SARC
MARITIME SOFTWARE AND SERVICES

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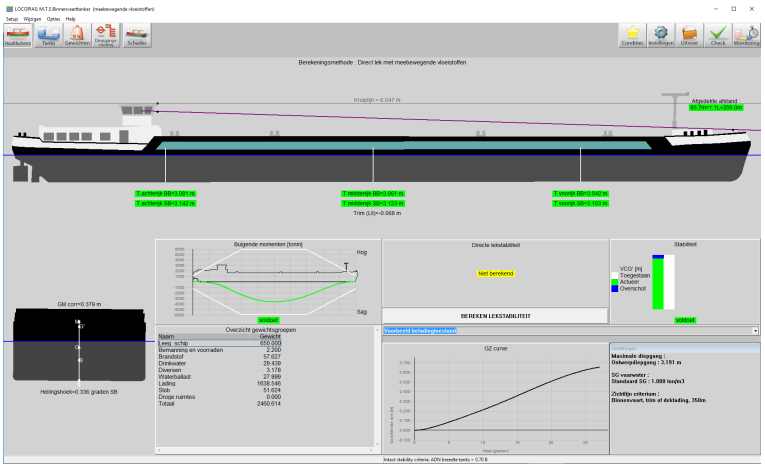
Manual of LOCOPIAS[1]
Inland Waterway Vessels

Loading Computer Software



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Contents

Chapter 1

Preliminary notes

Ship-specific data.
This manual contains a general description of background and *modus operandi* of the LOCOPIAS software. Particulars which are specific for a vessel or installation are included in a separate document, labelled "Ship-specific data and test conditions".

Test your loading software at regular intervals.
Your software contains some unmodifiable loading conditions, the so-called test conditions. These are intended to be used for verification of the correct operation of LOCOPIAS. Be sure to compute the test conditions (as discussed in section 3.8 on page 15, Output) at frequent intervals and compare the program results with the output as included in the "Ship-specific data and test conditions" booklet. A record of these verifications can be kept using the forms as included in the last chapter of that booklet.
For a detailed description of the verification procedure see chapter 6 on page 74, Verification of the calculation results.

Pictures and tables presented in this manual are used as examples only.
The examples from this general manual are fictional and do not refer to your specific ship.

Users of LOCOPIAS must be qualified.
Correct definition of input data and correct interpretation of calculation results requires a certain level of training and skill; it is of vital importance to make sure that the person operating LOCOPIAS is indeed qualified for these operations. This remains the responsibility of the master.

Terms of use of the software.
See section 9.2 on page 93, License conditions.

The structure of this manual.
On the next page the manual starts, directly aimed at the ship-related aspects, such as loading and stability, while computer-related subjects can be found at the end of this manual. That is a well-considered choice, made in order to concentrate on the heart of the matter. Those who wish to focus on the operation of LOCOPIAS first can now refer to section 8.1 on page 85, Operation of LOCOPIAS and general functions and section 8.3 on page 86, Preview of output to screen, and export of computation results. For installation of LOCOPIAS please refer to section 8.6 on page 89, Installation of LOCOPIAS

Chapter 2

Loading Software

LOCOPIAS is on-board loading computer software. Derived from PIAS[1], it uses the same proven technology to achieve optimum loading within the limits for strength, stability, draft, etc. This ensures optimal loading and maximum safety of the vessel, its crew, payload or passengers and the environment.

2.1 General

2.1.1 Invoking LOCOPIAS

After the Installation of LOCOPIAS its icon, as depicted below, will be present on your computer desktop. You start LOCOPIAS by selecting this icon, then the LOCOPIAS Main window will appear.

2.1.2 Define and verify loading conditions

The purpose of LOCOPIAS is to verify that user-defined loading conditions comply with chosen criteria for (damage-) stability and strength. For this purpose, calculations of intact stability, damage stability, and longitudinal strength can be performed. The graphical user interface of LOCOPIAS (chapter 3 on page 8, LOCOPIAS Main window) offers on-screen verification as well as full reports printed on paper.

2.1.3 All types of vessels

LOCOPIAS is suitable for all kinds of vessels: dry cargo, passenger, container, RoRo, heavy lift, oil, chemical and gas tankers, special-purpose ships, naval vessels, inland waterway etc. LOCOPIAS can deal with single, composed and asymmetric hull forms, catamarans, trimarans and odd shapes.

2.1.4 Use of software

The software is intended for on-board use, but can be installed in the office or on a laptop PC as well for planning and backup ashore. Loading conditions can be exchanged between versions of LOCOPIAS for the same vessel. An installed version of LOCOPIAS cannot be used by multiple users simultaneously.

2.2 Basic features

2.2.1 Direct Calculations

LOCOPIAS performs calculations based on the actual shape of the hull form and geometry of compartments for every combination of trim, heel and draft instead of using precalculated tables of hydrostatics, cross-curves etc.

[1] https://www.sarc.nl/pias/

Calculations are therefore not limited in range of list and trim and interpolation errors are excluded, this leads to accurate calculation results. LOCOPIAS is accepted by all major classification societies and it complies with Categories B and C of ISO standard 16155.

2.2.2 Different modules for different types of cargo

Multiple modules and special tools to facilitate cargo planning are available. Depending on the type of ship and user requirements, modules can be integrated in the software for e.g.:

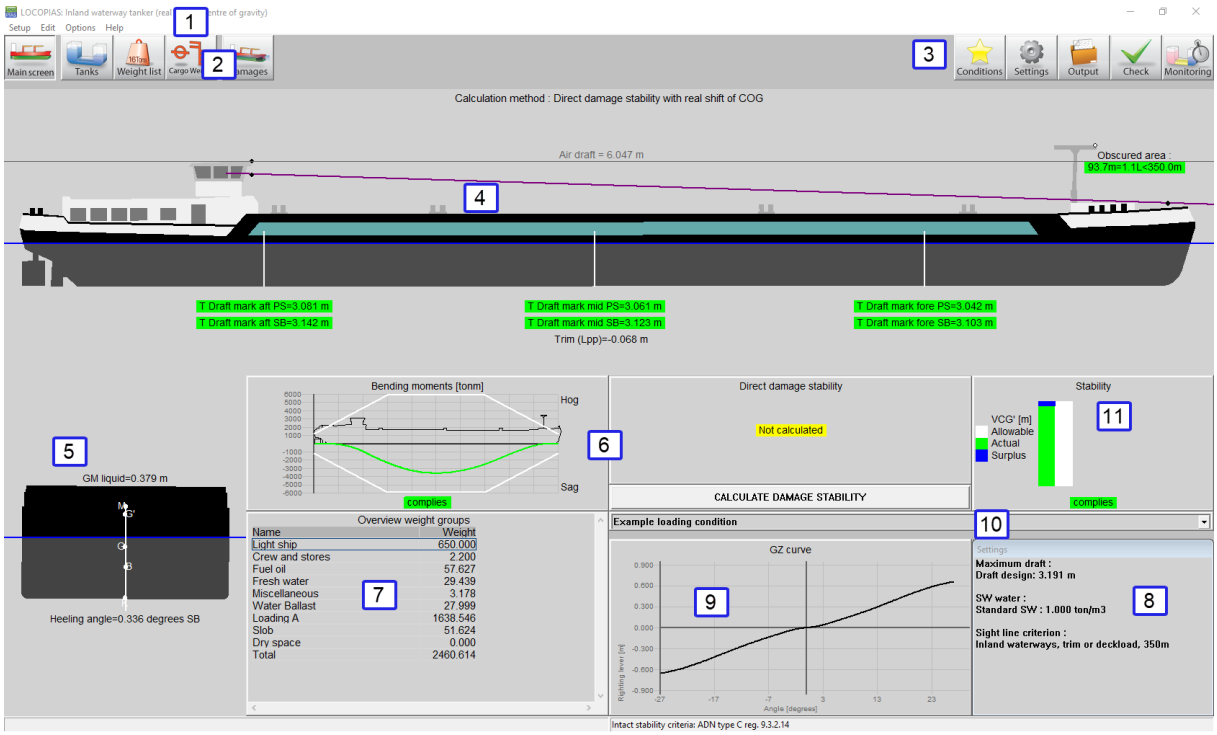
- Calculation of intact stability.
- Calculation of longitudinal strength and torsional moments.
- Calculation of damage stability.
- Tank filling.
- Damage control (evaluation of internal and external damages, including countermeasure advices).
- Container loading (including BAPLIE import/ export).
- Project- or general cargo loading.
- Roro loading.
- Grain and bulk loading.
- Positioning of hatch covers and tweendeck panels.
- Crane operation simulation, including dual crane operations.
- Interface with tank gauge system.
- Sounding, calculation of tank contents including the effect of list and trim.
- Calculation of anchor chain forces.
- Diagrams indicating dangerous seaways.
- Pipe stack module (deck load pipes incl. entrapped water).
- Line of sight.
- Cargo weight determination.

