RULES

PUBLICATION 66/P

COMPUTER SOFTWARE FOR ONBOARD STABILITY CALCULATIONS

July
2021

Publications P (Additional Rule Requirements) issued by Polski Rejestr Statków
complete or extend the Rules and are mandatory where applicable.

GDAŃSK

Publication 66/P – Computer software for onboard stability calculations– July 2021 completes and extends the requirements of *Part IV – Stability and Subdivision* of the *Rules for Classification and Construction of Sea-going Ships*.

This Publication was approved by the PRS S.A. Board on 24 May 2021 and enters into force on 1 July 2021.

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PRS/RP, 05/2021

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1 GENERAL PROVISIONS

1.1 The requirements are applicable to software which calculates the stability of actual loading conditions and which is installed on ships and on units subject to compliance with the *1966 Load Line Convention* or the *1988 Protocol* to the *Load Line Convention*, as amended, the IMO *MODU Code* and/or the 2008 *IS Code*.

1.2 The use of onboard computers for stability calculations is not a requirement of PRS class.

1.3 Stability software installed onboard shall cover all mandatory class and statutory intact and damage stability requirements applicable to the ship.

1.4 The present *Publication*, which requires approval of software installed on board computers which is, capable of performing stability calculations.

2 APPLICATION

2.1 The requirements of the present *Publication* apply to stability software on ships contracted for construction on or after 1 July 2005.

2.2 This *Publication* covers passive systems and the off-line operation mode of active systems only.

3 GENERAL REQUIREMENTS

3.1 The scope of a stability calculation software shall be in accordance with the *Stability Information* as approved by PRS or the administration and shall at least include all information and perform all calculations or checks as necessary to ensure compliance with the applicable stability requirements.

3.2 Approved stability software is not a substitute for the approved stability information, and is used as a supplement to the approved *Stability Information* to facilitate stability calculations.

3.3 The input/output information shall be easily comparable with approved *Stability Information* so as to avoid confusion and possible misinterpretation by the operator relative to the approved stability information.

3.4 An operation manual shall be provided for the onboard computer stability software.

3.5 The language in which the stability information is displayed and printed out as well as the operation manual is written shall be the same as used in the ship's approved *Stability Information*. PRS may require a translation into a language considered appropriate.

3.6 The onboard computer software for stability calculations is ship specific and the results of the calculations are only applicable to the ship for which it has been approved.

3.7 In case of modifications implying changes in the main data or internal arrangement of the ship, the specific approval of any original stability calculation software is no longer valid. The software shall be modified accordingly and re-approved.

4 CALCULATION SYSTEMS

4.1 A passive system requires manual data entry.

4.2 An active system replaces the manual entry with sensors reading and entering the contents of tanks, etc.

5 TYPES OF STABILITY SOFTWARE

5.1 Four types of calculations performed by stability software are acceptable depending upon ship stability requirements:

.1 Type 1 – software calculating intact stability only (for vessels not required to meet a damage stability criterion);

.2 Type 2 – software calculating intact stability and checking damage stability on basis of:
- a limit curve (e.g. for vessels applicable to SOLAS II-1 Part B-1 damage stability calculations, etc.) or checking all the stability requirements (intact and damage stability) on the basis of a limit curve.

.3 Type 3 – software calculating intact stability and damage stability by direct application of preprogrammed damage cases based on the relevant Conventions or Codes for each loading condition (for some tankers etc.);

.4 Type 4 – software calculating damage stability associated with an actual loading condition and actual flooding case, using direct application of user defined damage, for the purpose of providing operational information for safe return to port (SRtP).

Damage stability of both Type 3 and Type 4 stability software shall be based on a hull form model, that is, directly calculated from a full three-dimensional geometric model.

