Design Appraisal Document

Lloyd's Register EMEA
Stability, Load Line & Tonnage
UK&I Technical Support Office, Marine & Offshore
Global Technology Centre
Southampton Boldrewood Innovation Campus
Burgess Road, Southampton SO16 7QF

Date
08 February 2022

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GENERAL APPROVAL
Kongsberg Maritime AS, K-LOAD Version 5.0
INTACT AND DAMAGE STABILITY

1. GENERAL APPROVAL

1.1. The software listed in paragraph 1 of the appendix has been examined for compliance with Lloyd's Register's procedure "Approval of Strength and Stability calculations programs", Version 6, dated June 2018, and documents referred to therein, and is assigned an appraisal status as indicated, subject to the following.

1.2. This appraisal covers the following stability functions and the program is considered acceptable for evaluating stability compliance with the following Codes/Regulations,

- Ice Accumulation as a distributed deadweight item,
- International Code on Intact Stability General and Weather Criterion,
- Grain Code,
- Damage or combined intact and damage stability based on a limit curve,
- Direct Damage Statutory Assessment (Marpol/IBC/IGC) based on direct assessment of pre-defined damage cases.

1.3. In line with the above, General Approval is granted covering IACS Unified Requirements L5 (Rev.4 June 2020) Type 1, 2 and 3.

1.4. The Test Ship used is 80500DWT CABU CARRIER, Hull 677 (Balboa) IMO 9729740.

2. PROGRAM BASIS

2.1. Intact and damage stability is calculated directly from a three-dimensional model of the hull and compartments.

2.2. Intact stability is calculated to both port and starboard sides.

2.3. An initial heel alarm is set, this should be 1 degree or 0.5 degrees if carrying bulk grain.

2.4. Bulk grain stability calculations have been demonstrated for partly full and trimmed holds, full holds trimmed or untrimmed. Compliance is given through criteria assessment and pre-defined allowable grain heeling moments.

2.5. The General Approval does not cover holds with moveable decks or bulkheads.

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2.6. Ice accumulation can be defined as distributed deadweight items, it is up to the operator to define the ice accumulation adequately with reference to the Stability Manual.

2.7. Direct damage stability is calculated directly from a three-dimensional geometric hull and compartment model. Reference displacement can be configured to be intact or intact minus tank fluid outflow. The program calculates five intermediate stages on an added mass basis.

2.8. The damage stability results have been assessed based on the information received and compared to our independent assessment.

2.9. The program can assess damages in both directions; port and starboard.

2.10. The General Approval does not extend to progressive flooding occurring as part direct damage calculations.

2.11. The test ship has multiple modes of operation depending on cargo type, this has been demonstrated during the General Approval, however, the specifics of each ship should be reviewed separately where operational modes are applicable.

3. EXCLUSIONS

3.1. Bridge visibility, air draught and propeller immersion calculations are not covered by this general approval.

3.2. This approval does not cover use of damage stability calculations in actual compartment flooding situations.

3.3. This approval only applies to the 'offline' planning mode with user definition of the loading condition, and not 'online' (with tank or draft gauging system input, for example).

3.4. For vessels required to comply with the 2008 Intact Stability Code, where installed, stability calculation software should cover all stability aspects relevant to the ship and is subject to approval.

3.5. It remains the responsibility of the Master to ensure the appropriate characteristics of each loaded cargo item are included in any assessment.

3.6. The Master should be aware that regular review of the vessels condition regarding stability should be undertaken on each voyage, particularly where significant changes are made to tank content during the voyage, for example, where ballast tanks are filled/emptied or consumable spaces emptied. Such changes may have significant impact on stability results.

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3.7. The supplier is responsible for ensuring that any computer software and hardware is capable of handling date changes without loss of performance or functionality. The capability of the computer software and hardware to handle date changes without the loss of performance or functionality has not been demonstrated to LR.

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Appendix

1. The documents listed below have been examined

Version	Title	Status	Date
5.0	**Kongsberg Maritime AS, K-LOAD**	**A**	**08-Feb-2022**

2. The documents listed below have been considered together with the submitted documents in the appraisal

Document No.	Rev.	Title
-	**-**	**Operator Manual K-Load, Loading computer system**

Appraisal Status Key

A Approved - provided the arrangements are to the surveyor's satisfaction