2.3 Assessing the stability and safety of the vessel

2.3.1 Start

This part of the manual helps you with the general steps that should be taken to assess the stability and safety of the vessel. How to perform the specific steps is explained in different parts of the manual. Links to those parts are provided in this chapter.

At the start-up, LOCOPIAS opens with the main window, this is the central point in the software. From here the loading condition can be defined, applicable criteria and settings can be chosen and calculations can be invoked.



Layout of the main window.

A detailed explanation of the main screen can be found at section 3.1 on page 8, Main window layout. The main screen will give the user an overview of all the safety aspects. The user will be warned by red indicators if something is not correct. If all is okay, the user will see green indicators. Below a list of checks and indicators is displayed. Depending on the regulations, it is possible that your vessel does not have all the indicators.

Line of sight
This will be shown above the bow of the vessel in the side view 4

Maximum and minimum drafts and trims
Below the vessel in the side view 4 the draft and trim limits are checked. This could include propellor immersion, minimum slamming draft and ice draft limits.

Heeling angle
Below the cross section 5 the heeling angle is displayed.

Longitudinal strength
At 6 various compliance windows are shown. These can include shear forces, bending moments and torsion moments.

Damage stability
One of the compliance windows 6 is for damage stability. Due to calculation times this is the only item which will not be calculated automatically. Press the button ‘Calculate damage stability’, to calculate all the mandatory damage cases. After each change to the loading of the vessel, the damage stability has to be calculated again by pressing ‘Calculate damage stability’. When the damage stability is not calculated (e.g. when changes have been made to the loading condition, the program will indicate that the damage stability is not calculated.
It is possible that the check on (probabilistic) damage stability is done by checking the G’M or VCG’ value with stability limiting curves (type-2). If this is the case, these limiting curve(s) are checked within the intact stability criteria.

Intact stability
The intact stability diagram 11 will show if the intact stability complies.

2.3.2 Check loading condition (before loading)

Before loading the vessel, the master should ensure the vessel can carry that cargo safely by checking the appropriate items such as (but not limited to):

- Intact stability
- Damage stability
- Strength
- Maximum / minimum allowable drafts and trims

2.3.2.1 Loading the vessel

The general approach on how to make one (departure) loading condition can be found at section 3.2 on page 11, General approach.

LOCOPIAS has several modules to help the user to load the vessel. The detailed operation of these modules can be found in the chapter chapter 4 on page 38, Modules.

In the section 4.4 on page 56, Weight list special care should be given to the FSM type of tanks. Especially if the filling of tanks and therefore the FSM change during a voyage. Details can be found at section 4.4.2 on page 58, Content of the weight list. Please note that LOCOPIAS also offers a more advanced method to compensate for free liquid effects, which is the "actual shift of liquid method". If your LOCOPIAS is configured this way, it will compute the real movement of liquid, including the effects of heel and trim, and the FSM type cannot be set.

2.3.2.2 Settings

The user should check all settings in the section 3.4 on page 13, Settings window.

Some settings, such as maximum and minimum drafts, depend on the sailing area, season or weather. Other settings may depend on the cargo or configuration of the vessel. Verify the settings closely, so that they match the intended use of the vessel.

2.3.2.3 Check the stability and strength

Once the loading condition is finished and the settings are made, the stability and strength can be verified.

The first overview of compliance of all the stability and strength aspects can be found in the chapter 3 on page 8, LOCOPIAS Main window. Here all warnings are displayed.

To go into further detail, the section 3.7 on page 14, Check window can be opened. Compliance with the requirements is indicated by the color of the bullet (complies = green, does not comply = red). If, for instance, the overview shows a red bullet under intact stability, the corresponding tab provides more information as to the reason for non-compliance. Mandatory damage cases are not calculated automatically. The user can tick the box under damage stability and press 'OK', to have the damage cases calculated.

Finally, there is also the option to print reports. These reports contain even more detail. The reports can be found under section 3.8 on page 15, Output.

2.3.2.3.1 Damage stability output

As explained in the chapter of the module section 4.5 on page 61, Damages, there are mandatory (pre programmed) damage cases (type-3, mostly being tankers) and user-defined damage cases (type-4). For the mandatory type 3 damage cases, the main-screen indicates whether the vessel complies with the damage stability yes or no, or that the damage stability has not been calculated. To calculate the pre-programmed, mandatory damage cases you have to press the 'calculate damage stability' button or calculate stability of the mandatory damage cases via section 3.8 on page 15, Output. Via the latter it is possible to calculate either the mandatory (type 3) damage cases or the **selected** damage cases and create a full output or a summary output. The **selected** damage cases can be either mandatory (type-3) and/ or user-defined damage cases (type-4). Please note that each change to the loading condition will lead to the need of re-calculation of the Damage stability. The comprehensive output (Class report), test conditions and short output (see section 3.8 on page 15, Output)will calculate all mandatory damages cases and not the user-defined damages.

Note: it is also possible that there have been made probabilistic damage calculations for the vessel. Such calculations result in a minimum GM' requirement. If this is applicable, this GM' requirement can be found in the criteria for intact stability.

An example of the damage stabilty output can be found in section 3.8.2 on page 18, Examples of output

2.3.3 Voyage planning

Now the departure condition is finished, it is time to make a voyage planning. During the voyage some tanks will vary in filling and free surface moments. In section 3.3 on page 11, Conditions a copy of the departure condition can be made. Make sure all critical intermediate steps of the voyage are covered. Again, special care should be

given to the FSM type of tanks. Especially if tanks are full at departure, but with an increasing FSM during voyage. Details can be found at section 4.4.2 on page 58, Content of the weight list. Make sure each loading condition complies with all criteria.

Such planning with multiple loading conditions is not only applicable to a voyage, but also to ballast operations.

2.3.4 Verify after loading before departure

After loading the vessel, verify if the planned loading condition matches the actual loading condition. Check the tank fillings, the cargo and the draft and trim. If necessary, adjust all the loading conditions of the voyage.

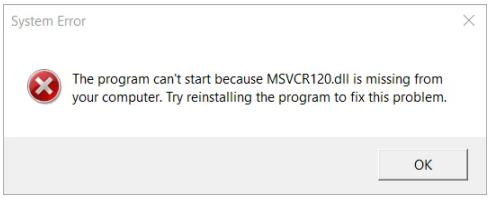
LOCOPIAS has some tools to help verify the displacement and calculate a correction weight, if necessary. The primary tool for this is the section 4.6 on page 64, Cargo weight determination module. If this is not purchased, a very basic tool can be found in the section 4.4.1 on page 56, Menu bar functions of the weight list called [Check displace].

2.4 Frequently asked questions

1. **A new installation of LOCOPIAS brings new loading conditions, so I lost my old ones. Is there anything to be done about it?**
   You can export the loading conditions of your existing LOCOPIAS installation — refer for that to section 3.3 on page 11, Conditions — and re-import these in the newly installed version. However, it is **not recommended** to do so in the transition from a preliminary to a final version of LOCOPIAS, because experience has shown that in such a case tanks may have been added or removed.
2. **Does LOCOPIAS also work on 64-bits Windows?**
   Yes.
3. **Is LOCOPIAS also available for Apple Mac?**
   LOCOPIAS is not available natively for the Mac. A Mac can be configured to emulate or run Microsoft Windows (possibly in a virtual machine), which might offer the ability to run LOCOPIAS (although LOCOPIAS will then not even be aware of the Mac basis).
4. **My virus scanner reports a LOCOPIAS file to contain a virus. What to do?**
   Some scanners do indeed wake up on an occasional LOCOPIAS file, but as far as SARC is aware this has, to date, always been a false alarm. Obviously, this does not guarantee that such a warning will always be false, but it is primarily the responsibility of your scanner supplier, who manages the algorithms and their data after all. So, if you would like to assist them, feel free to inform them. SARC cannot provide support because there are too many types and brands of scanners around. Two final comments:
   - Sometimes a scanner thinks it a good idea to delete some components of LOCOPIAS, e.g. a .dll file. It goes without saying that LOCOPIAS will then no longer work properly.
   - At SARC, all files, including LOCOPIAS packages intended for customers, are systematically tested for viruses and malware (with *ESET Endpoint Antivirus*).
5. **LOCOPIAS refuses to start, with error message "The application was unable to start correctly (0xc0000142). Click OK to close the application".**
   This is an error message from Windows, and indicates that an essential part of the Windows installation is missing or has become corrupted. This probably has to do with the ".NET Framework" and (re)installing of this is neccessary: By following these steps[2] '.NET Framework 3.5' can be installed.
6. **LOCOPIAS refuses to start, with error message "The program can't start because MSVCR120.dll is missing from your computer. Try reinstalling the program to fix this problem.".**
   This is an error message from Windows, and indicates that an essential part of the Windows installation is missing or has become corrupted. This is about "Microsoft Visual C++ 2013 Redistributable" and (re)installing of this is neccessary: By following this link[3] the x86(32 bit) and x64(64 bit) versions can be installed.

