capable whilst maintaining a minimum speed of 6 knots while heading into Beaufort 8 weather and corresponding sea condition.</td>
<td>Two steering systems to be located in at least two spaces which are not located in the same casualty scenario. Local control of steering gear acceptable where communication with bridge is provided. Lighting to be available to allow correct operation. Electrical power to be separated and independent from two sources of electrical power. One should be the emergency switchboard (see Pt 6, Ch 2,3.2.7(e)).</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Navigational systems</td>
<td>Equipment essential for navigation, position fixing and detection of risk of collision should be available. The ship should be capable of displaying the proper light configuration in compliance with the International Regulations for Preventing Collisions at Sea in force.</td>
<td>Following facilities to be provided at a location outside of the fire casualty affecting the bridge: (a) Magnetic or gyro compass and bearing repeater (b) Receiver for global navigation satellite system (e.g., GPS) (c) 9 GHz radar with ECDIS (d) Whistle (e) Navigation lights (f) Means to determine ship’s course and speed* (g) Echo sounder or other means to measure and display available depth of water* (h) AIS* (i) Means to receive maritime safety information by the safety net service via Inmarsat* (k) A sheltered position having a view forward of the bow on either side of the ship at least to the extent required by SOLAS Ch V, Reg 22.1.5*</td>
<td>Duplicated and independent equipment. Where vessel’s route is fixed Item (g) can be omitted. Where access to shore-based weather information for short journeys, Item (j) can be omitted. Where a forward facing alternative position is not available, direct communication with a space referred to by Item (k) can be provided. Items marked with * are in excess of MSC.1/Circular 1369.</td>
<td></td>
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</tbody>
</table>
## Table 1 Safe Return to Port (continued)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Functional area</th>
<th>Functional requirements</th>
<th>Performance requirement or minimal prescriptive requirements</th>
<th>Example solutions</th>
<th>Verification</th>
</tr>
</thead>
</table>
| 4        | Systems for fill, transfer and service of fuel oil  | Systems for internal fill, transfer and service of fuel oil should be capable of fuel transfer to active propulsion and power generation equipment to satisfy goal 1 | 1. Sufficient capacity of fuel oil to be available in line with Item 1, paragraph 3  
2. Transfer services to be available to enable movement of fuel from bunker to settling tank to service tanks  
3. Additional supporting systems required: Air pipes and overflow system | Redundant fuel transfer system  
Where a non-redundant transfer system is fitted, tank gauging is to be available to ensure that each machinery space has sufficient fuel oil to enable the ship to return safely to port with regard to the maximum SRtP distance  
Manual tank gauging is acceptable |                     |
| 5        | Internal communication                               | Internal communication should be achieved by any effective portable or fixed means of communications | 1. Two-way communication to be available between control stations and locations where SRtP actions are implemented  
2. For portable systems, charging facilities are to be available in more than one MVZ  
3. Public Address System to remain operational in all MVZs not affected by the casualty  
Performance to meet SOLAS Ch III, Reg 6.5.2  
4. Sounding of General Alarm including sounding of ship’s whistle should remain operational in all MVZs not affected by the casualty  
Performance to meet SOLAS Ch III, Reg 6.4.2 | Following locations are examples and can include but not be limited to:  
Control stations:  
• Bridge/Backup Bridge  
• ECR  
• Safety Centre  
• Fire Control Station  
SRtP Locations:  
• Steering gear flat  
• Engineering spaces  
• Spaces where manual actions are required  
• Fire-fighting and damage control teams  
At least two amplifiers located in different MVZs  
Redundant connection to ship’s whistle or multiple whistles | Design, inspection and functional test |
| 6        | External communication                               | The ship should be capable of communicating via the GMDSS or the VHF Marine and Air Band distress frequencies even if the main GMDSS equipment is lost | 1. GMDSS or VHF Marine and Air Band distress service to be available outside of the MVZ containing the main system  
2. For portable systems, charging facilities are to be available in more than one MVZ | Duplicated GMDSS equipment located in different MVZs  
Main GMDSS and portable VHF Marine and Air Band radio located in different MVZs | Inspection |
| 7        | Fire main                                            | The fire main should remain operational in all main vertical zones not directly affected by the casualty. Water for fire-fighting purposes should be available to all areas of the ship | 1. Availability in all unaffected spaces to be maintained  
2. Sufficient fire pumps are to be provided and arranged to ensure water remains available in all unaffected spaces  
3. The minimum pressure available at hydrants in unaffected spaces following casualty should be as required by SOLAS Ch II-2 Reg 10.2.1.6 | Water supplied from unaffected MVZs may be used to provide coverage. Where used, two lengths of hose may be used from hydrants in the unaffected MVZ (instead of the one as required by SOLAS)  
Means of isolation should be provided in the system to separate affected areas  
Piping complying with interpretation 12 of MSC Circular 1369 may be accepted as surviving a fire casualty | Calculations |
## Table 1 Safe Return to Port (continued)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Functional area</th>
<th>Functional requirements</th>
<th>Performance requirement or minimal prescriptive requirements</th>
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</tr>
</thead>
</table>
| 8        | Fixed fire-extinguishing systems                    | The automatic sprinkler system or any other fixed fire-extinguishing system designed to protect an entire space should be operational in all spaces not directly affected by the casualty | 1. Means of water and pressure supply to be provided and located to ensure water remains available in all unaffected spaces | Redundancy in terms of water supply and pumping will be required:  
- Sea-water connection  
- Connection to other fire-fighting systems or tank storage capacity  
- Tanks  
- Sea-water inlet  
- Pump unit |              |
| 9        | Fire and smoke detection                           | The fire detection system should remain operational in all spaces not directly affected by the casualty | Availability in all unaffected spaces to be maintained. Coverage of spaces on the same deck which are on the same section as that covering a space involved in a casualty can be lost | Multiple fire detection panels located in different MVZ required which can operate on failure of one panel |              |
| 10       | Bilge and ballast                                   | The bilge pumping systems and all associated equipment essential for its operation should be available in all spaces not directly affected by the casualty | 1. Availability in all unaffected spaces to be maintained  
2. Sufficient pumps are to be provided and arranged to ensure pumping remains available in all unaffected spaces and ensure isolated sections are still serviced by working pumps | Means of isolation should be provided in the system to separate affected areas  
Piping complying with interpretation 12 may be accepted as surviving a fire casualty |              |
| 11       | Power-operated watertight and semi-watertight doors | Operation                                                                               | 1. A casualty or failure is not to result in a watertight door changing position  
2. Local control shall remain available for all doors except those on the boundary of the spaces containing the casualty  
3. Remote indication to show whether each door is open or closed should be provided for any fire casualty not exceeding the casualty threshold except for those doors in the boundary of spaces directly affected by the casualty |              |              |
<p>| 12       | Systems intended to support “safe areas” as per MSC.1/Circular 1369 |                                                                                         |                                                               |                                                                                    |              |
| 13       | Flooding detection systems                          | The flooding detection system should remain operational after a casualty                  | Availability in all unaffected spaces to be maintained         |                                                                                    |              |
| 14       | Other systems determined by the Administration to be vital to damage control efforts | Where in the case of a casualty within the threshold system, availability is ensured by a separate system, this system is to meet the same requirements as per the primary system | Those applicable to primary system |                                                                                    |              |</p>
<table>
<thead>
<tr>
<th>Item No.</th>
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</thead>
<tbody>
<tr>
<td>15</td>
<td>Electrical power</td>
<td>Generation</td>
<td>1. Electrical generation to be arranged and located such that sufficient electrical power is available following loss of a space to allow the vessel to return safely to port whilst maintaining all the required services&lt;br&gt;2. Electrical generation to be arranged and located such that sufficient electrical power is available following loss of a MVZ to allow orderly evacuation and abandonment</td>
<td>Redundant power generation&lt;br&gt;Emergency source of electrical power can be used to supply services in addition to those required by SOLAS</td>
<td>Load balance to be submitted to demonstrate sufficient power available in different failure conditions for: SRtP&lt;br&gt;Evacuation</td>
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<td></td>
<td>Distribution</td>
<td>3. Electrical distribution to be arranged such that loss of a space will not affect the supply of electrical power to required service to support safe return port&lt;br&gt;4. Electrical distribution to be arranged such that loss of a MVZ will not affect the supply of electrical power to required services to orderly evacuation and abandonment</td>
<td>Fire-resistant cables complying with standards IEC 60331-1 and IEC 60331-2 (see also IACS UR E15) passing through (not serving) spaces may be considered to remain operational after a fire casualty provided they have no connections, joints and equipment connected to them, etc., within the space affected by the casualty&lt;br&gt;Cables complying with IEC 60092-359 passing through (not serving) spaces may be considered to remain operational after a flooding casualty provided they have no connections, joints and equipment connected to them, etc., within the space affected by the casualty&lt;br&gt;Cables should be either:&lt;br&gt;- Mechanically protected from direct fire-fighting&lt;br&gt;- Enclosed in ducting&lt;br&gt;- Built in accordance with EN</td>
<td>Routing inspection of non fire-resistant cables to confirm that a casualty will affect multiple distributions</td>
</tr>
<tr>
<td>16</td>
<td>Fire Safety</td>
<td>Fire safety stops</td>
<td>1. Systems provided to limit fire growth by stopping flammable liquid supply to spaces are to remain available for the operational machinery spaces following a casualty&lt;br&gt;2. Failure or loss of systems provided to limit fire growth by stopping ventilation fans is not to result in the loss of ability to operate essential machinery to allow the vessel to return safely to port</td>
<td>Fire-resistant cables</td>
<td></td>
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<td></td>
<td>3. Casualty is not to result in the loss of ability to re-open fire dampers for the safe return to port following loss of control and/or power failure</td>
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</table>

