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# 2023 Naval Damage Control Conference

## De-Watering : A New Review


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# De-Watering : A New Review

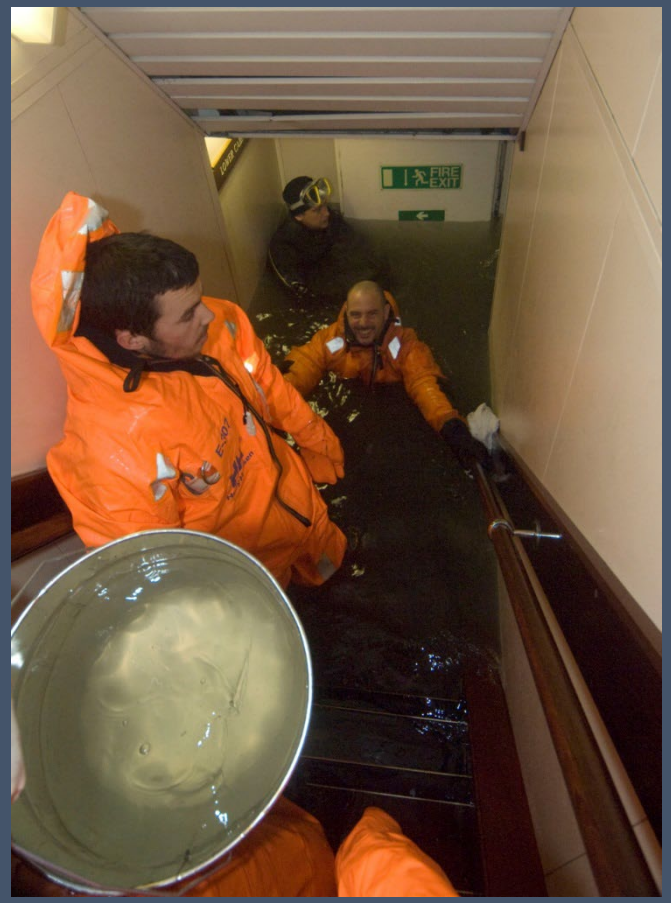
1. RNoMS Helge Ingstad incident
2. Review of Military and Civil Standards
3. A Goal Based Approach
4. Drainage
5. Flood Detection
6. Bilge System
7. Salvage System
8. Naval Ship Code
9. Summary and Questions

# HNoMS Helge Ingstad

HMoNS Helge Ingstad lessons identified:
Safety recommendations MARINE No 2021/22-26T

“Information from the crew as well as IPMS data show that many attempts were made to start the bilge system, while none of them succeeded.”

“The bilge system had been defined as a safety-critical system, but it did not deliver the expected capacity.”




HMS Endurance ER Flood

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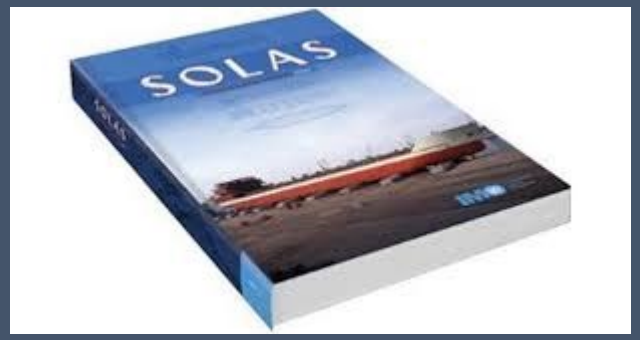
# Literature Review

Lloyd's Register Ship Rules
Det Norske Veritas Ship Rules
IACS Standards
UK MoD Defence Standards
RN Damage Control Requirements
IMO SOLAS
UK Statutory Requirements
Naval Ship Code