6 FUNCTIONAL REQUIREMENTS

6.1 The calculation program shall present relevant parameters of each loading condition in order to assist the Master in his judgement on whether the ship is loaded within the approval limits. The following parameters shall be presented for a given loading condition:
- deadweight data,
- lightship data,
- trim,
- draft at the draft marks and perpendiculars,
- summary of loading condition displacement,
- VCG,
- LCG,
- TCG (if applicable),
- downflooding angle and corresponding downflooding opening, (not applicable for Type 2 software which uses limit curve for checking all the stability requirements. However, if intact stability criteria are given in addition to the limit curve, downflooding angle and the corresponding downflooding opening shall be indicated);
- listing of all calculated stability criteria, the limit values, the obtained values and the conclusions (criteria fulfilled or not fulfilled), (not applicable for Type 2 software which uses limit curve for checking all the stability requirements. However, if intact stability criteria are given in addition to the limit curve, the limit values, the obtained values and the conclusion shall be indicated).

6.2 A clear warning shall be given on screen and in hard copy printout if any of the loading limitations are not complied with.

Loading limitations shall include, but may not be limited to:
- trim, draught, liquid densities, tank filling levels, initial heel;
- use of limit KG/GM curves in conjunction with above for Type 2;
- extrictions to the stowage height for timber where timber load lines are assigned.

6.3 Type 3 software is to include pre-defined relevant damage cases for both side of the ship according to the applicable rules for automatic check of a given loading condition.

6.4 The date and time of a saved calculation shall be part of the screen display and hard copy printout.

6.5 Each hard copy printout shall contain identification of the calculation program including version number.

6.6 Units of measurement shall be clearly identified and used consistently within a loading calculation.

6.7 For Type 3 and Type 4 software, the system shall be pre-loaded with a detailed computer model of the complete hull, including appendages, all compartments, tanks and the relevant parts of the superstructure considered in the damage stability calculation, wind profile, down-flooding and up-flooding openings, cross-flooding arrangements, internal compartment connections and escape routes, as applicable and according to the type of stability software.

6.8 For Type 1 and Type 2 software, in case a full three dimensional model is used for stability calculations, the requirements of the computer model are to be as per paragraph 4.1.7 above to the extent as applicable and according to the type of stability software

6.9 Further requirements for Type 4 stability software

6.9.1 The normal (Type 1, 2 and 3) and SRtP (Type 4) software need not be “totally separated”. Where the normal and SRtP software are not totally separated:
- the function of switching between normal software and Type 4 software shall be provided.
- the actual intact loading condition is to be the same for both functions (normal operation and SRtP); and
- the SRtP module needs only to be activated in case of an incident.

Approval of Type 4 (SRtP) software is for stability only.

6.9.2 In passenger ships which are subject to SRtP and have an onboard stability computer and shore-based support, such software need not be identical.

6.9.3 Each internal space shall be assigned its permeability as shown below, unless a more accurate permeability has been reflected in the approved stability information.

Spaces	Permeability			
	Default	Full	Partially filled	Empty
Container Spaces	0.95	0,70	0,80	0,95
Dry Cargo spaces	0.95	0,70	0,80	0,95
Ro-Ro spaces	0.95	0,90	0,90	0,95

Spaces	Permeability			
	Default	Full	Partially filled	Empty
Cargo liquids	0.95	0,70	0,80	0,95
Intended for consumable liquids	0.95	0,95	0,95	0,95
Stores	0.95	0,60	(0,60)	0,95
Occupied by machinery	0.85			
Void spaces	0.95			
Occupied by accommodation	0.95			

6.9.4 The system shall be capable of accounting for applied moments such as wind, lifeboat launching, cargo shifts and passenger relocation.

6.9.5 The system shall be capable of assessing the impact of open main watertight doors on stability (e.g. for each damage case provided for verification, additional damage stability calculation shall be done and presented, taking into account any watertight door located within the damaged compartment(s)).