Table 1 | Safe return to port (continued)
## Table 1  Safe Return to Port (conclusion)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Functional area</th>
<th>Functional requirements</th>
<th>Performance requirement or minimal prescriptive requirements</th>
<th>Example solutions</th>
<th>Verification</th>
</tr>
</thead>
</table>
| 17       | Lighting                 | Safe areas                       | 1. Sufficient lighting to be available in the safe areas not affected by the casualty  
2. Portable rechargeable battery-operated lighting acceptable. Charging capability to be available in each safe area |                                                                                    |              |
|          | Machinery spaces         |                                  | 3. Fixed lighting to remain available in all machinery spaces required to be entered whilst the vessel returns safely to port |                                                                                    |              |
|          | Locations requiring manual actions |                               | 4. Sufficient lighting to be available to allow safe entry to and passage through spaces, other than machinery spaces, which contain equipment which involves a manual action following a casualty |                                                                                    |              |
|          | Along escape routes at assembly stations and at embarkation stations of life-saving appliances |                               | 5. Availability in all unaffected spaces to be maintained following loss of a MVZ                                                |                                                                                    |              |
| 18       | Guidance systems for evacuation | Internal communication           | 1. Meet requirements of Item 5 following loss of a MVZ                                                                         |                                                                                    |              |
|          |                          | Marking of escape route           | 2. For lighting, see Item 17 Where lighting is used, to be available following loss of a MVZ  
3. Marking to comply with SOLAS Ch II-2, Reg 13.3.2.5 |                                                                                    |              |
Testing

Testing is to be undertaken to verify the implementation of the design and to demonstrate the required level of system capability. The tables in this appendix detail the level of system capability testing that is required and provide an indication whether the testing can be completed alongside during harbour acceptance testing (HAT) or during sea trial acceptance testing (SAT).

Functional Areas

To be deemed capable of returning to port, the following systems shall remain operational in the remaining part of the ship not affected by fire:

1. propulsion;
2. steering systems and steering control systems;
3. navigational systems;
4. systems for fill, transfer and service of fuel oil;
5. 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;
6. external communication;
7. fire main system;
8. fixed fire-extinguishing systems;
9. fire and smoke detection system;
10. bilge and ballast system;
11. power-operated watertight and semi-watertight doors;
12. systems intended to support ‘safe areas’;
13. flooding detection systems; and
14. other systems determined by the Administration to be vital to damage control efforts.

Regulation

Safe return to port under ship’s own propulsion after a casualty that does not exceed the casualty threshold (SOLAS II-1/8-1 and II-2/21)

[SOLAS Ch II-2, Reg 21.2] The purpose of this Regulation is to establish design criteria for a ship’s safe return to port under its own propulsion after a casualty that does not exceed the casualty threshold stipulated in paragraph 3 and also provides functional requirements and performance standards for safe areas.

Goal

When fire damage does not exceed the casualty threshold, the ship shall be capable of returning to port while providing a safe area for passengers.
System Capability Testing

Orderly Evacuation and Abandonment of a ship after a casualty that exceeds the casualty threshold (SOLAS II-2/22)

■ Regulation

[SOLAS Ch II-2, Reg 21.2] The purpose of this Regulation is to provide design criteria for systems required to remain operational for supporting the orderly evacuation and abandonment of a ship, if the casualty threshold, as defined in Regulation 21.3, is exceeded.

■ Goal

In case any one main vertical zone is unserviceable due to fire, the ship’s systems are to remain available in all other main vertical zones, to allow the safe orderly evacuation and abandonment of the ship.

■ Functional Areas

To facilitate the orderly evacuation and abandonment the following systems shall be so arranged and segregated as to remain operational for three hours outside of the unserviceable main vertical zone:

