

Alternative Procedures for Testing Tanks and Tight Boundaries

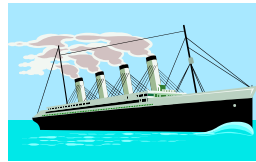
need Appropriate Quality Management Systems
Implemented by Shipyards



**The 3rd Report by O Kitamura
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The Beginning and Present

- Hydrostatic testing for fore peak, double bottom including duct keel, and inner skin has been required in **SOLAS** from **1929** or earlier.



- The latest SOLAS II-1/11 specifying testing of watertight boundaries and tanks at present has been effective from 1 January, **2009**.



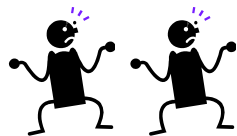
SOLAS Requirements



- Para 1: Testing watertight spaces not intended to hold liquids and cargo holds intended to hold ballast by filling with water is **not** compulsory.
- Para 2: The fore peak, double bottom (including duct keels) and inner skins shall be tested with water to a head up to the **bulkhead deck**.
- Para 3: Tanks which are intended to hold liquids shall be tested for **tightness** and **structural strength** with water to a head corresponding to **design pressure**.

Questions raised by EMSA

- European Maritime Safety Agency (**EMSA**) of **EC** questioned non-compliance of **Class (RO)** with SOLAS II-1/11 early in 2009, although recognizing that “established Industry practices” based on IACS UR had been applied for more than 15 years.
- Class reactions requiring hydrostatic tests more than ever and/or full scale stress measurements, etc. of shipbuilders have led to serious confusion.



Actions taken by IACS at MSC86

- At MSC86 (June, 2009), **IACS** and two member States proposed a new work item together with draft Guidelines on procedures for testing tanks and tight boundaries (**Testing Guidelines**), with a view to urging **IMO** to amend SOLAS II-1/11 again promptly.
- MSC86 agreed to task DE to tackle this issue.
- EMSA (EC) **did not oppose** amendments, but stressed, in particular, the necessity for Quality Control Standards implemented by Shipbuilders to assure structural design, fabrication and strength.

Discussion started at DE56

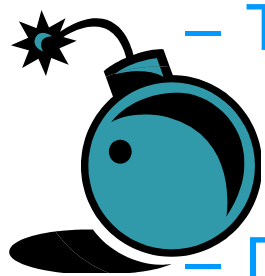


- DE54 (2010) and DE55 (2011) were fully booked.
- To DE56 (2012), IACS submitted draft Testing Guidelines of the latest version.
- DE56 agreed to take this issue forward and require Shipbuilders to implement appropriate Quality Management Systems (QMS), such as ISO9001 or equivalent, as proposed by China, Japan and Korea (**CJK**) in line with the opinion of EMSA.
- #1 Industry JWG was established to develop draft **Guidance to flag States on verification of QMSs for Shipbuilders (QMS Guidance)**.

Drastic change of direction at DE57

- To DE57 (2013), CJK and IACS submitted draft QMS Guidance, while IACS re-submitted draft Testing Guidelines of updated version.

- DE57 **failed** to consider and finalize draft QMS Guidance and Testing Guidelines because:



– There was **disagreement** among EC member States.

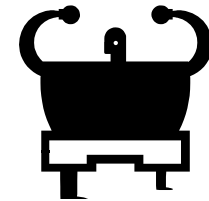
- Some member States insisted on mandatory hydrostatic testing of all tanks on all ships, supported by Shipping Industry **NGOs**.

– Draft QMS Guidance had not yet been **fully** discussed at #1 JWG and Shipping Industry NGOs were dissatisfied.

- Substantive actions were deferred to SDC1.

#2 JWG and restart at SDC1

- #2 intersessional JWG was re-established.
 - Japan, EMSA and BIMCO newly joined #2 JWG.
 - Some members required discussion on both draft Testing Guidelines and QMS Guidance.
 - Others proposed discussion on only draft QMS Guidance.
- To SDC1 (Jan. 2014), Japan submitted updated draft QMS Guidance, while IACS submitted updated draft Testing Guidelines once again for finalization.



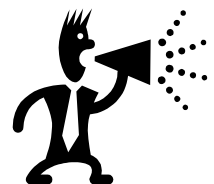
Views and ?s expressed at SDC1

- The absence of an equivalence between current SOLAS requirements and proposed alternative
- The possibility of decreasing the level of safety by replacement of physical (hydrostatic) tests with modelling (FEM) simulations
- Verification of each Shipbuilder's QMS by different flag States
- The need to take into account **dynamic** aspects of operational conditions



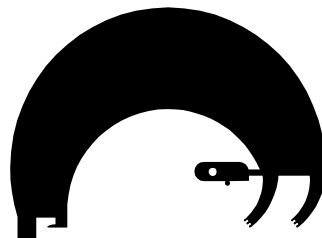
Is hydrostatic testing perfect ?

- Some members appealed that hydrostatic testing is the “only” reliable and final check to ensure that the structure has been properly designed and constructed.
- IACS refuted that hydrostatic testing could not confirm **real** design strength due to impracticality of superimposition of **dynamic** loading over **static** loading, and/or **global** loading over **local** loading.
- Status of no thickness diminution due to corrosion is an another obstacle to **“full”** confirmation.