6.9.6 The system shall utilize the latest approved lightship weight and centre of gravity information.

6.9.7 The output of the software is to be such that it provides the master with sufficient clear unambiguous information to enable quick and accurate assessment of the stability of the vessel for any actual damage, the impact of flooding on the means of escape and the controls of devices necessary for managing and/or controlling the stability of the ship.

When the actual loading condition is input in the SRtP software, the following output (intact stability) shall be available:
- deadweight data;
- lightship data;
- trim;
- heel;
- draft at the draft marks and perpendiculars;
- summary of loading condition displacement, VCG, LCG and, if applicable, TCG;
- downflooding angle and corresponding downflooding opening;
- free surfaces;
- GM value;
- GZ values relevant to an adequate range of heeling (not less than 60°) available indicatively at the following intervals: 0 5 10 15 20 25 30 40 50 60 deg;
- compliance with relevant intact stability criteria (i.e. 2008 IS Code): listing of all calculated intact stability criteria, the limiting values, the obtained values and the evaluation (criteria fulfilled or not fulfilled);
- GM/KG limiting curve according to SOLAS, II-1, Regulation 5-1.

When the actual loading condition is associated to the actual damage case(s) due to the casualty, the following output (damage stability) shall be available:
- trim;
- heel;

- draft at the draft marks and perpendiculars;
- progressive flooding angle and corresponding progressive flooding openings;
- GM value;
- GZ values relevant to an adequate range of heeling (not less than 60°) available indicatively at the following intervals: 0 5 10 15 20 25 30 40 50 60 deg;
- compliance with stability criteria: listing of all calculated stability criteria, the limit values, the obtained values and the conclusions (criteria fulfilled or not fulfilled);
- the survivability criteria for Type 4 software (SRtP) are left to the discretion of the Administration;
- relevant flooding points (unprotected or weathertight) with the distance from the damage waterline to each point;
- list of all flooded compartments with the permeability considered;
- amount of water in each flooded compartment;
- escape route immersion angles;
- profile view, deck views and cross-sections of the ship indicating the flooded waterplane and the damaged compartments.

6.9.8 For ro-ro passenger ships there shall be algorithms in the software for estimating the effect of water accumulation on deck (WOD) (e.g. 1**.** In addition to the predefined significant wave height taken from the approved stability document, there shall be possibility for the crew to input manually the significant wave height of the ship navigation area in the system; 2. In addition to the predefined significant wave height taken from the approved stability document, calculations with two additional significant wave heights shall be submitted for checking the correctness of the algorithms in the software for estimating the effect of WOD). *

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* *This paragraph applies to Ro-Ro Passenger ships subject to the Stockholm Agreement (IMO Circular Letter No. 1891).*

7 REVISED GUIDELINES ON IMPLEMENTATION OF REQUIREMENTS OF SOLAS II-1/8-1.3 FOR PASSENGER SHIPS CONSTRUCTED ON OR AFTER 13 MAY 2016 FOR SAFE RETURN TO PORT

7.1 When an onboard stability computer is provided in accordance with Regulation II-1/8-1.3.1, it should be capable of receiving and processing manual and electronic data to provide regularly updated operational information on the residual damage stability of the ship after a flooding casualty. Two-way communication links to shore-based support should also be available to provide the master with post-damage residual structural strength information.

7.2 When shore-based supports is provided in accordance with Regulation II-1/8-1.3.2, the system referred to these Guidelines should comprise two-way communication links to the shore-based support with a stability computer capable of receiving and processing manual and electronic data to provide the master with regularly updated operational information on the residual damage stability of the ship after a flooding casualty. In addition, the shore-based support should also have the capability to provide the master with post-damage residual structural strength information.

7.3 The stability computers should utilize software with the following capabilities:

.1 Using the pre-damage loading condition, software calculating the residual damage stability following any flooding casualty by processing data from both manual entry and from sensor readings to compute operational information required by the master.

.2 Detailed computer model of the entire hull, including superstructures and appendages, all internal compartments and tanks, etc..