[2] https://www.dell.com/support/article/nl/nl/nldhs1/sln288491/how-to-turn-windows-features-on-or-off-in-windows-7?lang=en

[3] https://support.microsoft.com/en-us/help/2977003/the-latest-supported-visual-c-downloads



Message that MSVCR120.dll is missing.

7. The results of a remake of a loading condition differ from those of the original.
Then the two are not exactly the same. What may be omitted in such cases, is for the weight items also to set the free surface moment type — 'FSM-type', as discussed in section 4.4.2 on page 58, Content of the weight list — the same.

8. I am expected to regularly verify the results of LOCOPIAS. Can't I leave that out, or can it not be automated?
No. With the background of LOCOPIAS such a verification is indeed unnecessary, but the regulator still demands it. Automation goes against the intentions of the regulator, because it is precisely the idea that a **person** verifies the program's correctness. Moreover, to assist with this process, a verification procedure has been added in this manual, please see chapter 6 on page 74, Verification of the calculation results.

9. The calculated drafts that I see on the screen in LOCOPIAS do not correspond to the actual drafts.
The actual vessel weight may differ from the data entered in LOCOPIAS. However, it is not allowed to simply change the light ship weight, as this entry has been approved by the classification society. However it is possible to add a correction weight, so that the drafts in LOCOPIAS match better. This procedure is described here chapter 7 on page 78, Correction of the light ship weight

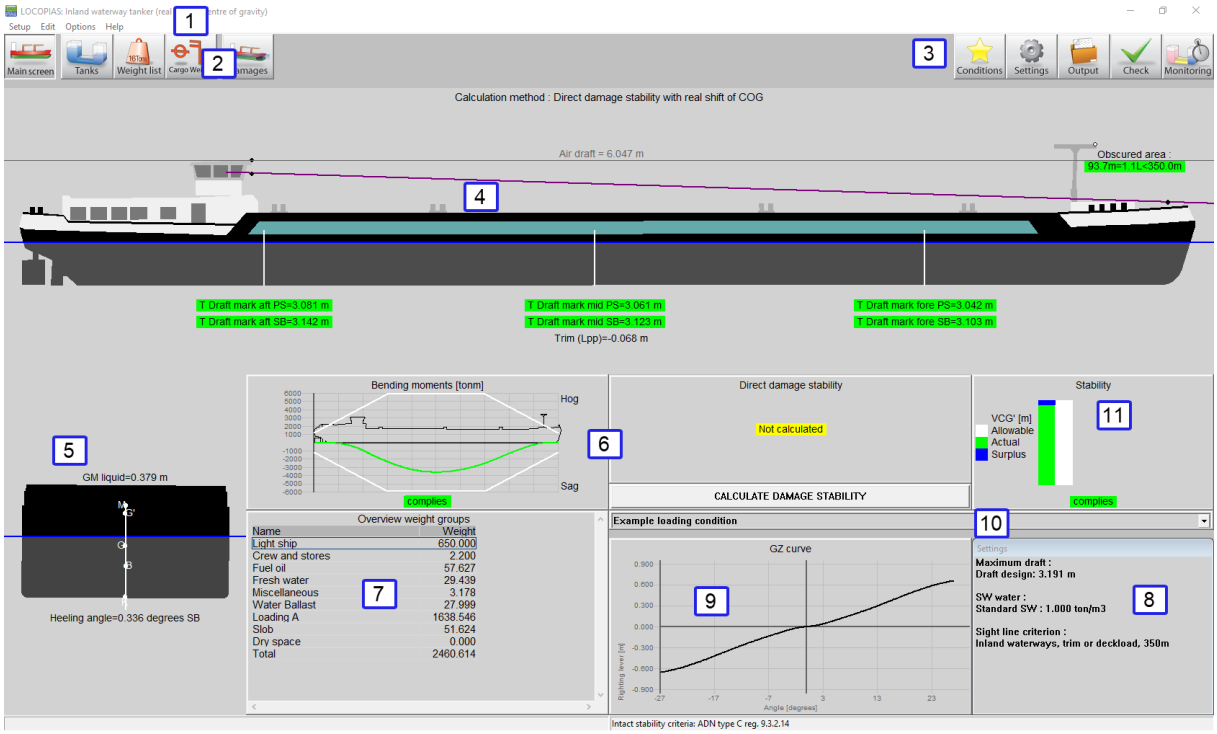
Chapter 3

LOCOPIAS Main window

At start-up LOCOPIAS opens with the main window, this is the central point in the software. From here, the loading condition can be defined, applicable criteria and settings can be chosen and calculations can be invoked.

3.1 Main window layout

A typical example layout of the main window is shown below, with an explanation of the labeled elements right below that.



Layout of the main window.

1 Menu bar
Basic functionalities are accessible through the menu bar, see Menu bar.

2 Module buttons
These tool bar buttons provide quick access to the main window and available cargo modules to load specific types of cargo.

Attention

The modules can be opened after or next to each other, see the explanation for the 'Multi-module' option.

3 Main window buttons
These buttons allow manipulation of Conditions, Settings, Output, Check and 2D/3D View.

4 Side-view
Shows the actual wind contour, drafts, actual waterline, line of sight and air draft.

5 Cross section
Shows heeling angle and initial stability (G'M).

6 Compliance windows
These windows indicate compliance with the criteria for the current loading condition. Click on a window for detailed information.

7 Overview weight groups
A summary of total weight per weight group.

8 Settings window
Shows current settings. Double-click on a setting to change it, or go to the [Settings] (discussed on page 13) dialog window by clicking the button [Settings].

9 GZ curve
Shows the GZ curve of the specific condition.

10 Drop-down list box
Shows the selected loading condition and you can select another condition.

11 Intact stability diagram
Indicates whether the vessel complies with the intact stability criteria and to what extent. Though the values for the Actual VCG' and allowable VCG' are calculated by LOCOPIAS in a manner which is correct and normally accepted by class societies, these values have not been checked by Lloyds Register and should therefore only be used as guidance!

Note

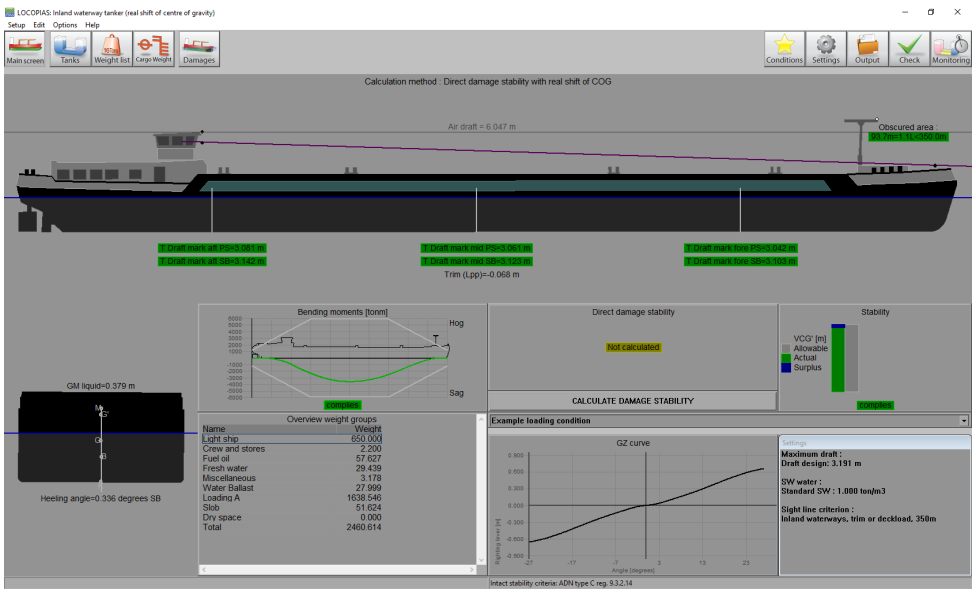
Depending on your installation, some of these elements may not be available.

3.1.1 Menu bar

The menu bar at the top of the main window (item 1) gives access to the following functions:

[Setup]→[Print Options]
Select output device. Besides preview/clipboard, (See section 8.3 on page 86, Preview of output to screen, and export of computation results), the default system printers are listed and can be selected here.

[Setup]→[Night colors]
Change the color palette to 'night mode'



Night colors switched on.