1. fire main;
2. internal communication (in support of fire-fighting as required for passenger and crew notification and evacuation);
3. means of external communication;
4. bilge systems for removal of fire-fighting water;
5. lighting along escape routes, at assembly stations and at embarkation stations of life-saving appliances; and
6. guidance systems for evacuation shall be available.
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Functional area</th>
<th>Functional requirements</th>
<th>Performance requirement or minimal prescriptive requirements</th>
<th>Verification/testing requirements</th>
<th>HAT/SAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Propulsion</td>
<td>Propulsion machinery and auxiliary machinery essential for the propulsion of the ship should remain operable. The auxiliary systems take into account the type of fuel used and associated support services. Where systems are run interconnected, consideration is to be given to the restoration of undamaged service following isolation.</td>
<td>1. Sufficient propulsion power to be available to return the ship safely to port whilst maintaining a minimum speed of 6 knots while heading into Beaufort 8 weather and corresponding sea condition 2. Maximum SRtP distance to be defined 3. Fuel storage to be sized based on the defined operational condition of running machinery required to satisfy the SRtP distance under the conditions described in Item 1.1 as above whilst maintaining the electrical load required by Item 15</td>
<td>1. Propulsion performance following a casualty is to be as designed and is to be verified to meet at least the performance requirement under sea-going conditions 2. Correct operation of auxiliary systems essential for the continued operation of the propulsion system is to be verified</td>
<td>SAT</td>
</tr>
<tr>
<td>2</td>
<td>Steering systems and steering control system</td>
<td>Steering systems and steering control systems should be capable of manoeuvring the ship following a casualty or Steering systems and steering control systems sufficient to provide manoeuvring capability acceptable to the National Administration for return to port under its own propulsion.</td>
<td>1. Manoeuvring to be capable whilst maintaining a minimum speed of 6 knots while heading into Beaufort 8 weather and corresponding sea condition</td>
<td>1. Steering performance following a casualty is to be as designed and is to be verified to meet at least the performance requirement under sea-going conditions</td>
<td>SAT</td>
</tr>
<tr>
<td>3</td>
<td>Navigational systems</td>
<td>Equipment essential for navigation, position fixing and detection of risk of collision should be available. The ship should be capable of displaying the proper light configuration in compliance with the International Regulations for Preventing Collisions at Sea in force. Following facilities to be provided at a location outside of the fire casualty affecting the bridge: (a) Magnetic or gyro compass and bearing repeater (b) Receiver for global navigation satellite system (e.g., GPS) (c) 9 GHz radar with ECDIS (d) Whistle (e) Means to determine ship’s course and speed (f) Echo sounder or other means to measure and display available depth of water (g) AIS (h) Means to receive maritime safety information by the safety net service via Inmarsat (i) A sheltered position having a view forward of the bow on either side of the ship at least to the extent required by SOLAS Ch V, Reg 22.1.5 (k) Navigation lights</td>
<td>1. The vessel can be safely navigated and manoeuvred from a secondary control position following a fire casualty affecting the navigating bridge area</td>
<td></td>
<td>SAT</td>
</tr>
</tbody>
</table>
## Table 1  Safe Return to Port System Capability Testing (continued)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Functional area</th>
<th>Functional requirements</th>
<th>Performance requirement or minimal prescriptive requirements</th>
<th>Verification/testing requirements</th>
<th>HAT/SAT</th>
</tr>
</thead>
</table>
| 4        | Systems for fill, transfer and service of fuel oil | Systems for internal fill, transfer and service of fuel oil should be capable of fuel transfer to active propulsion and power generation equipment to satisfy goal 1 | 1. Sufficient capacity of fuel oil to be available in line with Item 1, paragraph 3  
2. Transfer services to be available to enable movement of fuel from bunker to settling tank to service tanks  
3. Additional supporting systems required: Air pipes and overflow system | 1. Fuel oil and transfer services support the performance requirements of 1 and 2  
2. Manual tank gauging possible (where required) | HAT/SAT |
| 5        | Internal communication | Internal communication should be achieved by any effective portable or fixed means of communication | 1. Two-way communication to be available between control stations and locations where SRtP actions are implemented  
2. For portable systems, charging facilities are to be available in more than one MVZ | 1. Internal communication systems are to support effective propulsion, steering and navigation following a fire or flooding casualty  
2. Internal communication to be available at all locations requiring manual actions  
3. Internal communication to be available to support firefighting and evacuation following loss of a MVZ  
4. System testing is to include the loss of one base station/amplifier  
5. Where fitted, UHF communication devices are to support effective management of damage scenarios to meet at least the performance requirement following a casualty | HAT |
|          |                 |                         | 3. Public Address System to remain operational in all MVZs not affected by the casualty Performance to meet SOLAS Ch III, Reg 6.5.2  
4. Sounding of General Alarm including sounding of ship’s whistle should remain operational in all MVZs not affected by the casualty Performance to meet SOLAS Ch III, Reg 6.4.2 | 6. The Public Address System is to provide sufficient coverage following a casualty. Performance testing is to include loss of any one amplifier unit  
7. The General Alarm System, including ship’s whistle, is to remain operational following a casualty. Performance testing is to include loss of any one amplifier unit and/or sound generating unit | SAT |
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Functional area</th>
<th>Functional requirements</th>
<th>Performance requirement or minimal prescriptive requirements</th>
<th>Verification/testing requirements</th>
<th>HAT/SAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>External</td>
<td>The ship should be</td>
<td>1. GMDSS or VHF Marine and Air Band distress service to be</td>
<td>1. External communication</td>
<td>SAT</td>
</tr>
<tr>
<td></td>
<td>communication</td>
<td>capable of communicating</td>
<td>available outside of the MVZ containing the main system</td>
<td>may be achieved through either</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>via the GMDSS or the</td>
<td>2. For portable systems, charging facilities are to be</td>
<td>fixed or portable means</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>VHF Marine and Air</td>
<td>available in more than one MVZ</td>
<td>2. External communication</td>
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<td></td>
<td></td>
<td>Band distress services</td>
<td></td>
<td>provided is effective following</td>
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<td></td>
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<td>capable of Air Band</td>
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<td>a casualty</td>
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<td></td>
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<td>distress frequencies</td>
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<td>3. Availability of electrical</td>
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<td></td>
<td></td>
<td>even if the main GMDSS</td>
<td></td>
<td>power for charging facilities</td>
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<td></td>
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<td>equipment is lost</td>
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<td>following loss of navigating</td>
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<td>bridge to be confirmed</td>
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<td>4. External communication</td>
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<td>to be available to support</td>
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<td>evacuation following loss of</td>
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<td>a MVZ</td>
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<tr>
<td>7</td>
<td>Fire main</td>
<td>The fire main should</td>
<td>1. Availability in all unaffected spaces to be maintained</td>
<td>1. Water is to be available at</td>
<td>HAT</td>
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<td></td>
<td></td>
<td>remain operational in</td>
<td>2. Sufficient fire pumps are to be provided and arranged</td>
<td>hydrants located in MVZs other</td>
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<td>all main vertical zones</td>
<td>to ensure water remains available in all unaffected</td>
<td>than those containing spaces</td>
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<td>not directly affected by</td>
<td>spaces</td>
<td>affected by the casualty</td>
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<td>the casualty</td>
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<td>2. Water is to be available at</td>
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<td>Water for fire-fighting</td>
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<td>locations of additional fire</td>
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<td>purposes should be</td>
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<td>hoses, if provided</td>
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<td>available to all areas</td>
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<td>3. Water is to be available at</td>
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<td>of the ship</td>
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<td>hydrants located outside of the</td>
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<td>MVZ following the loss of a</td>
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<td>MVZ</td>
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<td>4. Performance following</td>
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<td>closure of isolation valves to</td>
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<td>be verified</td>
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<td>5. Manual actions to restore</td>
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<td>fire main and power supply to</td>
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<td>pumps following all relevant</td>
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<td>scenarios or groups of</td>
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<td>scenarios to be verified</td>
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<tr>
<td>8</td>
<td>Fixed fire</td>
<td>The automatic sprinkler</td>
<td>1. Means of water and pressure supply to be provided and</td>
<td>1. Coverage in all spaces other</td>
<td>HAT</td>
</tr>
<tr>
<td></td>
<td>extinguishing</td>
<td>system or any other</td>
<td>located to ensure water remains available in all</td>
<td>than those affected by the</td>
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<td></td>
<td>systems</td>
<td>fixed fire-extinguishing</td>
<td>unaffected spaces</td>
<td>casualty to be verified</td>
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<td></td>
<td></td>
<td>system designed to</td>
<td></td>
<td>2. Performance following</td>
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<td></td>
<td>protect an entire space</td>
<td></td>
<td>closure of isolation valves to</td>
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<td>should be operational in</td>
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<td>be verified</td>
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<td>all spaces not directly</td>
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<td>3. Verified that pumps and</td>
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<td></td>
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<td>affected by the casualty</td>
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<td>remotely controlled valves (if</td>
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<td>fitted) operate following a</td>
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<td>casualty</td>
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<td>4. Protection of shaft lines (if</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>fitted) and valves to be verified</td>
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</tr>
<tr>
<td>9</td>
<td>Fire and smoke</td>
<td>The fire detection</td>
<td>Availability in all unaffected spaces to be maintained</td>
<td>1. Coverage in all spaces other</td>
<td>HAT</td>
</tr>
<tr>
<td></td>
<td>detection</td>
<td>system should remain</td>
<td>Coverage of spaces on the same deck which are on the</td>
<td>than those affected by the</td>
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<td></td>
<td></td>
<td>operational in all spaces</td>
<td>same section as that covering a space involved in a</td>
<td>casualty to be verified</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>not directly affected by</td>
<td>casualty can be lost</td>
<td>2. Indications available at a</td>
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<tr>
<td></td>
<td></td>
<td>the casualty</td>
<td></td>
<td>control position following a</td>
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<td>casualty to be verified</td>
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<td>3. Correct operation following</td>
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<td>loss of one control panel to</td>
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<td>be verified</td>
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</tr>
</tbody>
</table>
## Table 1  Safe Return to Port System Capability Testing (continued)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Functional area</th>
<th>Functional requirements</th>
<th>Performance requirement or minimal prescriptive requirements</th>
<th>Verification/testing requirements</th>
<th>HAT/SAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Bilge and ballast systems and all associated equipment essential for its operation should be available in all spaces not directly affected by the casualty</td>
<td>The bilge pumping systems and all associated equipment essential for its operation should be available in all spaces not directly affected by the casualty</td>
<td>Bilge: 1. Availability in all unaffected spaces to be maintained 2. Sufficient pumps are to be provided and arranged to ensure pumping remains available in all unaffected spaces and ensure isolated sections are still serviced by working pumps</td>
<td>1. Manual isolation and remaining isolated sections remain operational 2. Sufficient pumps remain available in unaffected spaces of the ship 3. Functionality of bilge level detection outside spaces affected by a casualty to be verified 4. Bilge system to remain available in all other MVZs following loss of one MVZ</td>
<td>HAT</td>
</tr>
<tr>
<td>11</td>
<td>Power-operated watertight and semi-watertight doors</td>
<td>Operation</td>
<td>1. A casualty or failure is not to result in a watertight door changing position 2. Local control shall remain available for all doors except those on the boundary of the spaces containing a fire casualty 3. Local control shall remain available for all doors including those on the boundary of the spaces containing a flooding casualty for 30 minutes</td>
<td>1. Indication remains available at Navigating Bridge/Safety Centre or alternative location 2. Local control remains available following loss of main and emergency means of power (hydraulic or electric)</td>
<td>HAT</td>
</tr>
<tr>
<td>12</td>
<td>Systems intended to support ‘safe areas’ as per MSC.1/Circular 1369</td>
<td>4. Remote indication to show whether each door is open or closed should be provided for any fire casualty not exceeding the casualty threshold except for those doors in the boundary of spaces directly affected by the casualty 5. Remote indication to show whether each door is open or closed should be provided for any flooding casualty not exceeding the casualty threshold</td>
<td>1. Provisions in terms of ventilation, and HVAC (if applicable) 2. Water – Availability and access from safe areas 3. Food – Availability and access from safe areas 4. Toilets – Availability and access from safe areas</td>
<td>HAT</td>
<td></td>
</tr>
<tr>
<td>Item No.</td>
<td>Functional area</td>
<td>Functional requirements</td>
<td>Performance requirement or minimal prescriptive requirements</td>
<td>Verification/testing requirements</td>
<td>HAT/SAT</td>
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</tr>
<tr>
<td>13</td>
<td>Flooding detection systems</td>
<td>The flooding detection system should remain operational after a casualty</td>
<td>Availability in all unaffected spaces to be maintained</td>
<td>1. Detection available following loss of spaces 2. Indication remains available at Navigating Bridge/Safety Centre or alternative location</td>
<td>HAT</td>
</tr>
<tr>
<td>14</td>
<td>Other systems determined by the Administration to be vital to damage control efforts</td>
<td>Where in the case of a casualty within the threshold system availability is ensured by a separate system, this system is to meet the same requirements as per the primary system</td>
<td>Those applicable to primary system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Electrical power</td>
<td>Generation</td>
<td>1. Electrical generation to be arranged and located such that sufficient electrical power is available following loss of a space to allow the vessel to return safely to port whilst maintaining all the required services 2. Electrical generation to be arranged and located such that sufficient electrical power is available following loss of a MVZ to allow orderly evacuation and abandonment</td>
<td>1. Electrical power to support all required services following loss of space within casualty threshold 2. Electrical power to support all required services following loss of a MVZ</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Distribution</td>
<td></td>
<td>1. Electrical distribution to be arranged such that loss of a space will not affect the supply of electrical power to required service to support safe return to port 2. Electrical distribution to be arranged such that loss of a MVZ will not affect the supply of electrical power to required service to orderly evacuation and abandonment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Fire safety systems</td>
<td>Fire safety stops</td>
<td>1. Systems provided to limit fire growth by stopping flammable liquid supply to spaces are to remain available for the operational machinery spaces following a casualty 2. Failure or loss of systems provided to limit fire growth by stopping ventilation fans is not to result in the loss of ability to operate essential machinery to allow the vessel to return to port safely</td>
<td>1. Verify that failure of fire safety stops, including loss of power, does not prevent the restarting of essential systems required for SRiP</td>
<td>HAT</td>
</tr>
<tr>
<td></td>
<td>Fire dampers</td>
<td></td>
<td>3. Casualty is not to result in the loss of ability to re-open fire dampers for the safe return to port following loss of control and/or power failure</td>
<td>2. Verify that failure of fire dampers, including loss of power, does not prevent the restarting of essential systems required for SRiP</td>
<td>HAT</td>
</tr>
</tbody>
</table>
## Table 1 Safe Return to Port System Capability Testing (conclusion)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Functional area</th>
<th>Functional requirements</th>
<th>Performance requirement or minimal prescriptive requirements</th>
<th>Verification/testing requirements</th>
<th>HAT/SAT</th>
</tr>
</thead>
</table>
| 17       | Lighting       | Safe areas              | 1. Sufficient lighting to be available in the safe areas not affected by the casualty  
2. Portable rechargeable battery-operated lighting acceptable. Charging capability to be available in each safe area | 1. Lighting availability at prescribed locations following a fire or flooding casualty is to be verified  
2. Availability of electrical power for charging facilities following loss of navigating bridge to be confirmed | HAT     |
|          |                | Machinery spaces        | 3. Fixed lighting to remain available in all machinery spaces required to be entered whilst the vessel returns safely to port | Lighting availability at prescribed locations following a fire or flooding casualty is to be verified | HAT     |
|          |                | Locations requiring manual actions | 4. Sufficient lighting to be available to allow safe entry to and passage through spaces, other than machinery spaces, which contain equipment which involves a manual action following a casualty | Lighting availability at prescribed locations following a fire or flooding casualty is to be verified | HAT     |
|          |                | Along escape routes at assembly stations and at embarkation stations of life-saving appliances | 5. Availability in all unaffected spaces to be maintained following loss of a MVZ | Lighting availability at prescribed locations following loss of a MVZ is to be verified | HAT     |
| 18       | Guidance systems for evacuation | Internal communication | 1. Meet requirements of Item 5 following loss of a MVZ | | |
|          |                | Marking of escape route  | 2. For lighting, see Item 17  
Where lighting is used, to be available following loss of a MVZ  
3. Marking to comply with SOLAS Ch II-2, Reg 13.3.2.5 | Escape routes to be clearly visible following the loss of a MVZ | HAT     |
INTERIM EXPLANATORY NOTES FOR THE ASSESSMENT OF PASSENGER SHIP SYSTEMS' CAPABILITIES AFTER A FIRE OR FLOODING CASUALTY