.3 Up-flooding/down-flooding points, cross-flooding arrangements, escape routes, ship profile and watertight door status (i.e. open or closed).

.4 Windage area; account for the effect of wind by using the method in Regulation II-1/7-2.4.1.2 as the default, but allow for manual input of the wind speed / pressure if the on-scene pressure is significantly different (P = 120 N/m^2 equates to Beaufort 6, approximately 13.8 m/s or 27 knots).

.5 Be capable of accounting the impact of open main watertight doors on stability.

.6 The system should be pre-loaded with a detailed computer model of the complete hull, including appendages, all compartments, tanks and the relevant parts of the superstructure considered in the damage stability calculation, wind profile, down-flooding and up-flooding openings, cross-flooding arrangement, ~~internal compartment,~~ internal compartment connections and escape routes. Each internal space should be assigned its standard Regulation II-1/7-3 permeability, unless a more accurate permeability has been calculated.

.7 At least two independent stability computers should be available at all times (either two onboard, or two through shore-based support, or one each), which are capable of receiving and processing the data necessary to provide operation information to the master.

.8 The system should utilize the latest approved lightship weight and centre of gravity information in accordance with valid approved documentation,

.9 Details of all and any the damage location(s) and extent(s) or the damaged compartments should be input manually by the ship staff and combined with the data from electronic sensors such as draught gauges, tank level devices, watertight door indicators and flooding level sensors. If it is considered that at any time that a sensor or sensors are faulty or damaged, the ship staff should be able to override the sensor data with manual data. The system should clearly indicate to the operator if a sensor that should be available is being manually overridden.

.10 The system should always be updated to current loading condition which will form the basis of any damage stability calculation.

.11 The system should be capable of accounting for applied moments such as wind, lifeboat launching, cargo shifts and passenger relocation.

.12 The system should output the residual *GZ* curve both graphically and numerically. It should also provide the following information: draught (forward, midships and aft), trim, heel angle, GZ_{max}, *GZ* range, vanishing angle of stability, down-flooding immersion angles and escape route immersion angles;

.13 The output format and units of the information supplied by the ship staff or shore-based support team should be consistent with the format and units of the approved *Stability Booklet.* The system should show a profile view, deck views and cross-sections of the ship indicating the flooded waterplane and the damaged compartments.

7.4 The output should be within the tolerances specified in Chapter 8.

7.5 An operation manual should be provided for the system software printed in a language in which the ship staff are fully conversant. The manual should also indicate the limitations of the system.

7.6 At least two independent stability computers should be available at all times.

7.7 The onboard system should have an uninterruptible power supply (UPS) connected to both main and emergency switchboards.

7.8 At least two crew members should be competent in the operation of the system including the communication links to the shore-based support. They should be capable of interpreting the output of the system in order to provide the required operational information to the master.

7.9 When shore-based support is provided in accordance with Regulation II-1/8-1.3.1.2 there should be a contract for the supply of shore based support at all times during the validity of the ship's certificate.

7.10 When shore-based support is provided in accordance with regulation II-1/8-1.3.2, the shore-based support should be manned by adequately qualified persons with regard to stability and ship strength; not fewer than two qualified persons should be available to be on call at all times. The shore-based support should be operational within one hour (i.e. with the ability to input details of the condition of the ship, including structural damage, as instructed).

7.11 The software should also incorporate PRS requirements for hull strength.

7.12 For ro-ro passenger ships there should be algorithms in the software for estimating the effect of water accumulation on deck (WOD).

7.13 The stability aspects of the system should be initially approved by PRS and periodically checked against validated test conditions based on a number of loading/damage scenarios from the approved *Stability Booklet*.

7.14 Equivalent arrangements for the provision of operational information to the master following a flooding casualty may be employed to the satisfaction of the Administration.

7.15 The system is not intended to compute transient asymmetrical flooding whereby the ship could capsize under the immediate inrush of floodwater before there is time for equalization measures to take effect.