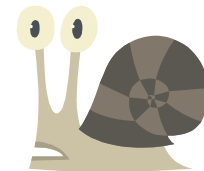
Is hydrostatic testing perfect ??

- Class rules, including H-CSR, concerning ultimate hull girder longitudinal strength, buckling strength of stiffened panel and localized stress concentration areas permit **plasticity** to a practical degree under the design (extreme) loading conditions.
 - We believe no Shipowner feels comfortable to see widely developed plastic deformation due to Testing before the delivery of his Ship.



Items noted or agreed at SDC1

- SDC1 noted:
 - **Sole** application of ISO9001 will not necessarily ensure the appropriate production quality; and
 - Highly outfitted spaces not intended to hold liquids should not be subject to hydrostatic tests.
- SDC1 agreed:
 - Current SOLAS II-1/11 does not necessarily include hydrostatic testing of “**all**” watertight boundaries; and
 - Intersessional **CG** should be established for further discussion and targeted completion of this issue at SDC2 (2015).



Work done to date by current CG

- CG members are from:
 - China, Finland, France, Germany, Greece, Japan, Korea, Netherlands, Spain, Thailand, Turkey and Vietnam;
 - EC (EMSA);
 - IACS;
 - CESA; and
 - BIMCO, ICS, INTERCARGO, INTERTANKO
- 3 rounds of written discussion and several informal meetings have been held.

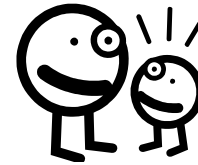


Diversified positions



- Some member alleges that Shipbuilders must not be exempted from hydrostatic testing of **all tanks on all ships** as required by current SOLAS.
- Some member insists that hydrostatic testing of **all cargo oil tanks on all tankers** should be compulsory.
- Some member requires that hydrostatic testing of **all tanks bounding cargo holds of bulk carriers** should be compulsory, too.
- Others consider partial exemption from hydrostatic testing of tanks may be approved by flag States.

Majority positions



- Current SOLAS needs to be amended so that exemption from hydrostatic testing of certain spaces may be approved by the flag State under specific conditions on a case by case basis.
- IMO should develop Guidance **to flag States** on verification of QMSs which are implemented by Shipbuilders, in which fabrication and welding inspection control should be covered in the context of testing tanks and tight boundaries based on the draft prepared by #2 JWG, taking into account IACS Rec. No.47 and UR Z23.

Shipbuilders' positions

- Modern and proven technologies concerning design, fabrication and testing should duly be incorporated into Rules and Regulations.
- Because of incompleteness of hydrostatic testing to confirm **real** design strength and tightness, structural safety should be ensured by appropriate QMS (**Primarily**) backed up with Testing (**Secondarily**) on a sampling basis, which follows standardized procedures specified in the Testing Guidelines.



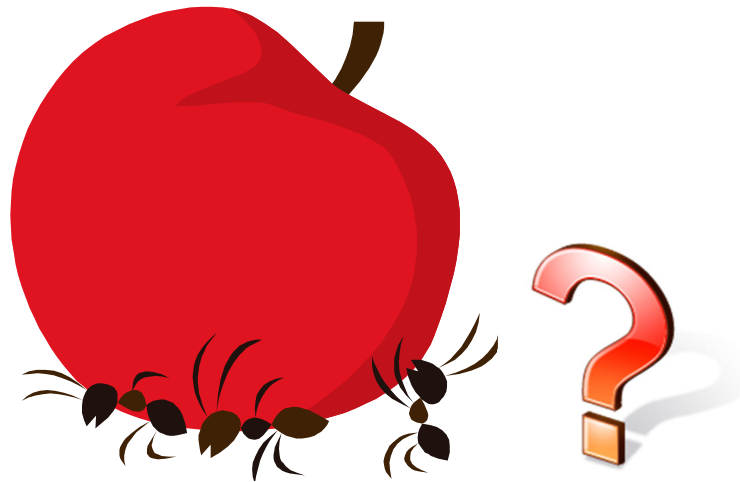
Shipbuilders' positions

- Flexible regime is needed to promote quality culture leading to ever-improving quality level of Ships **beyond** that expected by inflexible regime.



Prospects for the future

- What might be changed from present state ?
 - More hydrostatic testing of tanks and tight spaces including that on “sister ships”
 - Enhanced QMS
 - Authorization of conditional exemption from testing tanks and tight boundaries



Schedule

- Expected schedule:
 - Finalization at SDC2 (2015), Approval at MSC95 (2015), Adoption at MSC96 (2016) and Application early in 2018.



Lessons learned

- Lessons learned:
 - Shipbuilders should keep careful watch on what discussed and what to be discussed at IMO, etc.
 - Joint actions taken by Shipbuilders in a timely manner are needed not to invite unreasonable expansion of regulatory controls over Shipbuilding industry and extreme results missing practicality.
 - Asian Shipbuilding Associations cannot contribute to IMO directly in the present state.