1 The Maritime Safety Committee, at its eighty-seventh session (12 to 21 May 2010), having considered the proposal by the Sub-Committee on Fire Protection, at its fifty-fourth session, approved the Interim Explanatory Notes for the assessment of passenger ship systems' capabilities after a fire or flooding casualty, set out in the annex, to provide additional guidance for the uniform implementation of SOLAS regulations II-1/8-1, II-2/21 and II-2/22, which were adopted by resolution MSC.216(82) and are due to enter into force on 1 July 2010.

2 Member Governments are invited to bring the annexed Interim Explanatory Notes to the attention of passenger shipowners, ship builders, ship designers and other parties concerned.

3 This circular revokes circular MSC.1/Circ.1214.

***
ANNEX

INTERIM EXPLANATORY NOTES FOR THE ASSESSMENT OF PASSENGER SHIP SYSTEMS CAPABILITIES AFTER A FIRE OR FLOODING CASUALTY

INTRODUCTION

The requirements relevant to the safe return to port for passenger ships, as contained in resolution MSC.216(82), entering into force on 1 July 2010, have been shown to be challenging.

These Interim Explanatory Notes have been developed in the light of the experience gained so far in the early application of the aforementioned requirements, taking into account the guidance contained in the Performance standards for the systems and services to remain operational on passenger ships for safe return to port and orderly evacuation and abandonment after a casualty (MSC.1/Circ.1214).

1 GENERAL

1.1 These Interim Explanatory Notes are intended to outline the process of verification and of approval of a ship's design by the Administration, as well as describing the necessary documentation required, when requirements relevant to safe return to port (regulations II-1/8-1, II-2/21 and 22 of the 1974 SOLAS Convention, as amended) are applied.

1.2 These Interim Explanatory Notes are also intended to support safe engineering design with guidance on all three scenarios to be considered in the light of the above mentioned regulations:

1. availability of essential systems after a flooding casualty, according to SOLAS regulation II-1/8-1;

2. availability of essential systems to support a ship's safe return to port after a fire casualty, according to SOLAS regulation II-2/21; and

3. availability of essential systems to support a ship's evacuation and abandonment after a fire casualty, according to SOLAS regulation II-2/22.

In light of the above, general and specific interpretations to regulations II-2/21 and 22 of the 1974 SOLAS Convention, as amended are given in appendix 1.

1.3 The outcome of these assessments should confirm that the ship is designed and constructed to provide the capabilities required by SOLAS regulations II-1/8-1, II-2/21 and 22.

1.4 Within these Interim Explanatory Notes a system-based approach is primarily intended to be performed. Where a system approach will outline potential weaknesses, a compartment or space-by-space based approach may also be applied. In the latter case, part of or all the spaces subject to individual consideration may be subject to operational restrictions on access, use and installations as one element of the overall system of protection. All such spaces and their restrictions should be identified on drawings or in manuals as appropriate (see paragraphs 7.3 and 7.4). For the application of these Interim Explanatory Notes to be successful, all relevant parties, including the Administration or its designated representative, owners, operators, designers and classification societies, should be in continuous communication from the onset of a specific proposal to utilize these Interim Explanatory Notes.
1.5 A pre-requisite and starting point for this assessment is that the owner of the ship has defined the operating pattern or patterns of the ship (for instance, worldwide liner/cruise ship or point-to-point ferry operations, maximum number of passengers and crew for required routes, foreseeable area of operation and routes, etc.). The capabilities that will be needed to be built into the ship will depend on the above.

1.6 The Administration may (as per SOLAS regulation II-2/21.4.14) determine any system to remain operational after a casualty in addition to those identified.

2 DEFINITIONS

For the purpose of these Interim Explanatory Notes, the following definitions apply:

2.1 Passenger ship systems' capabilities after a fire or flooding casualty (short: ship systems' capabilities) are those required for passenger ships according to SOLAS regulations II-1/8-1, II-2/21 and II-2/22. The ship systems' capabilities are addressing:
   .1 availability of essential systems after a flooding casualty, according to SOLAS regulation II-1/8-1;
   .2 availability of essential systems to support a ship's safe return to port under its own propulsion after a fire casualty, according to SOLAS regulation II-2/21.4 (including functional requirements for safe areas according to SOLAS regulation II-2/21.5); and
   .3 availability of essential systems to support a ship's evacuation and abandonment after a fire casualty, according to SOLAS regulation II-2/22.

2.2 Passenger ship systems' design (short: ship systems' design) is a design description of systems intended to be installed, including all essential information showing how to achieve the ship systems' capabilities after a fire or flooding casualty according to SOLAS regulations II-1/8-1, II-2/21 and II-2/22.

2.3 Passenger ship systems' functionality (short: ship systems' functionality) is part of the passenger ship systems' design and defines how the onboard systems achieve the functional requirements defined in SOLAS regulations II-2/21 and II-2/22.

2.4 Fire casualty is any possible fire case on board the ship under consideration. Fire casualties may or may not exceed the casualty threshold stipulated in SOLAS regulation II-2/21.3.

2.5 Flooding casualty is any possible flooding cases on board the ship under consideration. Flooding casualties may not exceed a single watertight (WT) compartment flooding as stated in SOLAS regulation II-1/8-1.2.

2.6 Essential systems are all systems and those sections of systems in spaces not directly affected by the casualty that need to remain operational after a fire or flooding casualty, according to SOLAS regulations II-2/21.4 and II-2/22.3, and as referred to in SOLAS regulation II-1/8-1.2.

2.7 Critical systems are essential systems that were identified in the overall assessment of essential systems to have a possibility to fail to operate adequately as a consequence of one or more fire casualty case, each not exceeding the fire casualty threshold, or as a consequence of one or more flooding case, each not exceeding a single WT compartment. The failure of the
system may be caused by a failure of the whole system, of one component or of a connection between system components or by any other failure causing unsatisfactory operation of the essential system under consideration.

3 **SHIP'S DESCRIPTION**

3.1 For the purpose of the ship's description, any necessary information regarding the design of the ship should be provided to the Administration along with description of ship essential systems' design and functionality following a fire or flooding casualty. As a minimum, such information and description should include:

1. the design criteria for each individual essential system or group of essential systems, to achieve compliance (e.g., separation, duplication, redundancy, protection, or a combination of the above);

2. the basic layout of the vessel including boundaries of compartments subject to the casualty (watertight or "A" class boundaries), e.g., in the form of plan views and cross-sections, including, but may not be limited to: general arrangement plan, capacity plan, watertight subdivision plan, space fire categorization plan (or structural fire protection plan), plan of spaces protected by fixed fire-extinguishing systems, etc.;

3. criteria adopted for the selection of safe areas and intended locations;

4. a list of all systems that are intended to be submitted for assessment. It should be noted that although such a list would include, in the first instance and as a minimum, all essential systems referred to in SOLAS regulations II-2/21.4 and 22.3, their actual number and identification may vary depending on the size, type, arrangements, design, etc., (e.g., propulsion systems: shaft or podded propulsion units, etc.) of the ship;

5. drawings/documents describing the location, arrangement and connections of essential systems (including any of their components) mentioned in SOLAS regulation II-2/21 or II-2/22;

6. the description of the power supply for the essential systems;

7. data regarding the minimum speed vs. weather and sea conditions (e.g., results of model tank tests in sea keeping conditions including consideration of wind forces); and

8. any additional design detail intended to ensure or support the ship systems' capabilities.

3.2 Additional information about the intended area of operation, the operating pattern or patterns (which may be used to define any intended speed/maximum distance for safe return to port) should be included in the ship's description.

3.3 Interpretations as contained in paragraph 1 of appendix 1 to these Interim Explanatory Notes may be used when completing the ship's description.
4 ASSESSMENT OF REQUIRED SHIP SYSTEMS’ CAPABILITIES

4.1 The assessment of ship systems’ capabilities should follow the process described in these Interim Explanatory Notes and refer to appendix 2. The assessment should be based on structured methods and should document the intended essential systems functionality after a fire or flooding casualty defined by SOLAS regulations II-1/8-1, II-2/21 and II-2/22. An example of the development of an assessment is given in appendix 3.