7.16 The system is not intended to make any allowance for the motion of the ship in a seaway, including the effect of tide current or wave action.

7.17 The system should have the capability of using the same detailed hull model for damage control drills or to assess potential damage and stability scenarios during a flooding casualty. This should not interfere with the ability of the onboard computer or shore-based support to monitor the actual situation and provide operational information to the master.

8 ACCEPTABLE TOLERANCES

8.1 Depending on the type and scope of programs, the acceptable tolerances are to be determined differently, according to 7.2.1 or 7.2.2. Deviation from these tolerances shall not be accepted unless the PRS considers that there is a satisfactory explanation for the difference and that there will be no adverse effect on the safety of the ship. Deviation from these tolerances shall not be accepted unless the PRS considers that there is a satisfactory explanation for the difference and that there will be no adverse effect on the safety of the ship.

Examples of the pre-programmed input data include the following:

Hydrostatic data:	Displacement, *LCB, LCF, VCB,* KM_t and *MCT* versus draught.
Stability data:	*KN* or *MS* values at appropriate heel/trim angles versus displacement, stability limits.
Compartment data:	Volume, *LCG, VCG, TCG* and *FSM* (Grain heeling moments versus the level of the compartment's contents).

Examples of the output data include the following:

Hydrostatic data: Displacement, *LCB, LCF, VCB, KM$_t$* and *MCT* versus draught as well as actual draughts, trim.

Stability data: *FSC* (free surface correction), *GZ*-values, *KG, GM, KG/GM* limits, allowable grain heeling moments, derived stability criteria, e.g. areas under the *GZ* curve, weather criteria.

Compartment data: Calculated Volume, *LCG, VCG, TCG* and *FSM* (grain heeling moments versus the level of the compartment's contents).

8.2 The computational accuracy of the calculation program results shall be within the acceptable tolerances, specified in .1 or .2, of the results using an independent program or the approved *Stability Information* with the identical input:

.1 Programs which use only pre-programmed data from the approved *Stability Information* as the basis for stability calculations, shall have zero tolerances for the printouts of input data. Output data tolerances are to be close to zero, however, small differences associated with calculation rounding or abridged input data are acceptable. Additionally differences associated with the use of hydrostatic and stability data for trims that differ from those in the approved *Stability Information*, are subject to PRS acceptance in each particular case.

.2 Programs which use hull form models as their basis for stability calculations, shall have tolerances for the printouts of basic calculated data established against either data from the approved stability information or data obtained using the approval authority's model. Acceptable tolerances shall be in accordance with Table 1.

Table 1

Hull form dependent	**Acceptable tolerance**
Displacement	+/– 2%
Longitudinal centre of buoyancy, from *AP*	+/– 1%, 50 cm
Vertical centre of buoyancy	+/– 1%, 5 cm
Transverse centre of bouyancy	+/– 0.5% *B*, 5 cm
Longitudinal centre of flotation, from *AP*	+/– 1%, 50 cm
Moment to trim 1 cm	+/–2%
Transverse metacentric height	+/– 1%, 5 cm
Longitudinal metacentric height	+/– 1%, 50 cm
Cross curves of stability	+/–5 cm
Compartment dependent	
Volume or deadweight	+/– 2%
Longitudinal centre of gravity, from *AP*	+/– 1%, 50 cm
Vertical centre of gravity	+/– 1%, 5 cm
Transverse centre of gravity	+/– 0.5% *B*, 5 cm
Free surface moment	+/– 2%
Shifting moment	+/– 5%
Level of contents	+/– 2%
Trim and stability	
Draughts (forward, aft, mean)	+/– 1%, 5 cm
GM$_t$ (both solid and corrected for free surfaces)	+/– 1%, 5 cm

Hull form dependent	Acceptable tolerance
GZ values	+/– 5%, 5 cm
Flooding angle	+/– 2°
Equilibrium angle	+/– 1°
Distance from *WL* to unprotected and weathertight openings or other relevant point, if applicable	+/– 5%, 5 cm
Areas under the righting lever curve	+/– 5% or 0.0012 mrad

