

Verification of Damage Stability Requirements for Tankers

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ABSTRACT

Regulations require that the ship's master is provided with such information as is necessary to enable him to assess the stability of the ship under varying conditions of service. The information is usually provided in the form of a loading and stability information booklet containing details of typical service and ballast conditions thereby enabling the master to evaluate the condition of loading to ensure compliance with the relevant intact and damage stability requirements.

This paper provides an overview of the existing regulatory requirements and discusses the ongoing debate on the verification of such compliance as required by the authorities.

KEYWORDS

Damage Stability; SOLAS; Stability; Verification;

INTRODUCTION

All cargo ships of 80m length and above, unless they comply with regulations in other IMO instruments, shall comply with the statutory damage stability requirements as specified in SOLAS parts B-1 through B-4. MARPOL, the IBC Code and the IGC Code stipulate the damage stability requirements for Oil Tankers, Chemical Tankers and Gas Tankers respectively.

The Ship's master, under these various International Instruments, is required to ensure that the ship is at all times loaded and operated in a safe and seaworthy manner. The regulations also require that the ship's master is provided with such information as is necessary to enable him rapidly and accurately assess the stability of the ship under varying conditions of service.

Enforcement of these regulations is normally ensured by the flag and/or port state authorities. It was through such enforcement that a flag state authority highlighted, at the IMO, the apparent lack of verification of compliance (with statutory damage stability requirements) by ships which are not loaded as per the typical conditions provided in their loading and stability manuals i.e. ships are loaded in 'alternate loading conditions'.

These regulations, however, have been subject to differing interpretations as to their intent and applicability thus affecting the consistency in compliance as well as of their enforcement by various authorities.

Notwithstanding the clear requirement for compliance with the regulations governing damage stability requirements, a unified/common interpretation of the relevant instruments is viewed as necessary to ensure consistency of approach to both, compliance as well as enforcement.

THE REGULATIONS

The proper stability of a ship, both, intact and in a statutory damage condition, is central to maintaining a vessel in a seaworthy condition.

Regulations in SOLAS Chapter II-1 (Stability) ; MARPOL Annex I Regulation 28; the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemical in Bulk (IBC Code – Chapter 2) and the International Gas Carrier Code (IGC Code – Chapter 2) require that proposed loading conditions are also verified as compliant with intact as well as statutory damage stability criteria.

Although the ship's master is provided with the information required to assess and evaluate the stability criteria of the ship, the *intact stability* of a vessel is usually assessed using an intact stability function attached to the basic loading computer program. This, however, only provides verification of compliance with intact stability requirements.

As regulations require that a ship also complies with the statutory *damage stability* requirements, each proposed loading condition must be checked for compliance with the appropriate requirements as stipulated in either MARPOL; the IBC Code or the IGC Code.

The *certificate of fitness* which is issued to chemical tankers and gas carriers specifically requires that the vessel should be loaded in accordance with a loading condition in the approved loading manual or that any alternate loading condition should be submitted to the appropriate authority for approval.

The regulations aim to provide an environment which ensures that every vessel is always operated and maintained in a safe and seaworthy manner.

COMPLIANCE & NON-COMPLIANCE

At the build stage of the vessel, the typical stability approval is usually in the form of an intact stability information booklet (SIB) which contains a limited set of sample loading conditions which are approved for intact stability criteria.

The corresponding information necessary for the approval of and verification that the sample loading conditions comply with damage stability requirements is usually submitted separately.

This verification/approval simply demonstrates that the sample loading conditions will survive the extent of damage as required by the applicable regulations. It does not approve every possible loading condition that the ship may operate under. Conditions of loading that are alternate to the samples in the stability information booklet are usually checked for compliance with longitudinal strength and intact stability using the computer provided onboard, however, these are not automatically checked for compliance with the requirements for statutory damage stability and must, therefore, be verified for compliance.

Ships would be in compliance if they loaded strictly to one of the sample conditions in the loading manual provided that the conditions have been also approved for statutory damage stability.

It must be noted that compliance in this manner is based on the condition that parameters such as the specific gravity of the cargo, the draft or trim, the number and location of empty/part-filled cargo tanks, the cargo/ballast distribution and the use of deck tanks are as outlined in the manual. Any changes to these parameters may put the condition in a state of *non-compliance for statutory damage stability*.

Ensuring compliance can be achieved by either:

- Loading in accordance with an approved condition from the SIB; or
- Verify an alternate loading condition using approved critical KG/GM data or curves; or
- Verify an alternate loading condition using a computer program which has been approved for statutory damage stability by the appropriate authority; or
- Verify an alternate loading condition by obtaining approval from flag or class; or
- Through manual calculations onboard.

What are the implications if an alternate loading condition is not in compliance?

Other than the fact that the vessel is not in compliance with the regulations it could be that when checked the vessel is compliant and that there would be no additional hazard.

Non-compliance could in the best case lead to very low or zero margins on stability or in the worst case lead to the immersion of air pipes and the eventual total loss of stability and of the loss of the vessel, crew and the cargo.

The use of deck tanks or the presence of partly filled tanks on vessels with low intact stability could lead to non-compliance and inability to survive damage conditions.

It is on ships with low margins of stability that loading "close to" or "not significantly different from" approved loading conditions would leave them unable to survive minimum statutory damage criteria.

It is the Master's and Owner's responsibility to ensure that the vessel is in compliance with the regulations. This is also embodied in the ISM system.

OBSERVATIONS OF FLAG STATES AND PORT STATE AUTHORITIES

Recent reviews by some flag states and port state authorities have led to the conclusion that there are a significant number of vessels that are operating in conditions of loading which are not verified as compliant with statutory damage stability requirements.

This observation has led to a request to the IMO to consider the matter with a view to develop a common interpretation of the relevant instruments so as to enable consistency in the application and verification as well as in the enforcement of the regulations.

The Paris MoU have recently conducted a concentrated inspection campaign (CIC) on this issue and from a sample of 1016 inspected ships 17% were found to be loading to unapproved conditions and 4.6% were making no valid statutory damage stability verification.

Based on these results, it can be extrapolated that from the existing worldwide tanker fleet approximately 1 in 20 ships do not verify non approved loading conditions for statutory damage stability compliance.

THE IMO RESPONSE - GUIDANCE

This issue was first raised in 2005 and has been discussed at the IMO where the sub-committee on Stability, Load-Lines and Fishing Vessels Safety (SLF) has agreed that guidelines providing a

common interpretation of the regulations should be developed and issued.

Recognising that the verification and approval of stability information for intact and statutory damage stability is done at both, the design as well as the operational stage of the ship's life, the SLF sub-committee is in the process of developing guidance for the interpretation of the regulations at both stages.

It is envisaged that with this guidance, expected to be finalised at SLF 54 (July 2011), the application of the regulations will be made consistent and will also provide a guide to those authorities enforcing the regulations.

CONCLUSIONS

The regulations requiring Verification of Compliance with Damage Stability Regulations exist - that is not in question.

The challenge is that the regulations are interpreted and applied consistently by all ships.

The increasing use of computing technology provides us with the most appropriate solution to the issue of on-board verification - a combined intact and statutory damage stability programme.

Alternately, the industry is presented with the more restrictive option of having each loading condition approved by class or other recognised organisation.

Irrespective of the methods used to verify compliance, the development of common interpretations and guidance will be a step in the right direction to enabling ship-builders and ship-operators to ensure that the ships are at all times maintained and operated in a safe and seaworthy manner.