4.2 Each assessment should be divided in two steps.

4.2.1 The first step is an overall systems’ assessment. The systems’ assessment is addressing all essential systems and functional requirements mentioned in SOLAS regulations II-2/21 and II-2/22. This step should include a structured assessment of all essential systems after a fire or flooding casualty, as defined in SOLAS regulations II-1/8-1.2, II-2/21.4 or II-2/22.3.1. Propulsion and steering systems are required to remain in operational and may not be identified as "critical systems". However, manual intervention may be accepted in order to make these systems available in the minimum possible time.

4.2.2 The second step is a detailed assessment of critical systems identified in the systems’ assessment. The detailed assessment is only required if any critical system was identified in the previous systems’ assessment.

4.3 SOLAS regulations II-1/8-1, II-2/21 and 22 do not include reference to quantities or performance limits. The ability of the ship to return to port should be linked to the area and conditions of operation. The capability available for each system in the worst case (e.g., minimum propulsion power for return to port, electrical generating capacity, heating capacity, ventilation capacity, food and water storage/availability, etc.) should be included in the onboard documentation as a part of the assessment report (see paragraph 7.4).

5 OVERALL ASSESSMENT OF ESSENTIAL SYSTEMS

5.1 Assessment of all essential systems

5.1.1 A structured assessment of all essential systems should be conducted. The systems’ assessment can be performed in qualitative terms. Quantitative analysis may be required as part of the detailed systems’ assessment as described in section 6. A systems’ assessment report should be prepared according to section 7.

5.2 Identification of critical systems

5.2.1 Essential systems identified to be fully redundant for all fire and flooding casualty cases not exceeding the threshold (e.g., when runs of cables, pipes and equipment are duplicated and adequately separated), need not be further analysed as described in section 6.

5.2.2 For the arrangement of equipment, components or connections reference may be made to relevant interpretations contained in paragraph 2 of appendix 1 to these Interim Explanatory Notes. Where other solutions are adopted, equipment, components or connections should be further analysed as described in section 6.

5.2.3 Manual action by the crew, to provide ship systems’ capabilities, may also be possible but should be assessed in detail taking into account that:
.1 manual action should only be acceptable by the Administration in connection with an agreed defined number of fire and flooding casualties and should be clearly described in the documentation that should be prepared as per section 7;

.2 compliance with the return to port criteria should be based on the assumption that any manual action that may be required for the ship to return to port, or for any essential system to remain operational, following a casualty:

.1 is pre-planned, pre-set and instructions as well as necessary materials are available on board;

.2 is performed on systems designed to ensure that the required manual action can be completed within one hour from the time the action started; and

.3 emergency lighting and a means of communication is demonstrated available in the area where manual actions are to be taken; and

.3 in general, feasibility of manual actions should be demonstrated by tests or drills, as applicable.

5.2.4 Performance requirements applicable to any essential system may be analysed and documented separately; however, any relevant information should be included in the overall assessment of essential systems' report.

5.3 Results of overall assessment

5.3.1 Should no critical systems be identified, the overall assessment can be considered acceptable without the need for a detailed systems' assessment to be carried out. The systems' assessment report can be used for the preparation of documentation and approval submission, as referred to in section 7.

6 Detailed assessment of critical systems

6.1 When performing a detailed assessment of critical systems, additional information may be necessary. The ship's description, described in section 3, should be supplemented, for each identified critical system, with the following, as applicable:

.1 details of pipes, cables or other devices connecting the components of the critical system, or connecting different critical systems including their location within the affected area;

.2 details of any manual action providing the required ship systems' functionality (see also paragraph 5.2.3); and

.3 details of any operational solution forming part of the design criteria.

6.2 Where acceptable to the Administration, a quantitative analysis can be carried out as a part of the detailed assessment of all critical systems. As an example, the following may be performed:

.1 quantitative analysis of fire risk within a space, supplemented by fire engineering analysis and/or fire testing where necessary (e.g., to assess consequences of a fire casualty on a system or system component);
.2 Failure Mode Effect Analysis (FMEA) of a system or system component analyses in accordance with standard IEC 60812, *Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA)* or resolution MSC.36(63), annex 4 (Procedures for Failure Mode and Effects Analysis), would be acceptable; and

.3 Detailed analysis of possibility of flooding of internal watertight compartments and of consequences of flooding on system components, given the location of the compartment and arrangement of piping within the compartment.

7 DOCUMENTATION

7.1 Design of ship and ship's systems

7.1.1 Different design criteria may be followed in the design of the ship and in the design of the ship's systems and arrangements to achieve the passenger ship systems' capabilities after a fire or flooding casualty and to comply with the requirements. The chosen design criteria should be well documented. This is to form the basis for the preparation of all ship's operational procedures to be adopted by the crew for the case of any such casualty.

7.2 Documentation for future design changes

7.2.1 The documentation to be presented for approval is described in detail in the paragraphs below. Such documentation should also be referred to in case design changes to the ship are proposed and may also be used as evidence of compliance should the ship transfers to the flag of another State.

7.3 Documentation of the assessment of required ship systems' capabilities for approval

7.3.1 The documentation of the assessment to be presented for approval should include the design criteria followed to reach ship systems' capabilities and summarize the whole process of assessment including methods and assumptions. The following information should be provided for approval of ship systems' capabilities:

.1 ship's description (see section 3);

.2 overall assessment of essential systems' report (see paragraph 4.2.1 and section 5);

.3 detailed assessment of critical systems' report (see paragraph 4.2.2 and section 6), if any critical system is identified; and

.4 additional information:

.1 list of manual actions (see paragraph 5.2.3);

.2 test programme (for both testing during construction, and sea trials, as applicable) which should include methods of testing, and test facilities provided, where applicable;

.3 maintenance plan; and

.4 references.
7.4 Onboard documentation

The onboard documentation demonstrating the ship system capabilities should include:

.1 documentation, as per paragraphs 7.3.1.1, 7.3.1.2 and 7.3.1.3 above;

.2 operational manual for fire and flooding casualty cases and safe return to port operation, including details of any manual action required to ensure operation of all essential systems, availability of safe areas including provision of basic services therein (e.g., closing/opening of valves, shutting down/start of equipment/fans, etc.);

.3 description of operation of essential systems after a fire casualty exceeding the casualty threshold;

.4 list of spaces considered having negligible fire risk, if any; and

.5 test, inspection, and maintenance plan.

7.5 Record of ship systems' capabilities

7.5.1 The ship systems' capabilities should be included in the list of operational limitations issued to passenger ships (reference SOLAS regulation V/30). The ship’s safety management manual should describe in detail the quantities, arrangements and procedures that are to be applied in each particular case. (For example, food/drink/fuel carriage requirements may be different for a ship cruising in the Aegean to one cruising in the Antarctic.) Example of wording concept for this purpose may be as follows:

"Safe return to port voyage planning should be based on:

.1 habitable conditions for passengers and crew is provided according to "Owners document xyz" dated yyyy-mm-dd (the operational area will determine maximum possible distance to a safe location and the maximum numbers of persons that can be supported during the safe return voyage).

.2 the ship systems' capabilities of returning to port following a fire casualty is contingent upon the conditions/assumptions given in onboard document xyz, yyyy-mm-dd.

.3 ships "port/aft/main" propulsion and steering system is capable of x knots in Beaufort x with a consumption of x tonnes of fuel.

.4 ships "starboard"/forward/emergency propulsion and steering system is capable of x knots in Beaufort x with a consumption of x tonnes of fuel."."
APPENDIX 1

INTERPRETATIONS TO SOLAS REGULATIONS II-2/21 (SAFE RETURN TO PORT AND SAFE AREAS) AND II-2/22
(SHIP'S ORDERLY EVACUATION AND ABANDONMENT)

1. Interpretation for ship's description

1.1 The following interpretations are intended to be of assistance when carrying out the ship description contained in section 3 of the Interim Explanatory Notes, before performing assessments as described in sections 4, 5 and 6.

1.2 These interpretations provide design criteria. The decision on whether or not to evacuate the ship remains with the Master. In actual situations the Master may well decide, based on the actual appraisal of the situation that it is safer to evacuate for accidents that are below the casualty threshold and remain on board for accidents that are above it.

