EVACUATION ANALYSIS FOR PASSENGER SHIPS

Forthcoming amendments to SOLAS Chapter II-2, Part D, Regulation 13 – Means of Escape, require that the escape routes of passenger ships be evaluated by an evacuation analysis early in the design process.

The provisions make evacuation analysis mandatory not only for ro-ro passenger ships but for other passenger ships (carrying more than 36 passengers) constructed on or after 1 January 2020.

The analysis is used to identify and eliminate, as far as practicable, congestion which may develop during an abandonment, due to normal movement of passengers and crew along escape routes. This includes the possibility that crew may need to move along these routes in a direction opposite to the movement of passengers. In addition, the analysis is used to demonstrate that escape arrangements are sufficiently flexible to provide for the possibility that certain escape routes, assembly stations, embarkation stations or survival craft may not be available as a result of a casualty.

IMO guidelines (MSC.1/Circ. 1533)

The revised guidelines on evacuation analysis for new and existing passenger ships provide a guide for the implementation of the SOLAS requirements, covering both a simplified evacuation analysis and/or an advanced evacuation analysis.

Safety at Sea has carried out evacuation analyses for more than 40 vessels including high speed craft, small passenger ferries, large ro-ro passenger vessels, large cruise ships and offshore construction vessels. We have our own in-house software (EVI) to carry out evacuation analysis in line with the most recent update of the relevant IMO guidelines.

The acceptable evacuation durations in these guidelines are based on an analysis of fire risk and include the following:

<table>
<thead>
<tr>
<th>Primary cases</th>
<th>Secondary cases (*impaired escape routes)</th>
<th>Additional scenarios (as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1: night</td>
<td>Case 3: night *</td>
<td>Case 5: open deck (large spaces)</td>
</tr>
<tr>
<td>Case 2: day</td>
<td>Case 4: day *</td>
<td>Case 6: embarkation</td>
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</tbody>
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In all cases, the total evacuation time should not exceed a prescribed time limit (60 or 80 minutes, depending on the size of the ship) and no significant congestion should be observed along the escape routes.

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The EVI software

EVI conforms to the definition of advanced evacuation analysis in accordance with the IMO guidelines, i.e. a computer-based simulation that represents each occupant as an individual that has a detailed representation of the layout of a ship and represents the interaction between the occupants and the layout.

Further information: http://www.brookesbell.com/service/software/evi-escape-evacuation-analysis

Advanced evacuation analysis with EVI software

The analysis can be carried out efficiently throughout the design process to assess designs at an early stage, to validate compliance of the final design as well as to assess evacuation performance and identify corrective actions for existing vessels.

The input for the analysis consists of the available general arrangement and escape plans including the definition of the primary escape routes, the assembly and embarkation stations.

The process consists of creating an evacuation model that contains all relevant geometrical, topological and semantic (e.g. signage and procedures) aspects of the evacuation arrangements.

The evacuation scenarios are defined by the initial location of passengers and crew, the escape plan – in accordance with the stairways calculations (as per Chapter 13 of the FSS Code), the state of escape routes (impaired or not) and the demographics of the passenger and crew population governing the response time and walking speed for all persons in the model.

The results of the analysis include:

- Individual escape times and total evacuation time for all evaluated scenarios
- Identification of areas of significant congestion
- Corrective actions and other recommendations regarding the arrangement of vertical escape routes, muster and embarkation stations
- Customisable reporting – including video clips of simulations

Other types of analyses carried out with EVI include:

- Port/terminal turn-around analysis
- Fire risk assessment
- Escape, evacuation and rescue assessment (EERA – in support of offshore safety cases)

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