[Edit]→[Edit Weight Groups]

Weight items can be grouped in so-called weight groups, were a weight group is a category of a particular content, such as 'diesel oil' or 'fresh water'. The weight groups are managed from this location in the program. The user can add, modify and delete weight groups themselves. When deleting a group, a check is made to see if there are still weight items of that group, and if there are, a notification is given and it is better not to delete the group. There are some default weight groups that are fixed in the program and cannot be changed or deleted. Editable properties are:

- The *name* of the weight group.
- The *hatching* type which is used when hatching or filling in the compartments in tank sketch plots.
- The *group color*, which is the color representing this weight group, and which is used in plots, and also as background color in text windows if the last column of this weight group is set to 'yes'.
- The *text color*, which, if the last column is set to 'yes', specifies the foreground color in textual overview windows of the texts which belong to this weight group.
- *In table*, which indicates whether the weight group color should also be used in overview tables of compartments and weight items.
- *Print summ.*, which indicates whether in the output only the subtotal should be printed. The calculation is based on all weight items though.

[Edit]→[Edit cross sections tank graphics]

Go to this menu to add or edit cross sections and views of the tanks. These sections and views are automatically added to the output of intact stability calculations.

[Options]→[Select stability criteria]

See section 3.7 on page 14, Check

[Options]→[Export data via XML]

Exports the current loading condition to an XML file which can be used to exchange data with third party software.

[Options]→[Environmental conditions]

Gives the ability to simulate running aground, or check the stability in wind and/or waves.

[Options]→[Multi-module]

This option allows you to set whether only 1 loading module is active at a time, or several side by side. The latter is especially useful if multiple screens are connected to the computer. If the multi-module option is on, the loading condition can be adjusted in different screens. The modules can then be opened only from the main screen.

[Help]→[Help reader (F1)]

Opens this help reader.

[Help]→[Manual]→[Ship-specific data and test conditions]
Opens the booklet containing the Ship-specific data and test conditions.

[Help]→[About LOCOPIAS]
Opens a window with relevant data with regard to the LOCOPIAS program as well as the license conditions.

[Help]→[Not purchased]
Shows a preview of modules which have not been purchased.

[Help]→[Enter activation code]
Give an activation code here for modules purchased afterwards. At the moment this is only possible for the tank measurement system module for specific sytems. Please contact SARC for further details.

3.2 General approach

In general, you can use the following steps to define a loading condition and perform the required calculations. Please note that this workflow is *just one* way to get you started, it is not the only possible way to use LOCOPIAS. All actions can be performed in random order and frequency but it is important to check the compliance with all the appropriate criteria after a change in the loading condition has been made The functionalities will be elaborated further in the remainder of this chapter. This example starts at the main window.

Select the [Conditions] button and create a new condition. When LOCOPIAS is opened for the first time, the main window shows a preprogrammed example condition. By creating a new condition, you start with a preprogrammed default condition.

Click the [Settings] button and adjust the settings according to your situation. By adjusting the settings to the current situation before loading your cargo, useful feedback can be received during configuration of the loading condition. Settings are applicable for the current loading condition.

Go to the [Tanks] module to modify the contents of consumables e.g. fresh water, fuel oil, lubricating oil.

In the [Weight list], miscellaneous supplies, e.g. crew, provisions and stores can be entered.

Open the [Tanks] module again. When all cargo is loaded, the floating position can be optimized by adding water ballast.

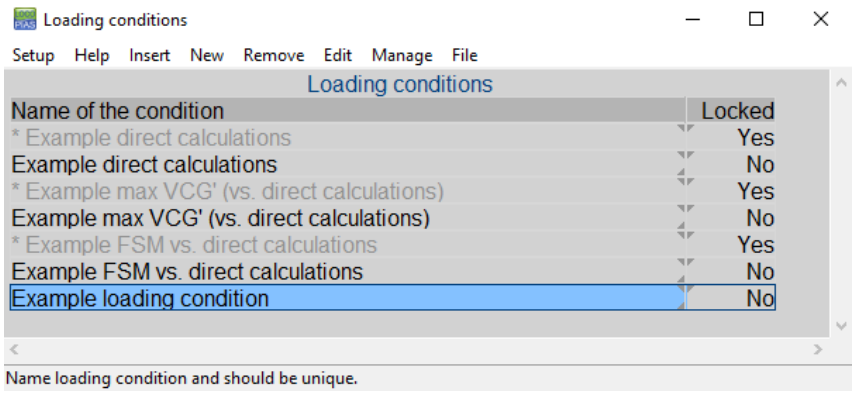
The [Check] button provides a quick check of stability and strength at any moment during this process.

Press [Output] to perform calculations and generate output on screen or on paper.

Press [Monitoring] or [Update Monitoring] to switch on the monitoring functions in LOCOPIAS, if available.

3.3 Conditions

By pressing the [Conditions]-button, the loading conditions menu, as shown in the figure below, will appear. In this window the defined loading conditions are displayed and can be managed. You can create a new loading condition and you can delete, rename, copy/paste or export existing conditions. To modify a loading condition, select a condition and double click on it or press the <enter> key. The main window will now reflect this loading condition.



Select or create a loading condition.

New loading condition

1. Click [New].
2. Enter a new (unique) name for your loading condition.

The new condition is a preprogrammed default condition.

Delete loading condition

1. Select a loading condition.
2. Click [Remove].

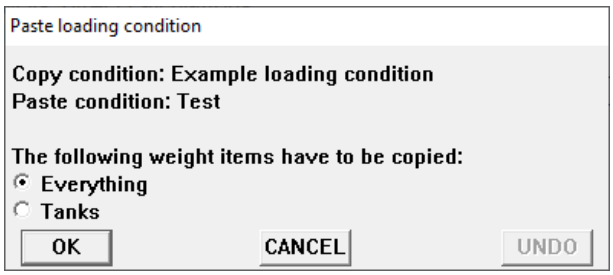
Rename loading condition

1. Click on a loading condition and press the functionkey <F2>.
2. Enter a new (unique) name.

Copy/paste a loading condition

1. Click on a loading condition, and press the [Edit]→[Copy row].
2. Now select the condition to copy to and click [Edit]→[Paste row].

Copy a loading condition and paste it over another loading condition to create a loading condition that has the same properties. If a specific module has been purchased you can choose to paste the complete condition or just the cargo defined with the specific module. The newly pasted condition will appear on the main window, as shown in the figure below.



Choose the data that have to be copied.

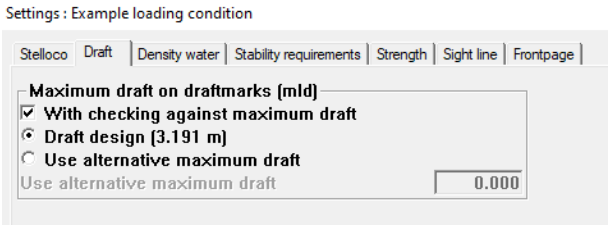
Import/export of selected loading condition

Import/export allows transport of data from one LOCOPIAS to another for the same vessel and same version.

1. Press the [File]→[Export] to write the selected loading conditions to file.
2. Press the [File]→[Import] to select a file of exported loading conditions, to import them into the active version of LOCOPIAS.

3.4 Settings

All settings that apply to the loading condition can be altered in the settings menu. By clicking the [Settings]-button, the following menu, as shown in the figure below, opens. It has several tabs which can be selected. These tabs are explained below.



Settings window.

Configuration
(Re)configures the vessel. See "Ship-specific data and test conditions" booklet for more information about the possible configurations.

Draft/Trim
Select the applicable maximum and minimum drafts. If the option [use alternative maximum draft] is selected, a user-defined draft can be entered. The selected drafts will be displayed in the summary of the loading condition, with the conclusions for the applicable stability criteria.

Density water
The density (specific weight) can be set and will be stored per loading condition. This density is then used for all calculations performed with the loading condition.

Stability requirements
Different intact stability requirements can be available for the vessel depending on the operational sailing area.

Strength
Different values of maximum allowable bending moments and shear forces can be applicable for a vessel at sea or in a harbour. If these values are available, the appropriate values can be selected here. The selected values are also indicated in the output of longitudinal strength.

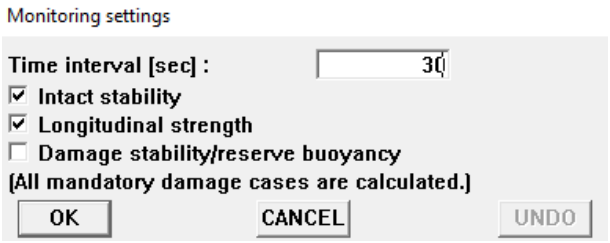
Anchor handling
This option makes it possible to indicate whether, in addition to the normal stability output, a polar diagram should be printed which shows the maximum permissible anchor chain angle at each anchor chain angle. Anchor force still permitted according to the anchor-handling stability requirements. For this purpose it is no need to assess the loading condition against other than the standard stability criteria.