<table>
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<tr>
<th>Regulation</th>
<th>Interpretations</th>
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| II-2/21.1 Application | Interpretation 1  
Horizontal Fire Zones (special category and ro-ro spaces) should not be included in the count of the number of the Main Vertical Zones. |
| II-2/21.1 Application | Interpretation 2  
Where electrical or machinery installation, fire safety, or lifesaving appliances of a ship have been approved following the methodology of SOLAS regulations II-1/55, II-2/17 or III/38 respectively (Alternative design and arrangements), the effect on the ship essential system capability should be explicitly included in the analysis required by the above regulations. Special attention is to be given to the determination and assignment of Safe Areas and compliance with the requirements of SOLAS regulation II-2/22. |
| II-2/21.2 Purpose | Interpretation 3  
For the purpose of assessing the ship systems' capabilities, fire casualties and flooding casualties may be considered as not occurring at the same time. |
| II-2/21.3 Casualty threshold | Interpretation 4  
"A" class boundaries refers to both bulkheads and decks. |
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<th>Regulation</th>
<th>Interpretations</th>
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<tr>
<td>II-2/21.3 Casualty threshold</td>
<td><strong>Interpretation 5</strong>&lt;br&gt;The rating of &quot;A&quot; class boundaries does not affect the application of this regulation. However, a trunk closed at all boundaries constructed to &quot;A-60&quot; standard and containing ducts, cabling and/or piping is considered operational when passing through a space of origin.</td>
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<tr>
<td>II-2/21.3 Casualty threshold</td>
<td><strong>Interpretation 6</strong>&lt;br&gt;The lay-out of special category and ro-ro spaces, normally extending for more than the length of one MVZ, does not properly fit with the casualty threshold. However, during the assessment of the ship systems' capabilities it has to be verified that a casualty in such spaces would not compromise the operation of the essential systems in the remaining fire zones of the ship.</td>
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<tr>
<td>II-2/21.3.2 Casualty threshold</td>
<td><strong>Interpretation 7</strong>&lt;br&gt;Where a space of origin is not protected by a fixed fire-extinguishing system, for determining the &quot;nearest &quot;A&quot; class boundaries, which are not part of the space of origin&quot;:&lt;br&gt;a) only the spaces within the same Main Vertical Zone need to be considered; and&lt;br&gt;b) casualty threshold includes spaces one deck upwards.</td>
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<tr>
<td>II-2/21.3.2 Casualty threshold</td>
<td><strong>Interpretation 8</strong>&lt;br&gt;Spaces in which the risk of a fire originating is negligible¹ need not be considered as spaces of origin of a fire. Examples of such spaces include but may not be limited to:&lt;br&gt;a) spaces with restricted accessibility for inspection and/or maintenance only, such as:&lt;br&gt;.1 void spaces;&lt;br&gt;.2 trunks closed at all boundaries only containing pipes and/or electrical cables; and&lt;br&gt;.3 cofferdams;</td>
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¹ **Note**: A fire/risk assessment may be requested (refer to paragraphs 7.4.4 of the Interim Explanatory Notes), to determine whether a space other than those listed in the above can be considered as being "space in which the risk of a fire originating is negligible". Different factors should be taken into account while performing the assessment such as:<br>a) presence of combustible material, flammable liquids and/or flammable gases;<br>b) presence of electrical switchboards and relevant power;<br>c) statistics on fire within spaces having the same purpose;<br>d) intended service of equipment/machinery installed; and<br>e) other factors considered appropriate for the space under consideration.
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| II-2/21.3.2 Casualty threshold | Interpretation 8 (cont'd)  
  b) tanks;  
  c) chain lockers;  
  d) ventilation trunks except those containing ducts presenting fire hazard such as galley range exhaust ducts, laundry  
  exhaust ducts, category "A" machinery spaces ducts, special category and ro-ro spaces ducts;  
  e) cross flooding ducts connecting void spaces. In the case where connected spaces are not with a negligible fire risk, ducts  
  should be separated from those spaces by non-watertight fire resistant boundaries to be considered as a space where  
  fire risk is negligible;  
  f) vertical escape trunks from machinery spaces, service spaces, control stations and other crew accommodation  
  spaces;  
  g) store rooms for gaseous fixed fire-extinguishing systems;  
  h) busbars enclosed in "A" class divisions;  
  i) "A" class enclosures within spaces of Category 1, 2 or 4 only containing isolation valves or section valves forming  
  part of the fixed fire-extinguishing system for the protection of accommodation spaces, service spaces and control  
  stations; and  
  j) shaft tunnels only used for this purpose, i.e. no storage is allowed. |
| II-2/21.3.2 Casualty threshold | Interpretation 9  
 Concealed spaces (spaces above ceilings, behind bulkheads linings) are considered as part of the space of origin. Lack of a  
 fixed fire-extinguishing system above ceilings or behind linings need not be considered under regulation II-2/21.3.2. |
| II-2/21.3.2 Casualty threshold | Interpretation 10  
 In case of manual actions, equipment and systems the controls of which cannot be reached without accessing the space  
 affected by the casualty should not be considered operational. |
| II-2/21.3.2 Casualty threshold | Interpretation 11  
 For passenger ships carrying not more than 36 passengers space of origin is any space bounded by "A" class boundaries or  
 divisions of steel or equivalent material. Where the deck between two spaces is constructed of steel or equivalent material it  
 should be considered to form part of the "A" class boundary provided all penetrations are tight to prevent the passage of flame  
 or smoke. |
2 Interpretations for detailed assessment of critical systems

2.1 The following interpretations are intended to be of assistance when performing detailed assessments of critical systems, as described in section 6.

