FAIRMONT SHIPPING SINGAPORE
TAMAR SHIP MANAGEMENT

# STRUCTURAL FAILURE / ASSESSMENT OF HULL DAMAGE

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| | **ACTION (NOT NECESSARILY IN ORDER)** |
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| ☐ | Sound general alarm, assemble crew and activate emergency contingency plan. |
| ☐ | Investigate where structure has failed and is there any ingress of water in any tank or compartment. |
| ☐ | In circumstances deemed justifiable for sending personnel onto decks that may be frequently awash with green water, at least two personnel should go to investigate. They should wear harnesses that attach them to a lifeline and to each other and should be in constant (radio) communication with the bridge. |
| ☐ | Inform the company of the incident and related information with master's view and comments. |
| ☐ | Whether voyage can continue or urgent repair is needed on way to destination port |
| ☐ | Handle the ship carefully so that the failure may not spread. Consider Slowing down, changing course, de-ballasting, etc. |
| ☐ | Check all emergency systems are ready for immediate use |
| ☐ | Check bilge & ballast pumps are lined up ready for immediate use. |
| ☐ | Refer loading manual/computer in relation with bending moment and shearing force and damage stability. |
| ☐ | Activate Damage Assessment for stability through office. Send vessel's load condition to office. |
| ☐ | Prepare life-saving equipment for evacuation if sustained damage is identified or suspected. However, abandonment by spoken orders of the master following assessment of the risk. |
| ☐ | Contact with a Maritime Rescue Co-ordination Centre (MRCC) in case of any suspicion that the ship is damaged. |
| ☐ | Send an URGENCY signal and upgrade to DISTRESS if the ship is confirmed as damaged. |
| ☐ | When a loss of hull integrity is known or suspected, personnel should not be sent onto decks that are being regularly submerged or deeply awash. |
| ☐ | When a loss of hull integrity is known and ship is in imminent danger, activate ABONDON SHIP contingency. |

# STRUCTURAL FAILURE / ASSESSMENT OF HULL DAMAGE



**STRUCTURAL FAILURE**

The structure failure may be caused due to sloshing/cargo movement damage to bulkhead or slamming damage to forward bottom. Routine sounding of tanks and void spaces and development of sudden list or trim do give an indication of structural failure.

Heavy cargo: Heavy cargo such as iron ore, steel product leave large unoccupied space in the cargo holds. In case of flooding, the large volume of water entered in cargo hold rapidly destroy the ship's residual buoyancy, its stability and makes vessel susceptible to structural failure due to increase of weights caused by the influx of water. Heavy cargoes place high loads on the structure, and structural failure is therefore more probable when subjected to the additional forces associated with flooding.

IMSBC Code Group A Cargo: When vessel is loaded with IMSBC Code Group A cargoes which are liable to liquefaction due to moisture, if the moisture content in the cargo is more than its TML or any ingress of water in the hold will turn such cargo rapidly in the liquid form, making vessel more susceptible to structural failure due to sloshing effect of liquid cargo and loss of GM due to free surface effect.

Structure: Deterioration of structure through corrosion, fatigue and damage is identified as a principal factor in the loss of many bulk carriers. Failing to identify such deterioration may lead to sudden and unexpected failure.

Forward flooding: Spaces forward of the collision bulkhead will, in the event of flooding, significantly affect the trim of the ship and reduce freeboard at the bow. In extreme weather condition, ship's ability to resist further escalation of flooding is compromised.

Early assessment: Master should quickly assess damage to their ships by being alert to water ingress and its consequences. The following guidelines are given to assist them in this assessment.

- Unusual motion or attitude of the vessel
- An unusual trim or heel
- Sudden changes of heel or trim will indicate flooding or in smaller ships with lighter cargoes it may indicate cargo shift.
- Jerky lateral motions can be indicative of large-scale sloshing as would be the case if a hold were flooded.
- Slowing of the ship's roll period may indicate excessive water within the hull - a serious threat to stability.
- Increases of water boarding forward decks may indicate flooding of a forward compartment. Trim and freeboard changes are notoriously difficult to assess from an after bridge.

Methods of detection:

- Hatch covers may be dislodged by pressure and/or sloshing from within a hold if
- flooding occurs through side shell or bulkhead.
- Sudden pressurization of compartments adjoining those that are damaged or flooded will indicate failure of internal subdivision, most notably bulkheads.
- Spaces may be monitored, either using gauging or bilge/water level alarms.
- Visual monitoring from the bridge using binoculars.
- Assessment of trim changes can in certain conditions be detected by noting the level of
- the horizon, when visible, against a known reference point on the foremast.
- Draught and trim can be assessed using draught gauges.

Investigation: Masters may wish to investigate any suspected water ingress more closely but preparations for evacuating the ship should be made WITHOUT DELAY and concurrent with any investigation. Remote methods of observation are preferable to sending personnel onto decks, particularly in bad weather and/or at night. Deck floodlights should be used if necessary to try and identify abnormalities. Detrimental effects on watchkeepers' night vision are of secondary importance in such circumstances.

Reference: MSC/Circ.1143