mca
Maritime and Coastguard Agency

Lloyd's Register

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# Literature Review

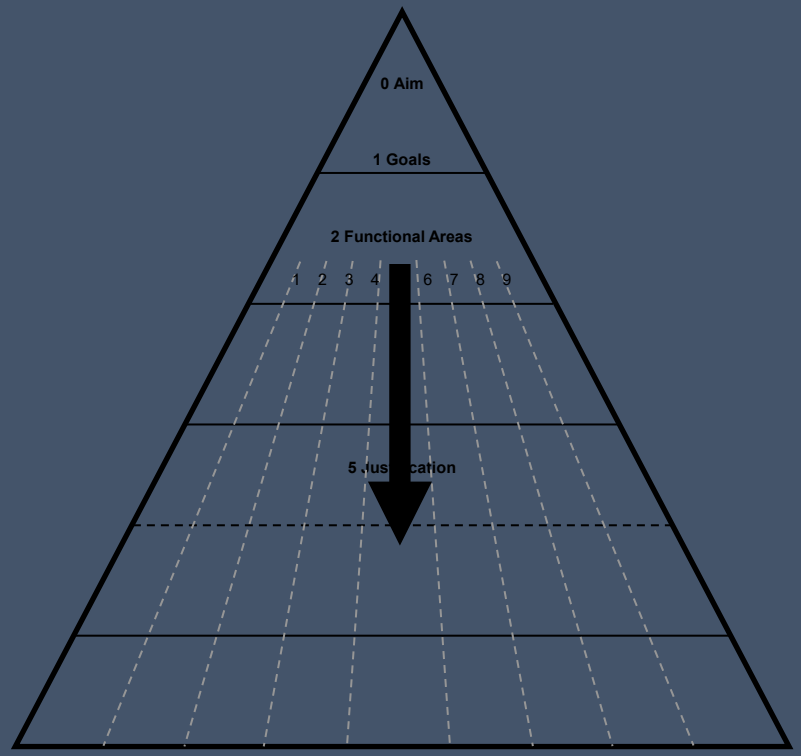
## Naval Ship Code:

Inconsistent approach across:

Chapter III Stability

Chapter IV Machinery Systems

Chapter VI Fire

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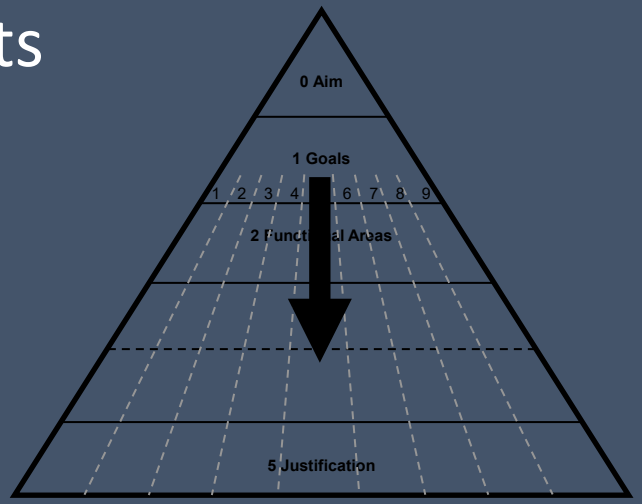
# Goal Based Approach

Part 1: Performance Reqts
- Drainage
- Flood Detection
- Bilge system
- Salvage system

Part 2: Solutions

Part 3 Justification




Functional Objective:
To remove the accumulation of liquids as result of controlled and uncontrolled discharge from internal systems, through external openings above the waterline and flood water leakage through an internal watertight boundary.

Carnival Dream fire-main discharge

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# Goal Based Approach

<u>Question Number 1:</u>

What do we think the bilge and salvage system are for ?

Bilge ≠ Salvage

Salvage = Emergency Bilge

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# Goal Based Approach

Bilge:  The vessel is to be provided with a means to remove routine accumulation of liquids from within the watertight boundary.

Salvage/Emergency Bilge: The vessel is to be provided with a means to remove flood water from spaces within the watertight boundary.

Note: the current capacity of bilge/salvage/emergency bilge systems will not control unrestricted flooding from accidental or hostile damage.

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# Drainage

## Drainage System

### Functional Requirement:

The vessel is to be provided with a means to prevent the hazardous accumulation of liquids on deck and in spaces within the watertight boundary.

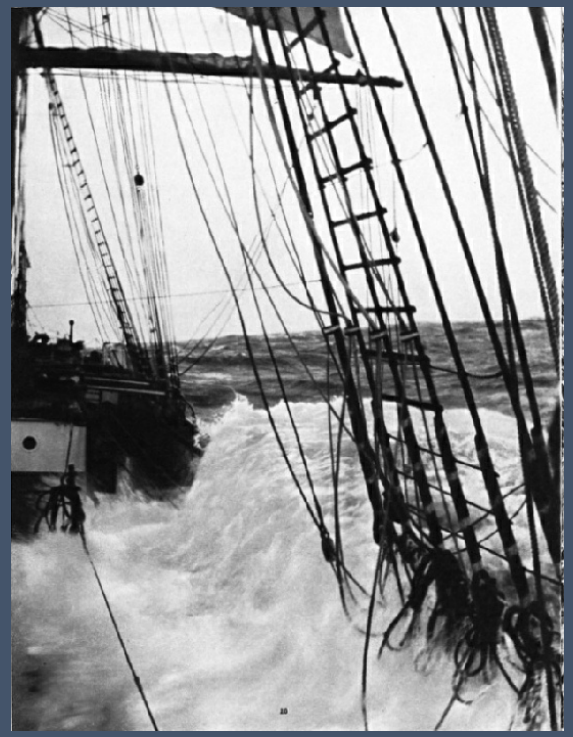
### Performance Requirement:

1. Adequate provision shall be made for the drainage of enclosed spaces, capable of operation in all foreseeable conditions.