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<th>Regulation</th>
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<tr>
<td>II-2/21.4 Safe Return to Port/Fire Casualty</td>
<td>Interpretation 12</td>
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<tr>
<td></td>
<td>Steel pipes other than those carrying flammable liquids and passing through (not serving) spaces affected by a fire casualty may be considered to remain operational provided they are of substantial thickness (reference can be made to ICLL 66 regulation 22(3), as interpreted by IACS UI LL36/Rev. 2 paragraph (b)) or &quot;A-60&quot; insulated (&quot;A-60&quot; class insulation approved in accordance with resolution A.754(18) for bulkheads or decks may be used for this purpose). In both cases the pipes should be adequately supported.</td>
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<td>In order to be considered as remaining operational after a fire casualty, steel pipes should be joined by welding otherwise mechanical joints should be tested according to IACS UR P2.11.5.5.6 fire test or equivalent to the satisfaction of the Administration.</td>
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<td>Temperature increase of liquids carried may need to be considered, and measures taken where necessary, so that the performance and purpose of the affected systems can be maintained as intended after the casualty has occurred.</td>
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<td>Plastic pipes can be considered to remain operational after a fire casualty if tested to resolution A.753(18), Level 1.</td>
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<tr>
<td>II-2/21.4 Safe Return to Port/Fire casualty</td>
<td>Interpretation 13</td>
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<td>Fire-resistant cables complying with standards IEC 60331-1 and IEC 60331-2 (see also IACS UR E15) passing through (not serving) spaces may be considered to remain operational after a fire casualty provided they have no connections, joints and equipment connected to them, etc., within the space affected by the casualty.</td>
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<td>Installation of these cables should be made to support their survival in a fire casualty and during fire fighting efforts.</td>
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<td>Regulation</td>
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<td>II-2/8.1 Flooding casualty</td>
<td>Interpretation 14 An electrical balance should be submitted for each of the following return to port scenarios: a) minimum electrical-generating capacity available; and b) any other scenario of reduced power that would cause any essential system to run at reduced capacity due to lack of electrical generating capacity. In connection with the above, all essential systems and their auxiliaries and systems needed to support safe areas should be accounted according to their use in these particular conditions.</td>
</tr>
<tr>
<td>II-2/21 Fire casualty</td>
<td>Interpretation 15 Emergency generator, fitted for compliance with SOLAS regulation II-1/42, may be used to meet the requirements on safe return to port and ship's orderly evacuation and abandonment providing that its ability to supply emergency services as referred to in SOLAS regulation II-1/42.2, is not impaired (e.g., the availability of fuel needed for providing those services listed in regulation II-1/42 should be maintained). In the evaluation of the emergency generator capacity, the most demanding condition between regulations II-1/42, II-2/21 and 22 may be considered.</td>
</tr>
<tr>
<td>II-2/21.4 Safe return to port</td>
<td>Interpretation 16 Electrical power should be available and sustainable for all essential services specified in SOLAS regulations II-2/21.4 and II-2/21.5.1.2, with due regard being paid to such services as may be operated simultaneously. The application of regulation II-2/21.4 requires that other systems (e.g., engine-room ventilation, lighting of spaces outside safe areas not affected by the casualty, etc.) remain operational to support the functionalities listed therein.</td>
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<tr>
<td>II-2/21.4.1 Propulsion</td>
<td>Interpretation 17 Propulsion machinery and auxiliary machinery essential for the propulsion of the ship should remain operable.</td>
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<tr>
<td>II-2/21.4.1 Propulsion</td>
<td>Interpretation 18 Following a fire casualty within the threshold, the ship should be able to maintain an adequate speed for sufficient time to permit the ship's planned safe return to port in sea and wind conditions acceptable to the Administration taking into account the intended area of operation. A minimum speed of 6 knots while heading into Beaufort 8 weather and corresponding sea conditions is recommended. Configuration for power generation and propulsion in the worst case scenario in terms of casualty cases should be verified during normal sea trials.</td>
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| II-2/21.4.1 Propulsion | **Interpretation 19**  
A steel shaft line including relevant bearings passing through a space affected by a flooding or a fire casualty (see also interpretation 11), may be considered operational if it is enclosed in a watertight and "A" class tunnel or alternatively if:  
   a) in the flooding case it can be shown that it can operate under water; and  
   b) in the fire case it is protected by a dedicated water spray system capable of delivering not less than $5 \text{l/m}^2/\text{min}$ on the protected area or equivalent. |
| II-2/21.4.1 Propulsion | **Interpretation 20**  
Manual control at local positions can be accepted provided adequate communication and emergency lighting are arranged and it is demonstrated that the loss of any control and monitoring system does not prevent or impair any such manual/local control of the propulsion and electrical power generation systems (including, but may not be limited to, engines, electric motors, fuel system, etc.). Consideration should be given to the provision of machinery alarms when operating in that manner. |
| II-2/21.4.2 Steering systems and steering-control systems | **Interpretation 21**  
When documenting that steering system is operable the following should be taken into consideration:  
   a) local control of remaining steering system is acceptable provided adequate communication and emergency lighting are arranged;  
   b) emergency means of steering, e.g., azimuth thrusters, pump jets, rudder, propellers, may be considered; and  
   c) in general, tunnel thrusters should not be considered adequate for emergency steering. |
| II-2/21.4.3 Navigational systems | **Interpretation 22**  
Equipment essential for navigation, position fixing and detection of risk of collision should be available. The ship should be capable of displaying the proper light configuration in compliance with the International Regulations for Preventing Collisions at Sea in force. |
| II-2/21.4.4 Systems for fill, transfer and service of fuel oil | **Interpretation 23**  
Systems for internal fill transfer and service of fuel oil should be capable of fuel transfer to active propulsion and power generation equipment. |
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<tr>
<td>II-2/21.4.4 Systems for fill, transfer and service of fuel oil</td>
<td>Interpretation 24 Systems for internal fill, transfer and service of: a) fuel; b) other flammable hydrocarbons; or c) any fluid that may be flammable or dangerous if heated to a very high temperature (both within the pipe and on going through pumps, orifices or other equipment), should not be considered operational within spaces affected by a fire casualty.</td>
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<tr>
<td>II-2/21.4.5 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</td>
<td>Interpretation 25 Internal communications should be achieved by any effective portable or fixed means of communications. However, portable equipment may be accepted provided that repeater system or equivalent remains operational after the casualty and charging capability is available in more than one MVZ.</td>
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<tr>
<td>II-2/21.4.5 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</td>
<td>Interpretation 26 PA systems, arranged as general alarm systems, should remain operational in the MVZs not affected by the casualty.</td>
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| II-2/21.4.6 External communication | **Interpretation 27**  
The ship should be capable of communicating via the GMDSS or the VHF Marine and Air Band distress frequencies, even if the main GMDSS equipment is lost. |
| II-2/21.4.7 Fire main | **Interpretation 28**  
Automatic start of remaining pumps may not be necessarily required (manual local start may be accepted after a casualty). The system should be so arranged that SOLAS regulation II-2/10.2.1.5.1 is fulfilled in all other Main Vertical Zones of the ship not affected by the casualty. Isolating valves should be arranged as appropriate. The remaining part of the affected deck in a Main Vertical Zone may be served from hydrants of adjacent zone or water tight compartment. Fire hoses may be extended for fire-fighting within the affected Main Vertical Zone; however, for complying with this requirement, two lengths of hoses from each hydrant may be accepted. |
| II-2/21.4.8 Fixed fire-extinguishing systems | **Interpretation 29**  
When a gaseous based system located outside the protected space is the sole fixed fire-extinguishing system as defined in regulations II-2/10.4.1 and 10.7.1 and it is designed to protect more than one space:  
a) there should be enough capacity to protect the two largest spaces;  
b) where the application of the fire casualty threshold leads to the loss of the storage room due to fire in an adjacent space, there should be two rooms, not being lost by the result of the same casualty, each holding a quantity of gas, capable of protecting the largest space; and  
c) the system should be so arranged that a casualty in one protected space does not impair the operation of the system in another protected space.  
When a gaseous based system located outside the protected space is the sole fixed fire-extinguishing system as defined in regulations II-2/10.4.1 and 10.7.1 and it is designed to protect a single space, where the application of the fire casualty threshold leads to the loss of the storage room due to fire in an adjacent space, there should be two rooms, not being lost by the result of the same casualty, each holding the quantity of gas required for the protected space. |
| II-2/21.4.8 Fixed fire-extinguishing systems | **Interpretation 30**  
Sprinkler or equivalent fixed fire-extinguishing systems may be considered to be lost only in spaces directly affected by the fire casualty and in other spaces that are protected by the same section (i.e. are controlled by the same section valve) provided each section should not serve more than one deck area in one MVZ. However, all levels of a stairway enclosure may be protected by the same section. |
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<td>II-2/21.4.8 Fixed fire-extinguishing systems</td>
<td><strong>Interpretation 31</strong>&lt;br&gt;Section valves (as referred to in FSS Code, chapter 8, paragraph 2.4.2.2) located within the space affected by the fire casualty should be considered to be not operational unless they are suitably fire rated or fire protected (e.g., contained within a solely dedicated enclosure having &quot;A&quot; class boundaries, or protected by a water nozzle, etc.).</td>
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<td>II-2/21.4.8 Fixed fire-extinguishing systems</td>
<td><strong>Interpretation 32</strong>&lt;br&gt;Equivalent water based fire-extinguishing systems intended for the protection of machinery spaces (total flooding, as referred to in MSC/Circ.1165, as amended) should be so designed that in case of loss of any section valve it would still be possible to supply the entire system at the required performance, except where another fixed fire-extinguishing system is provided for the protection of such spaces (e.g., gaseous based systems). Duplication, fire protection of valves (e.g., contained within a solely dedicated enclosure having &quot;A&quot; class boundaries, or protected by a water nozzle, etc.), fire rated valves or location of valves in spaces as identified by interpretation 11 may be considered. Reference may be made to IACS UR P2.11.5.6.</td>
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<td>II-2/21.4.8 Fixed fire-extinguishing systems</td>
<td><strong>Interpretation 33</strong>&lt;br&gt;Indication of activated sections in the continuously manned central control station for sprinkler or equivalent fixed fire-extinguishing systems, located outside the Main Vertical Zone, where the space affected by the casualty is located, should continue to function after a fire or flooding casualty.</td>
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<td>II-2/21.4.8 Fixed fire-extinguishing systems</td>
<td><strong>Interpretation 34</strong>&lt;br&gt;Arrangement of piping distribution for sprinkler systems or equivalent, or for water based fixed fire-extinguishing systems for machinery spaces, may include isolation valves, to ensure the system can be reconfigured as to remain operational after a casualty, which should be kept to a minimum, clearly marked and easily accessible. Valves whose uncorrected status may jeopardize the operation of the system under normal condition should be provided with status indication in the continuously manned control station.</td>
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<tr>
<td>II-2/21.4.8 Fixed fire-extinguishing systems</td>
<td><strong>Interpretation 35</strong>&lt;br&gt;When sprinkler or equivalent water based fixed fire-extinguishing systems include one or more emergency feed, risers, connection, or other emergency means to comply with this regulation, then hydraulic calculations (as referred to in the FSS Code, chapter 8, paragraph 2.3.3.2) should take this into account.</td>
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| II-2/21.4.8 Fixed fire-extinguishing systems | Interpretation 36  
Local application systems need not to remain operational following a casualty unless they form part of a system for the protection of machinery spaces (total flooding, as referred to in MSC/Circ.1165, as amended). |
| II-2/21.4.9 Fire and smoke detection systems | Interpretation 37  
Fire and smoke detection systems may be considered to be lost only in spaces directly affected by the fire casualty and in other spaces on the same deck that are part of the same section, as defined by the FSS Code, chapter 9, paragraph 2.4.1, provided that all other detectors remain operational in any other decks served by that section. |
| II-2/21.4.10 Bilge and ballast systems | Interpretation 38  
The bilge and ballast pumping systems and all associated essential equipment should be operational in all spaces served by the systems and not directly affected by the casualty. Manual control at local positions may be accepted provided fixed or portable means of communication are available from those positions to the Safety Centre or the Engine Control room. |
| II-2/21.4.11 Power-operated watertight and semi-watertight doors | Interpretation 39  
Indication to show whether each door is open or closed should be provided for any fire casualty not exceeding the casualty threshold except for those doors in the boundary of spaces directly affected by the casualty. |
| II-2/21.4.13 Flooding detection systems | Interpretation 40  
Flooding detection systems may be considered to be lost only in spaces directly affected by the fire casualty and in other spaces in the same compartment that are part of the same section provided that all other detectors remain operational in any other compartment served by that section. |
| II-2/21.5 Safe areas | Interpretation 41  
When considering a fire casualty in a certain MVZ, only spaces within the casualty threshold are to be considered lost. Food, water and equipment for the support of the basic services to the safe areas, stored in spaces not directly affected by the fire casualty and belonging to the same MVZ, could be considered still available. |
### Regulation Interpretations