Line of sight
Depending on the regulations under which the vessel will sail, the line of sight requirements can be adjusted here.

```
<dt>Frontpage</dt>
<dd>It is possible to add a front page to your output. You can select the
text lines to be printed and enter free text as desired (e.g. a voyage
number, port of loading, etc.). </dd>
```

3.5 Monitoring

This option is only available when purchased and a connection with a tank gauge system is available. After selecting the icon for [Monitoring] a settings popup-window, as seen below, will appear. Here you can enter the time interval which will be used for reading the tank data, calculating the intact stability, longitudinal strength and damage stability (which is available and selected) and updating all data in the main screen. As long as the monitoring mode is active, it is not possible to edit loading conditions. This mode can be stopped by selecting the icon for monitoring again.



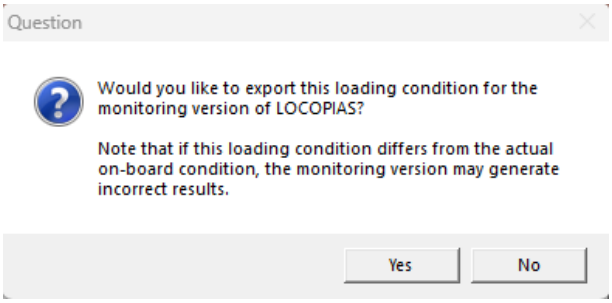
Settings for monitoring.

3.6 Update Monitoring

This function is only available if 'direct monitoring' is delivered with LOCOPIAS. 'Direct monitoring' is an additional feature of LOCOPIAS that can be configured to continuously send calculation results to other software, via a suitable interface. These results may include including tank fillings, weight items, results of (damage) stability and longitudinal strength, etc.

With this function the actual loading condition can be exported to update the loading condition as used in a second instance of LOCOPIAS, running in 'direct monitoring' mode. That instance LOCOPIAS will read the updated loading condition and recalculate results. Thus, monitoring need not be interrupted to define changes cargo, bunkers, or other weights on board or calculation settings.

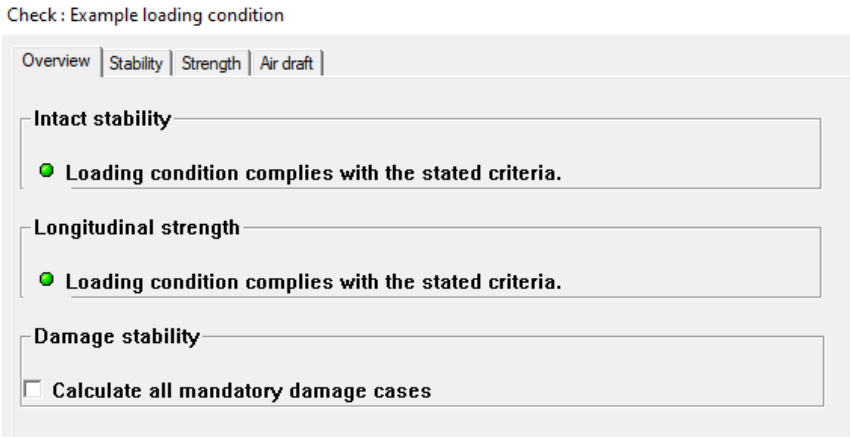
Details of the configuration of 'direct monitoring' and the interface used are described in the ship-specific documentation.



Update monitoring message.

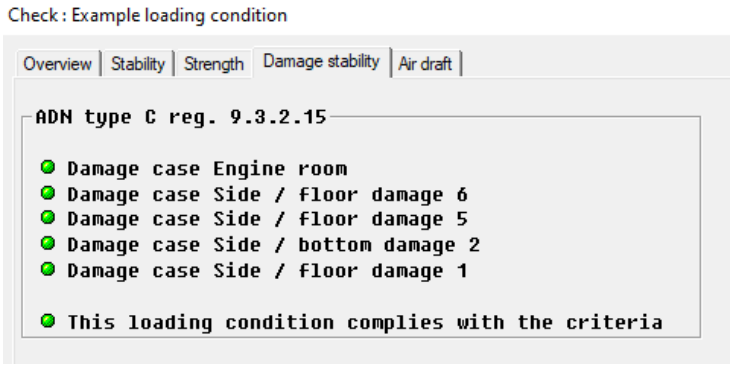
3.7 Check

Click the [Check]-button to check that the loading condition complies with the (damage) stability and strength requirements. After clicking the [Check]-button, a window opens with several tabs: overview, stability, strength and damage stability, if applicable. Compliance with the requirement is indicated by the color of the bullet (complies = green, does not comply = red). If, for instance, the overview shows a red bullet under intact stability, the corresponding tab provides more information as to the reason for non-compliance. Note that when the vessel operates under more than one classification society, the set of damage stability criteria applicable to the loading condition can be set via the menu bar item [Options]→[Select stability criteria]. The intact stability criteria can be set per loading condition via section 3.4 on the previous page, Settings.



Check window.

When you want to check all mandatory damage cases (type-3) select: 'Calculate all mandatory damage cases' and press OK. Now the Check window has generated a new tab called *Damage stability*. Here you can check whether the damage cases complies with the criteria (complies = green, does not comply = red).



Check window damage stability tab.

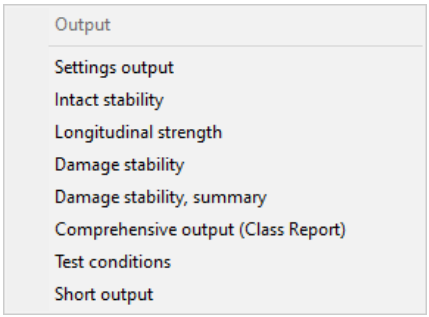
User defined damage cases (type 4) have to be calculated via section 3.8 on this page, Output.

If more detailed information is desired, for intact stability, damaged stability (type 3 and/ or type 4) or strength calculations, one should create a full listing via section 3.8 on the current page, Output. When 'Preview/Clipboard' is selected (see section 8.3 on page 86, Preview of output to screen, and export of computation results) this output is printed on screen. We recommend to make use of 'preview/ clipboard'. Printing the results shown on screen can be done with by clicking 'Output' and then select the full listing one wants to be printed (on screen or on paper) and the full listing will be printed.

The procedure for calculating damage stability is described in: section 4.5 on page 61, Damages.

3.8 Output

You can use 'Output' to perform full calculations and to make a printout. If the selected printer is 'preview/clipboard' the output will appear on screen. To get the output in a preview on screen, see section 8.3 on page 86, Preview of output to screen, and export of computation results.



Output menu.

The following output options can be available in your version of LOCOPIAS:

Output settings
Select which data is to be printed in the full output. See Output Settings.

Intact stability
Standard format output of intact stability calculations with an overall conclusion for compliance with applicable stability requirements.

Longitudinal strength
Output of longitudinal strength calculations with an overall conclusion for compliance with selected allowable bending moment and shear force requirements.

Torsion moments
Output of torsional moments calculations with an overall conclusion for compliance with defined maximum allowable torsion moments.

Damage stability mandatory damage cases (type 3)
Full output of damage stability calculations of the mandatory (type 3) damage cases with an overall conclusion for compliance with applicable stability requirements.

Damage stability mandatory damage cases (type 3), summary
Output of damage stability conclusions of the mandatory (type 3) damage cases.

Damage stability selected damage cases
Full output of damage stability calculations of the selected damage cases with an overall conclusion for compliance with applicable stability requirements.

Damage stability selected damage cases, summary
Output of damage stability conclusions of the selected damage cases.

Comprehensive output (Class Report)
Output of the standard format of all available calculations (including mandatory damage cases, if applicable) with a common conclusion in accordance with the requirements. This 'Class report' should be printed to see if full compliance with all required criteria of the vessel is met. A hardcopy or digital copy should be saved for future reference. This 'Class report' should be printed with all the available and relevant output settings."

Test conditions
Output of (damage)stability and/or longitudinal strength of the test conditions calculations. The output of the test conditions can be compared with the condition in the approved/ stamped "Ship-specific data and test conditions" booklet of the ship. The output of the test conditions should be regularly verified with this bookletto ensure that the loading instrument is functioning correctly. If the output of a test condition does not correspond to the values in the "Ship-specific data and test conditions" the results of calculations cannot be trusted. Re-installation of the software might be necessary. If that doesn't solve the problem, contact SARC
See chapter 6 on page 74, Verification of the calculation results.

Short output
A summary of the loading condition and a conclusion.

Sounding table
Output for all measuring devices, for every tank, in the loading condition.

Cargo/ullage report
An overview of all onboard cargoes, including their weight, temperature effect, sounding and etc.. In this

list only those tanks are included of which ‘Include this tank in ullage report’ is switched on.