Notes:
1. Deviation in % = {(base value – applicant's value)/base value} × 100.
2. Where the "base value" may be taken from the approved *Stability Information* or the PRS's computer model.
3. When applying the tolerances in Table 1 having two values, the allowable tolerance is the greater of the two values.
4. Where differences in calculation methodology exist between the programs used in the comparison, this may be a basis for accepting deviations greater than that specified in Table 1 provided a software examination is carried out in sufficient detail to clearly document that such differences are technically justifiable.
5. Deviation from these tolerances shall not be accepted unless the Society considers that there is a satisfactory explanation for the difference and that it is clearly evident from the Society's stability calculations that the deviation does not impact compliance with the required stability criteria for the ship under consideration.

9 APPROVAL PROCEDURE

9.1 The onboard software used for stability calculations is subject to approval, which is to include:
- verification of type approval, if any,
- verification that the data used is consistent with the current condition of the ship,
- verification and approval of the test conditions,
- verification that the software is appropriate for the type of ship and stability calculations required,
- verification of functional requirements under paragraph 6.2.

9.2 The satisfactory operation of the software with the onboard computer(s) for stability calculations is to be verified by testing upon installation (refer to Chapter 12). A copy of the approved test conditions and the operation manual for the computer/software are to be available on board.

10 GENERAL APPROVAL

10.1 Upon application to PRS for general approval of the calculation program, PRS shall provide the applicant with the test data consisting of two or more design data sets, each of which is to include a ship's hull form data, compartmentation data, lightship characteristics and deadweight data, in sufficient detail to accurately define the ship and it's loading condition. Acceptable hull form and compartmentation data may be in the form of surface coordinates for modelling the hull form and compartment boundaries, e.g.: a table of offsets, or in the form of pre-calculated tabular data, e.g.: hydrostatic tables, capacity tables, etc., depending upon the form of data used by the software being submitted for approval.

10.2 Alternatively, the general approval may be given based on at least two test ships agreed upon between PRS and the applicant.

10.3 In general, the software shall be tested for two types of ships for which the approval is requested, with at least one design data set for each of the two types. Where approval is requested

for only one type of ship, a minimum of two data sets for different hull forms of that type of ship are required to be tested.

10.4 For calculation software which is based on the input of the hull form data, the design data sets shall be provided for three types of ships for which the software is requested to be approved, or a minimum of three data sets for different hull forms if the approval is requested for only one type of ship.

10.5 Representative ship types which require different design data sets due to their hull forms, typical arrangements, and nature of cargo include:
- tanker,
- bulk carrier,
- container ship,
- dry cargo ship,
- passenger ship.

10.6 The test data sets shall be used by the applicant to run the calculation program for the test ships.

10.7 The results obtained (together with the hydrostatic data and cross-curve data developed by the program, if appropriate) shall be submitted to PRS for the assessment of the program's computational accuracy.

11 SPECIFIC APPROVAL

11.1 PRS shall verify the accuracy of the computational results and actual ship data used by the calculation program for the particular ship on which the program will be installed.

11.2 Upon application to the PRS for data verification, PRS and the applicant shall agree on a minimum of four loading conditions, taken from the ship's approved *Stability Information*, which are to be used as the test conditions. For ships carrying liquids in bulk, at least one of the conditions shall include partially filled tanks. [For ships carrying grain in bulk, one of the grain loading conditions shall include a partially filled grain compartment.] Within the test conditions each compartment shall be loaded at least once. The test conditions shall cover the range of load draughts from the deepest envisaged loaded condition to the light ballast condition and shall include at least one departure and one arrival condition. For Type 4 stability software for SRtP, the Society shall examine at least three damage cases, each of them associated with at least three loading conditions taken from the ship’s approved stability information. Output of the software is to be compared with results of corresponding load / damage case in the approved damage stability booklet or an alternative independent software source.