2. All exposed decks shall be free draining.

### Solutions:

Drainage – Largely  the same as Naval Ship Code ChIII (based on SOLAS & Load Line)



# Flood Detection

## Flood Detection

### Functional Requirement:

The vessel is to be provided with a means of alerting control stations to the presence of flooding that may affect the essential safety or capability functions of the vessel.

### Performance Requirement:

A system is to provide indication to a main control station, and other control stations or locally, as required by the Naval Administration, of discharges from internal systems and ingress due to loss of hull integrity that would have a detrimental effect on stability and essential safety or capability functions. The system is also to provide information on the degradation of essential safety functions.

### Solutions:

In compartments that contain Essential Safety functions and Essential Operational functions
Provide real time information for DC prioritisation
Location requirements (vertical, longitudinal and transverse)
Alarms locally and at central and damage control stations

# Salvage/Emergency Bilge System

## Salvage/Emergency Bilge System

Functional Requirement:

The vessel is to be provided with a means to remove flood water from spaces within the watertight boundary.

Performance Requirement:

A system capable of removing the accumulation of flood water shall be provided. The system shall be sized on the greatest of the following scenarios:

- discharge of firefighting systems; e.g. 125%
- largest foreseeable hull system failure; e.g. 125%
- largest foreseeable internal system failure; e.g. 125%
- total penetration damage area in a boundary retaining flood water from a hostile event; and
- a minimum capacity as defined by the Naval Administration e.g. a pumping capacity of 200 tonnes/hour for type A ships and 100 tonnes/hour for type B and C ships.)

# Salvage/Emergency Bilge System

## Salvage/Emeregncy Bilge System

Performance Requirements Continued:

- The system or systems are to be able to operate continuously when submerged, or the system is to be capable of operating at minimum required capacity following the loss of a single watertight zone.
- The systems are to be rapidly operable from the central and damage control stations and a local dry location.
- Operation of the system is to be indicated to the central and damage control stations.
- Redundancy is required for essential compartments. Two independent suctions in each space located to provide suitable separation whilst being capable of operation in all foreseeable conditions.
- Guidance is to be provided on the maintenance, testing and operation of the system or systems.
- As agreed with the Naval Administration a supplementary salvage/emergency bilge capacity is to be provided by portable pumps. Power provision and a means of removing water is to be provided.

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# Bilge System

## Bilge System

In commercial standards the term “bilge” is used interchangeably for the collection of normal operational drain down and small-scale leakage, and emergency dewatering, however, these are separate functions with separate goals (although the systems may interface).

Functional Objective:

The vessel is to be provided with a means to remove routine accumulation of liquids from within the watertight boundary.

Performance Requirement:

A system capable of routinely removing Liquid from bilges as a result of minor system leakage, cleaning or maintenance procedures shall be provided.

Note: Minor system leakage is considered to be leakages from system joints at a rate that does not affect system performance or alternatively minor weather ingress or the collection of condensation.

The system shall have a capacity to remove the maximum level of Liquid in the bilge in an appropriate time, to maintain an empty bilge.

The system is to be of an approved type unless agreed by the Naval Administration;

The system is to prevent the discharge of oil or contaminated water to sea in normal operation.

Solution:

Based on SOLAS and Naval Requirements

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# Approvals

## Plan Approval and Survey

Information requirements
System drawings
Justifications for sizing
Guidance for the Ships Crew

## Commissioning Maintenance and Testing

Test & Maintenance Procedures
Demonstration of functionality through trials
New Construction or modified systems – Performance Verification.
Periodic demonstration of performance

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# Naval Ship Code

## Way Forward

Draft “de-watering” Chapter developed - Systems Approach

Preliminary Joint Chapter III & IV review conducted.

International Naval Safety Association Working Group established in 2023.

Technical Review and NShipC Integration in progress.

Change Proposal to be presented at 2023 AGM

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# De-Watering: A New Review

# Questions?