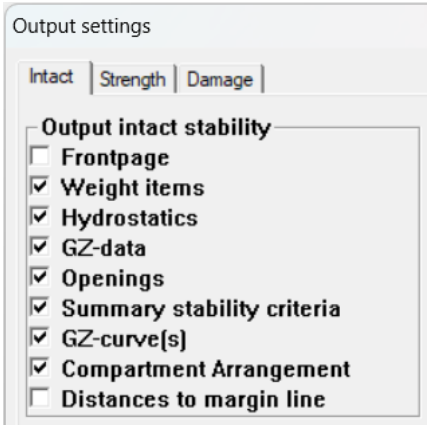
3.8.1 Output Settings

In ‘Output Settings, one can select which data is printed in the full output. The output settings can be made for ‘intact stability’, ‘strength’ and/or ‘damage stability’ whatever is applicable for the type of vessel. For a full rapport, validating the compliance with the applicable criteria one should include all output, except for the ‘frontpage’ in intact stability. ’Frontpage’ allows the user to print additional data such as information about the cargo etc. This additional information can be given at section 3.4 on page 13, Settings.. Not all ships will have a margin line defined and in such cases this could be left out.

Examples of the output can be found in Examples of output.

Available settings:

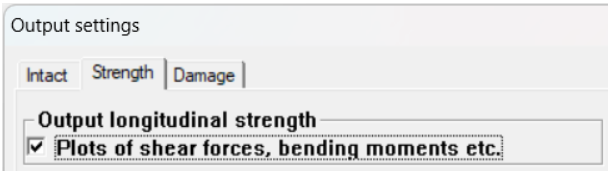
Intact stability



Output settings intact stability.

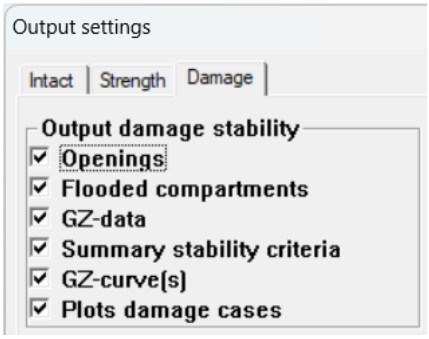
If one wants to include a frontpage, the content of this frontpage can be given at section 3.4 on page 13, Settings.. Distances to margin line will not be applicable to all vessels.

Strength



Output settings strength.

Damage stability



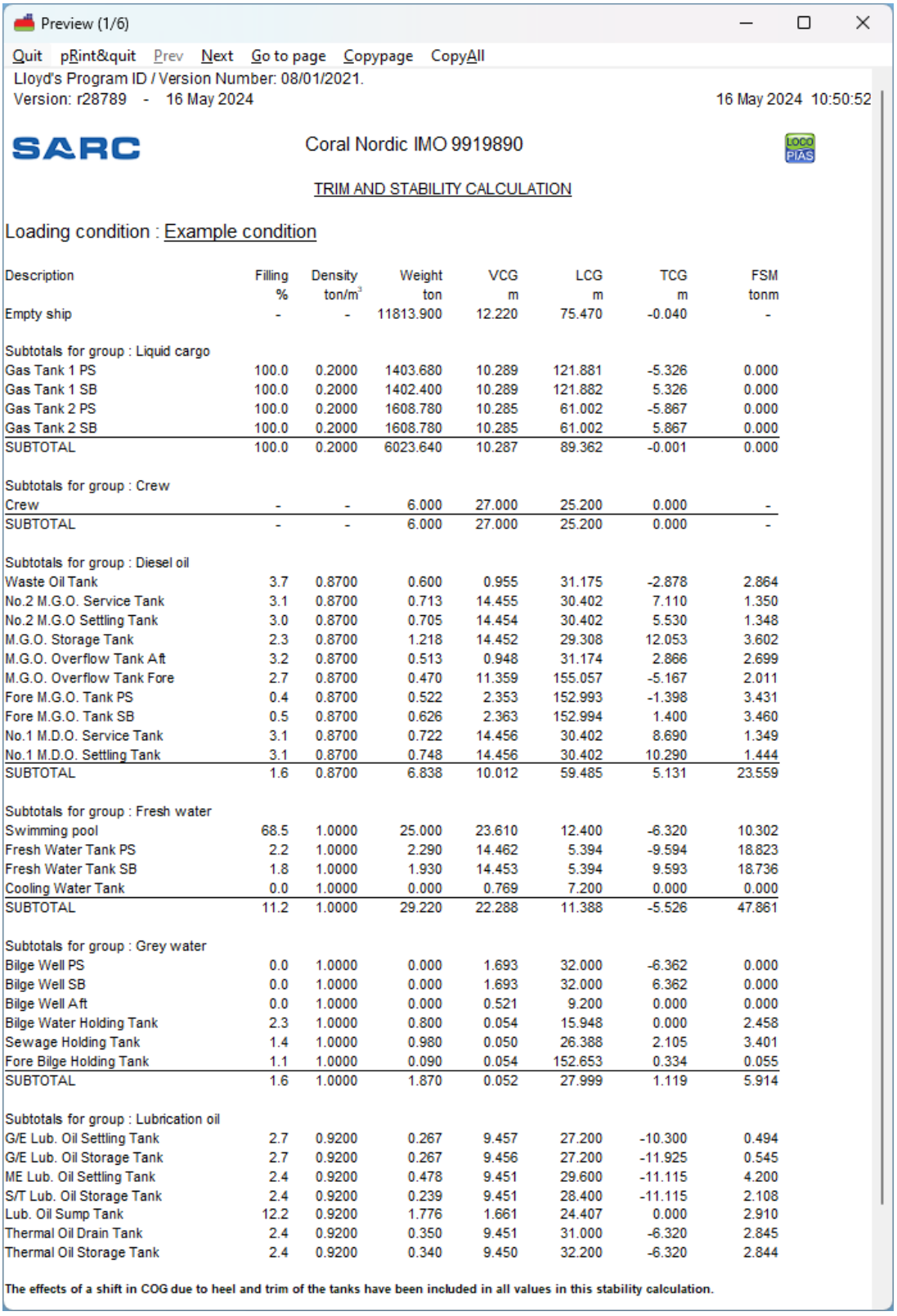
Output settings damage stability.

3.8.2 Examples of output

Below, examples of output for: Intact Stability, Longitudinal strength, Damage stability, Damage stability (summary) and Damage stability (summary DNV)

3.8.2.1 Intact Stability

Example of print-out of intact stability. Actual output and/ or results may differ according the choosen calculation, and/ or output settings.



Preview (1/6)

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SARC Coral Nordic IMO 9919890 LOCO PIAS