11.3 PRS shall verify that the following data, submitted by the applicant, is consistent with arrangements and most recently approved lightship characteristics of the ship according to current plans and documentation on file with PRS, subject to possible further verification on board:
- lightship data.
- identification of the calculation program including version number.
- main dimensions, hydrostatic particulars and, if applicable, the ship profile.
- the position of the forward and after perpendiculars, and if appropriate, the calculation method to derive the forward and after draughts at the actual position of the ship's draught marks.

- ship lightweight and centre of gravity derived from the most recently approved inclining experiment or light weight check.
- lines plan, offset tables or other suitable presentation of hull form data if necessary for PRS to model the ship.
- compartment definitions, including frame spacing, and centres of volume, together with capacity tables (sounding/ullage tables).
- free surface corrections, if appropriate.
- cargo and consumables distribution for each loading condition.

11.3.1 Verification by the PRS does not absolve the applicant and shipowner of responsibility for ensuring that the information programmed into the onboard computer software is consistent with the current condition of the ship.

12 OPERATION MANUAL

12.1 A simple and straightforward operation manual, containing descriptions and instructions, as appropriate, shall be provided for at least the following:

- installation,
- function keys,
- menu displays,
- input and output data,
- required minimum hardware to operate the software,
- use of the test loading conditions,
- computer-guided dialogue steps,
- list of warnings.

13 INSTALLATION TESTING

13.1 To ensure correct working of the computer after the final or updated software has been installed, it is the responsibility of the ship's Master to have test calculations carried out in the presence of a PRS surveyor.

13.2 In order to check the correct operation of both hardware and software, at least one load case (other than light ship) from the approved test conditions shall be calculated.

13.3 Steps to be performed:

- retrieve the test load case and start a calculation run; compare the stability results with those in the documentation.
- change several items of deadweight (tank weights and the cargo weight) sufficiently to change the draught or displacement by at least 10%. The results shall be reviewed to ensure that they differ in a logical way from those of the approved test condition.
- revise the above modified load condition to restore the initial test condition and compare the results. Confirm that the relevant input and output data of the approved test condition have been replicated.
- alternatively, one or more test conditions shall be selected and the test calculation performed by entering all the deadweight data for each selected test condition into the program as if it were a proposed loading. The results shall be verified as identical to the results in the approved copy of the test conditions.

Notes:

- Actual loading condition results are not suitable for checking the correct working of the computer.
- Normally, the test conditions are permanently stored in the computer.

14 PERIODICAL TESTING

14.1 It is the responsibility of the ship's Master to check the accuracy of the onboard computer for stability calculations at each Annual Survey by applying at least one approved test condition.

14.2 If a PRS surveyor is not present for the computer check, a copy of the test condition results obtained by the computer check is to be retained on board as documentation of satisfactory testing for the surveyor's verification.

14.3 At each class renewal survey this checking for all approved test loading conditions shall be done in the presence of the surveyor.

15 OTHER REQUIREMENTS

15.1 Protection against unintentional or unauthorised modification of the programs and data shall be provided.

15.2 The program shall monitor operation and activate an alarm when the program is incorrectly or abnormally used.

15.3 The program and any data stored in the system shall be protected from corruption by loss of power.

15.4 Error messages with regard to limitations such as filling a compartment beyond capacity, or exceeding the assigned load line, etc. shall be included.

List of amendments effective as of 1 January 2021

Item	*Title/Subject*	*Source*
6.9.5	The point has been deleted, subsequent paragraphs have been renumbered	MSC 1/Circ.1532 rev.1
7	Changes in the text was made (upgrade-revised)	MSC 1/Circ.1532 rev.1

List of amendments effective as of 1 July 2021

Item	*Title/Subject*	*Source*
6.3	Type 3 software	IACS UI L5 rev.4