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<tr>
<td>II-2/21.5.1.1 Safe areas Functional requirements</td>
<td><strong>Interpretation 42</strong>&lt;br&gt;Safe areas could be a number of spaces distributed on board and should preferably be arranged in accommodation spaces. Sizing of safe areas where persons are accommodated could be based on the time needed for safe return to port operation. For safe return to port operations longer than 12 h a minimum space of 2 m² per person, calculated on the basis of the gross deck surface of the space(s) being considered, should be provided. For safe return to port operations shorter than 12 h a minimum space of 1 m² per person should be provided.</td>
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<tr>
<td>II-2/21.5.1.2.1 Safe areas, sanitation</td>
<td><strong>Interpretation 43</strong>&lt;br&gt;As a minimum one toilet for every 50 persons or fraction should remain operational. Grey and black water can be disposed of into the sea, allowed by MARPOL (reference MARPOL Annex IV, regulation 3).</td>
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<td>II-2/21.5.1.2.2 Safe areas, water</td>
<td><strong>Interpretation 44</strong>&lt;br&gt;As a minimum 3 litres per person per day drinking water should be available. Additional water for food preparation and hygiene may need to be provided.</td>
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<td>II-2/21.5.1.2.3 Safe areas, food</td>
<td><strong>Interpretation 45</strong>&lt;br&gt;Food could be of any kind including dry food. Storage of food should be distributed as necessary, so that an access route is available from the safe areas.</td>
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<td>II-2/21.5.1.2.4 Safe areas Alternate space for medical care</td>
<td><strong>Interpretation 46</strong>&lt;br&gt;In addition to the ship's hospital or medical centre one or more locations on the ship should be provided which should:&lt;br&gt;a) be in a different Fire Zone (from the hospital or primary medical centre);&lt;br&gt;b) be easily accessible; and&lt;br&gt;c) have lighting and power supply on the main and emergency source of electrical power.&lt;br&gt;Reference should also be made to MSC/Circ.1129.</td>
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| II-2/21.5.1.2.6  
Means of preventing heat stress and hypothermia | **Interpretation 47**  
Definition of means for protection against heat stress and hypothermia should take into account external weather conditions, which may depend on area(s) of operation of the vessel. Casualty scenarios for which there is a reduction in ventilation or heating capacity should be identified and consequences assessed. The temperature within the internal safe areas should be maintained in the range of 10 to 30°, consideration being paid to the external temperature during expected operations. |
| II-2/21.5.1.2.7  
Safe areas, light | **Interpretation 48**  
Portable rechargeable battery operated lighting may be acceptable for use in spaces which are not covered by the ship's emergency lighting system. Adequate charging capability should be available for these lights. Supplementary lighting complying with regulation II-1/42-1 is also acceptable. |
| II-2/21.5.1.2.8  
Safe areas, ventilation | **Interpretation 49**  
Ventilation volume should be available as a minimum of 4.5 m³/h per person. |
| II-2/21.4.14  
Safe areas, other systems vital to damage control efforts | **Interpretation 50**  
This includes any system that the Administration determines is vital to damage control pertaining to fire or flooding. |
| II-2/21.5.1.4  
Safe areas, access to embarkation deck | **Interpretation 51**  
Means of access from safe areas to life-saving appliances should be provided from all safe areas in case of any casualty, either internally through areas unaffected by the fire or via external routes. External routes are considered to remain available also in the portion of the ship containing the MVZ where the casualty had occurred. |
| II-2/22.3.1  
Evacuation and abandonment, Systems | **Interpretation 52**  
Electrical power should be available for the abandonment of the ship, including life-saving appliances and arrangements and the systems referred to in SOLAS regulation II-2/22.3.1, with due regard being paid to such services as may be operated simultaneously. |
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| II-2/22.3.1.1 Evacuation and abandonment, Fire Main Safe | **Interpretation 53**  
The fire main should remain operational in all main vertical zones not directly affected by the casualty. Water for fire-fighting purposes should be available to all areas of the ship. |
| II-2/22.3.1.2 Evacuation and abandonment, Internal communications | **Interpretation 54**  
A means should be available for communicating orders to fire-fighting and damage control teams and personnel in charge of evacuation and abandonment. |
| II-2/22.3.1.3 Evacuation and abandonment, Bilge system | **Interpretation 56**  
The bilge pumping system and all associated equipment essential for its operation should be available in all spaces not directly affected by the casualty. |
| II-2/22.3.1.4 Evacuation and abandonment, Means of external | **Interpretation 55**  
The ship should be capable of communicating via the GMDSS or the VHF Marine and Air Band distress frequencies even if the main GMDSS equipment is lost. |
APPENDIX 2

Assessment of passenger ship systems' capabilities process flowchart

1. **Ship's Description** (see section 3)
   - Include documents about ship systems capability

2. **Overall assessment of essential systems** (see section 5)

3. **Detailed assessment of critical systems** (see section 6)

4. **Final Design** (all essential systems, including critical systems)

5. **Documentation and Approval** (see section 7)
APPENDIX 3

EXAMPLE OF THE DEVELOPMENT OF AN ASSESSMENT
(refer to an assessment for SOLAS regulation II-2/22)

Note: Users should note that the example provided represents one way of handling an assessment as other approaches could be equally effective.

The assessment is developed adopting the following steps:

Step 1 – Identification of all essential systems and any required auxiliaries and support systems.

Step 2 – For each deck of each MVZ, determination of which essential systems are present.

Step 3 – For each essential system that is located in the MVZ under analysis, verification of the availability of an alternative in another location.

Step 4 – Essential systems without a suitable alternative in another location must be protected from a fire/flooding casualty.

Step 5 – For each critical system, determination of how the cables, pipes, components will be protected. A hierarchy for protecting critical systems is proposed as follows:

1. First solution – Provide an alternative in a MVZ not affected by the casualty

Example: A main power cable for the GMDSS system passes through the MVZ on deck 3. In a fire this cable could be damaged. An emergency power cable is routed from a different direction to the navigation bridge that does not pass through this area. The conclusion is that further analysis is not needed. Damage to the power cable does not affect the ship's safe return to port capability.

2. Second solution – Protect the essential system within the MVZ under analysis

Example: In the case of the a.m. power cable, it is determined that only a short length of cable passes through the MVZ under consideration, located 5 m above the deck. An A-60 trunk is installed to protect the cable to preclude fire damage.

3. Third solution – Provide a repair or manual action to compensate for loss of the system

Example: – Another essential system cable is analysed, and it is determined that the cable is routed throughout the MVZ at various levels and construction of an A-60 trunk is not practicable. Instead, a repair cable is prepared and staged with necessary tools at a protected location. If the cable is damaged from a fire in the MVZ under analysis, the crew is able to temporarily re-route power from another location using the repair cable.
INTERIM EXPLANATORY NOTES FOR THE ASSESSMENT OF PASSENGER SHIP SYSTEMS’ CAPABILITIES AFTER A FIRE OR FLOODING CASUALTY

REVISIONS TO INTERPRETATIONS NOS. 22 AND 27 OF APPENDIX 1 OF MSC.1/CIRC.1369

1 The Maritime Safety Committee, at its ninety-first session (26 to 30 November 2012), having considered the proposals by the Sub-Committee on Safety of Navigation, at its fifty-eighth session, approved the revisions to interpretations Nos. 22 and 27 of appendix 1 to MSC.1/Circ.1369 on Interim Explanatory Notes for the assessment of passenger ship systems’ capabilities after a fire or flooding casualty.

2 Member Governments are invited to bring the annexed revised interpretations Nos. 22 and 27 of appendix 1 to MSC.1/Circ.1369 to the attention of passenger ship owners, ship builders, ship designers and other parties concerned.

***
ANNEX

REVISIONS TO INTERPRETATIONS NOS. 22 AND 27
OF APPENDIX 1 OF MSC.1/CIRC.1369

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| I-2/21.4.3 Navigational systems | **Interpretation 22**

Equipment essential for navigation, position fixing and detection of risk of collision should be available. The following equipment should be available as a minimum:

a) a properly adjusted standard magnetic compass
b) a Receiver for a global navigation satellite system or a terrestrial radionavigation system
c) a 9 GHz radar
d) Electronic Chart Display and Information System (ECDIS) or an appropriate folio of paper nautical charts and publications
e) Whistle
f) Navigation lights
g) Internal communications with engine control room and steering gear
h) a pelorus or Compass bearing device to take bearings
j) Means of correcting heading and bearings to true at all times

The ship should be capable of displaying the proper light configuration in compliance with the International Regulations for Preventing Collisions at Sea in force.

| I-2/21.4.6 External communication | **Interpretation 27**

The ship should be capable of communicating via the GMDSS or the VHF Marine and Air Band distress frequencies, even if the main GMDSS equipment is lost.
The external communication may be achieved by additional fixed means or portable means installed in the same area as the navigation and manoeuvring equipment.
UNIFIED INTERPRETATIONS OF SOLAS REGULATION II-2/21.4

1 The Maritime Safety Committee, at its ninetieth session (16 to 25 May 2012), with a view to providing more specific guidance for the assessment of passenger ship systems' capabilities after a fire or flooding casualty, approved the unified interpretations of SOLAS regulation II-2/21.4, prepared by the Sub-Committee on Fire Protection, at its fifty-fifth session, as set out in the annex, for use in conjunction with the Interim explanatory notes for the assessment of passenger ship systems' capabilities after a fire or flooding casualty (MSC.1/Circ.1369), when conducting an assessment of critical systems.

2 Member Governments are invited to use the annexed unified interpretations as guidance when applying relevant provisions of SOLAS regulation II-2/21 and to bring them to the attention of all parties concerned.

***
ANNEX

UNIFIED INTERPRETATIONS TO SOLAS REGULATION II-2/21.4

(To be used in conjunction with the interim explanatory notes for the assessment of passenger ship systems’ capabilities after a fire or flooding casualty (MSC.1/Circ.1369))

Regulation II-2/21.4 – Fire and flooding casualty, pipes and vent ducts

All pipes and vent ducts passing through (not serving) a compartment affected by a flooding casualty are considered to remain operational provided they, together with relevant fittings, are capable of withstanding the head of water expected at their location.

Regulation II-2/21.4 – Fire and flooding casualty, electrical cables

Electrical cables complying with standard IEC 60092-359 may be considered to remain operational in a space affected by a flooding casualty, provided they have no connections, no joints, no equipment connected to them, etc., within such space or such connections, joints and devices have a degree of protection IPX8 in accordance with standard IEC 60529 (head of water expected at their location for a period not inferior to that estimated for the safe return to port).

Regulation II-2/21.4.4 – Systems for fill, transfer and service of fuel oil

Systems for internal fill, transfer and service of:

.1 fuel;
.2 other flammable hydrocarbons; or
.3 any fluid that may be flammable or dangerous if heated to a very high temperature (both within the pipe and ongoing through pumps, orifices or other equipment),

should be established as being capable of remaining operational when crossing flooded watertight compartments, considering in particular consequences of low seawater temperature on liquids behaviour.

Regulation II-2/21.4.6 – External communications

.1 Portable radiocommunication equipment might be accepted; and
.2 charging capability for any portable devices should be available in more than one main vertical zone (MVZ).