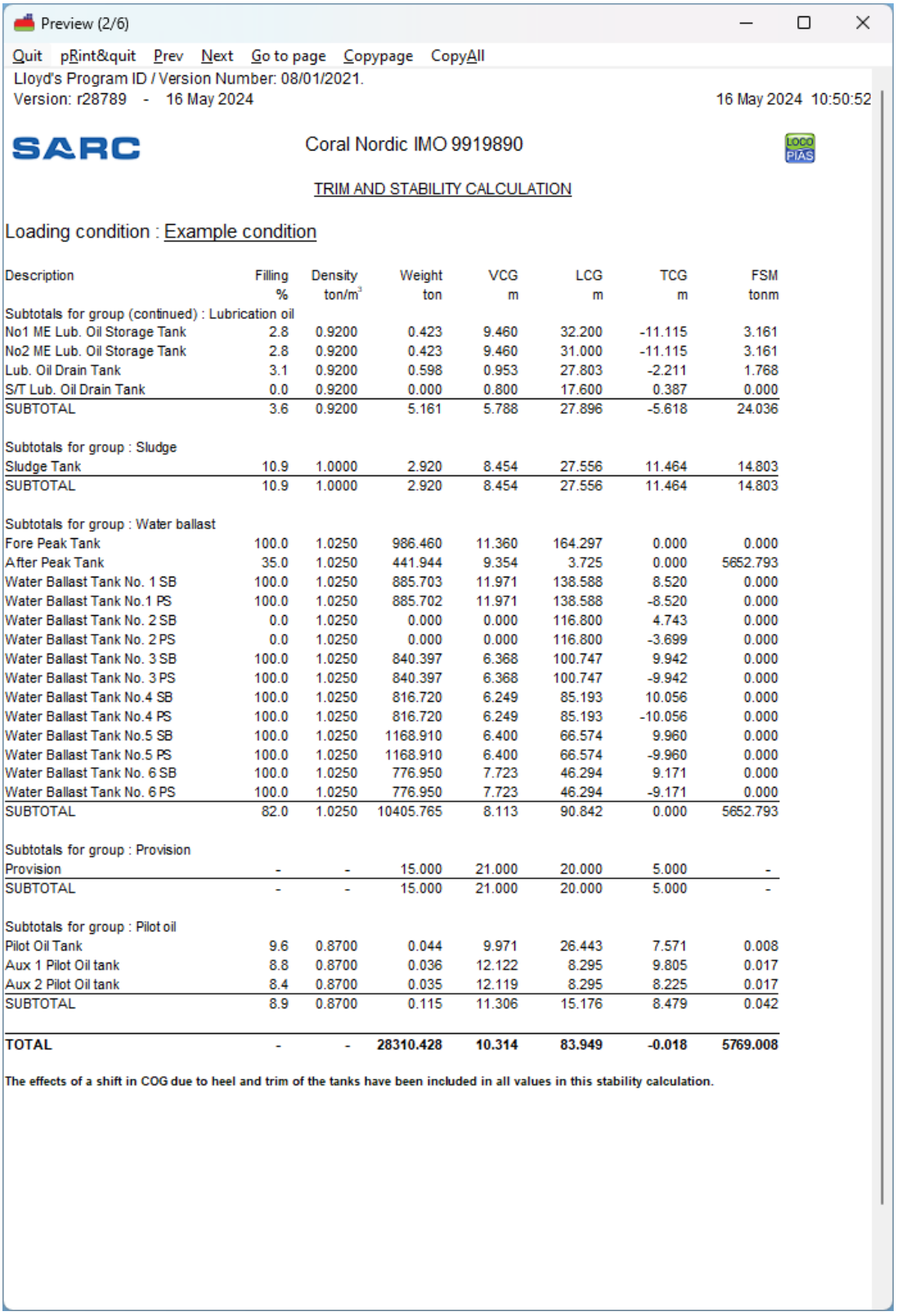
TRIM AND STABILITY CALCULATION

Loading condition : Example condition

Description	Filling %	Density ton/m³	Weight ton	VCG m	LCG m	TCG m	FSM tonm
Empty ship	-	-	11813.900	12.220	75.470	-0.040	-
Subtotals for group : Liquid cargo							
Gas Tank 1 PS	100.0	0.2000	1403.680	10.289	121.881	-5.326	0.000
Gas Tank 1 SB	100.0	0.2000	1402.400	10.289	121.882	5.326	0.000
Gas Tank 2 PS	100.0	0.2000	1608.780	10.285	61.002	-5.867	0.000
Gas Tank 2 SB	100.0	0.2000	1608.780	10.285	61.002	5.867	0.000
SUBTOTAL	100.0	0.2000	6023.640	10.287	89.362	-0.001	0.000
Subtotals for group : Crew							
Crew	-	-	6.000	27.000	25.200	0.000	-
SUBTOTAL	-	-	6.000	27.000	25.200	0.000	-
Subtotals for group : Diesel oil							
Waste Oil Tank	3.7	0.8700	0.600	0.955	31.175	-2.878	2.864
No.2 M.G.O. Service Tank	3.1	0.8700	0.713	14.455	30.402	7.110	1.350
No.2 M.G.O Settling Tank	3.0	0.8700	0.705	14.454	30.402	5.530	1.348
M.G.O. Storage Tank	2.3	0.8700	1.218	14.452	29.308	12.053	3.602
M.G.O. Overflow Tank Aft	3.2	0.8700	0.513	0.948	31.174	2.866	2.699
M.G.O. Overflow Tank Fore	2.7	0.8700	0.470	11.359	155.057	-5.167	2.011
Fore M.G.O. Tank PS	0.4	0.8700	0.522	2.353	152.993	-1.398	3.431
Fore M.G.O. Tank SB	0.5	0.8700	0.626	2.363	152.994	1.400	3.460
No.1 M.D.O. Service Tank	3.1	0.8700	0.722	14.456	30.402	8.690	1.349
No.1 M.D.O. Settling Tank	3.1	0.8700	0.748	14.456	30.402	10.290	1.444
SUBTOTAL	1.6	0.8700	6.838	10.012	59.485	5.131	23.559
Subtotals for group : Fresh water							
Swimming pool	68.5	1.0000	25.000	23.610	12.400	-6.320	10.302
Fresh Water Tank PS	2.2	1.0000	2.290	14.462	5.394	-9.594	18.823
Fresh Water Tank SB	1.8	1.0000	1.930	14.453	5.394	9.593	18.736
Cooling Water Tank	0.0	1.0000	0.000	0.769	7.200	0.000	0.000
SUBTOTAL	11.2	1.0000	29.220	22.288	11.388	-5.526	47.861
Subtotals for group : Grey water							
Bilge Well PS	0.0	1.0000	0.000	1.693	32.000	-6.362	0.000
Bilge Well SB	0.0	1.0000	0.000	1.693	32.000	6.362	0.000
Bilge Well Aft	0.0	1.0000	0.000	0.521	9.200	0.000	0.000
Bilge Water Holding Tank	2.3	1.0000	0.800	0.054	15.948	0.000	2.458
Sewage Holding Tank	1.4	1.0000	0.980	0.050	26.388	2.105	3.401
Fore Bilge Holding Tank	1.1	1.0000	0.090	0.054	152.653	0.334	0.055
SUBTOTAL	1.6	1.0000	1.870	0.052	27.999	1.119	5.914
Subtotals for group : Lubrication oil							
G/E Lub. Oil Settling Tank	2.7	0.9200	0.267	9.457	27.200	-10.300	0.494
G/E Lub. Oil Storage Tank	2.7	0.9200	0.267	9.456	27.200	-11.925	0.545
ME Lub. Oil Settling Tank	2.4	0.9200	0.478	9.451	29.600	-11.115	4.200
S/T Lub. Oil Storage Tank	2.4	0.9200	0.239	9.451	28.400	-11.115	2.108
Lub. Oil Sump Tank	12.2	0.9200	1.776	1.661	24.407	0.000	2.910
Thermal Oil Drain Tank	2.4	0.9200	0.350	9.451	31.000	-6.320	2.845
Thermal Oil Storage Tank	2.4	0.9200	0.340	9.450	32.200	-6.320	2.844

The effects of a shift in COG due to heel and trim of the tanks have been included in all values in this stability calculation.

An example of output of intact stability, page 1/6.



Preview (2/6)

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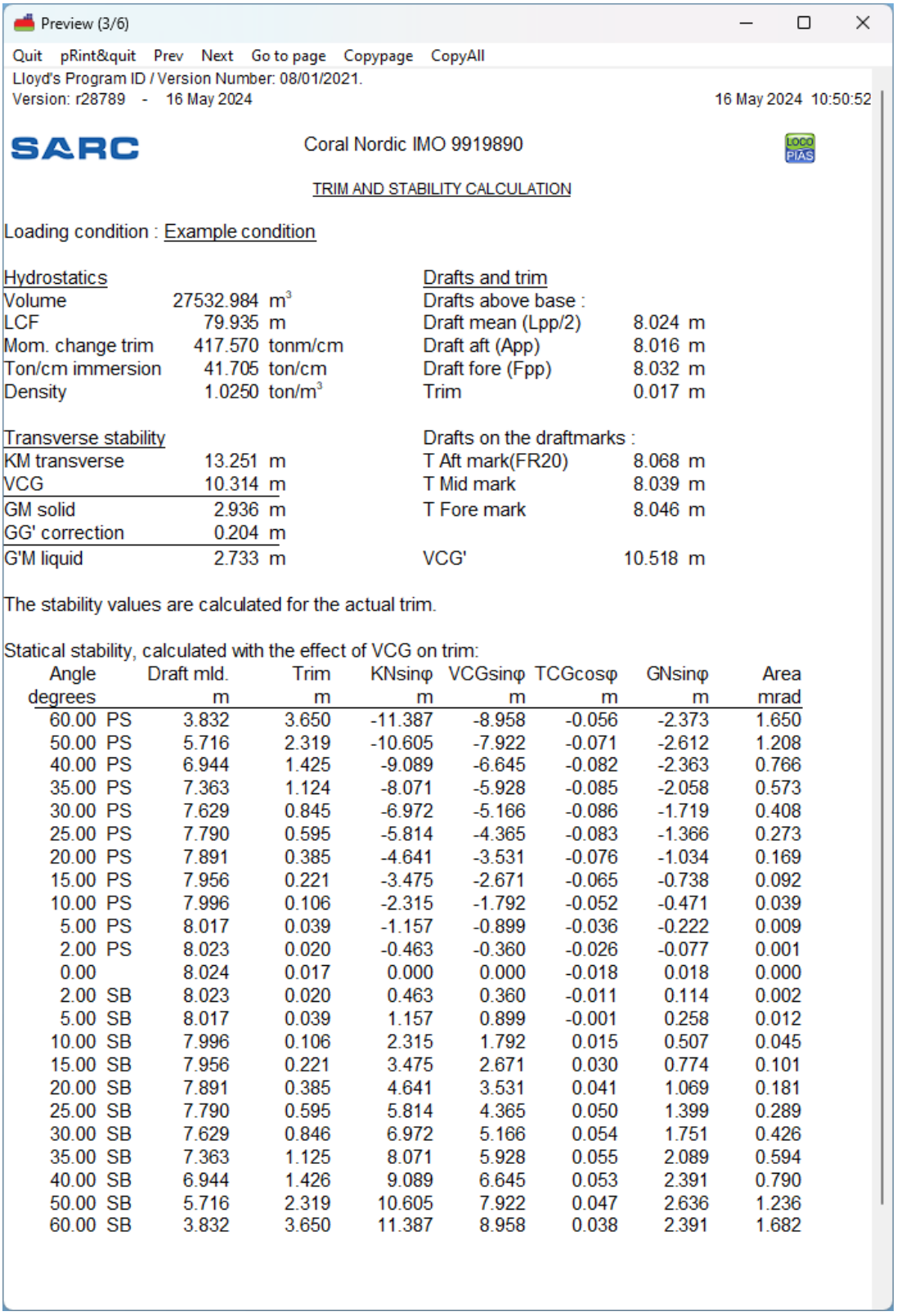
TRIM AND STABILITY CALCULATION

Loading condition : Example condition

Description	Filling %	Density ton/m³	Weight ton	VCG m	LCG m	TCG m	FSM tonm
Subtotals for group (continued) : Lubrication oil							
No1 ME Lub. Oil Storage Tank	2.8	0.9200	0.423	9.460	32.200	-11.115	3.161
No2 ME Lub. Oil Storage Tank	2.8	0.9200	0.423	9.460	31.000	-11.115	3.161
Lub. Oil Drain Tank	3.1	0.9200	0.598	0.953	27.803	-2.211	1.768
S/T Lub. Oil Drain Tank	0.0	0.9200	0.000	0.800	17.600	0.387	0.000
SUBTOTAL	3.6	0.9200	5.161	5.788	27.896	-5.618	24.036
Subtotals for group : Sludge							
Sludge Tank	10.9	1.0000	2.920	8.454	27.556	11.464	14.803
SUBTOTAL	10.9	1.0000	2.920	8.454	27.556	11.464	14.803
Subtotals for group : Water ballast							
Fore Peak Tank	100.0	1.0250	986.460	11.360	164.297	0.000	0.000
After Peak Tank	35.0	1.0250	441.944	9.354	3.725	0.000	5652.793
Water Ballast Tank No. 1 SB	100.0	1.0250	885.703	11.971	138.588	8.520	0.000
Water Ballast Tank No.1 PS	100.0	1.0250	885.702	11.971	138.588	-8.520	0.000
Water Ballast Tank No. 2 SB	0.0	1.0250	0.000	0.000	116.800	4.743	0.000
Water Ballast Tank No. 2 PS	0.0	1.0250	0.000	0.000	116.800	-3.699	0.000
Water Ballast Tank No. 3 SB	100.0	1.0250	840.397	6.368	100.747	9.942	0.000
Water Ballast Tank No. 3 PS	100.0	1.0250	840.397	6.368	100.747	-9.942	0.000
Water Ballast Tank No.4 SB	100.0	1.0250	816.720	6.249	85.193	10.056	0.000
Water Ballast Tank No.4 PS	100.0	1.0250	816.720	6.249	85.193	-10.056	0.000
Water Ballast Tank No.5 SB	100.0	1.0250	1168.910	6.400	66.574	9.960	0.000
Water Ballast Tank No.5 PS	100.0	1.0250	1168.910	6.400	66.574	-9.960	0.000
Water Ballast Tank No. 6 SB	100.0	1.0250	776.950	7.723	46.294	9.171	0.000
Water Ballast Tank No. 6 PS	100.0	1.0250	776.950	7.723	46.294	-9.171	0.000
SUBTOTAL	82.0	1.0250	10405.765	8.113	90.842	0.000	5652.793
Subtotals for group : Provision							
Provision	-	-	15.000	21.000	20.000	5.000	-
SUBTOTAL	-	-	15.000	21.000	20.000	5.000	-
Subtotals for group : Pilot oil							
Pilot Oil Tank	9.6	0.8700	0.044	9.971	26.443	7.571	0.008
Aux 1 Pilot Oil tank	8.8	0.8700	0.036	12.122	8.295	9.805	0.017
Aux 2 Pilot Oil tank	8.4	0.8700	0.035	12.119	8.295	8.225	0.017
SUBTOTAL	8.9	0.8700	0.115	11.306	15.176	8.479	0.042
TOTAL	-	-	**28310.428**	**10.314**	**83.949**	**-0.018**	**5769.008**

The effects of a shift in COG due to heel and trim of the tanks have been included in all values in this stability calculation.

An example of output of intact stability, page 2/6.



Preview (3/6)

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TRIM AND STABILITY CALCULATION

Loading condition : Example condition

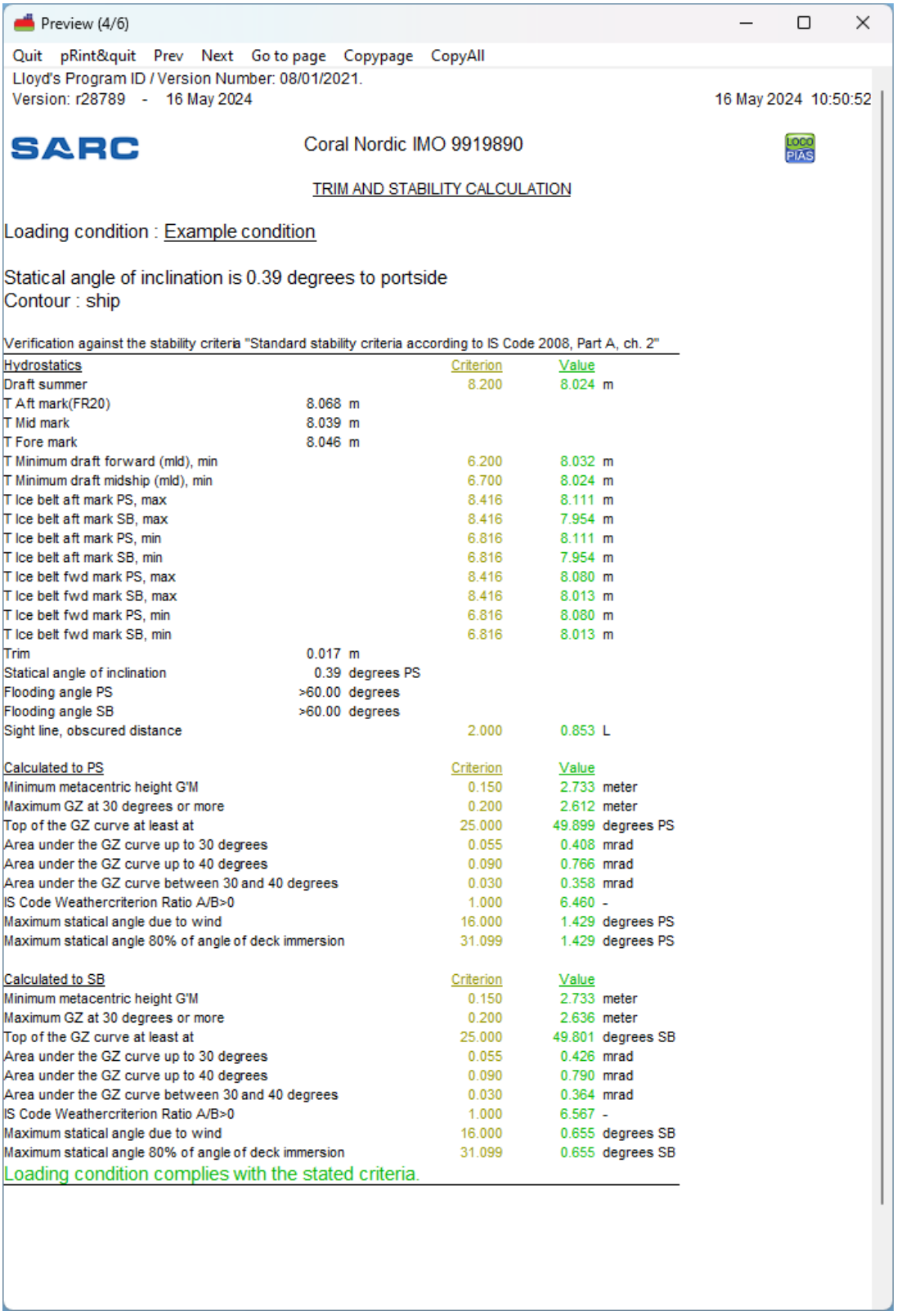
Hydrostatics			Drafts and trim	
Volume	27532.984	m^3	Drafts above base :	
LCF	79.935	m	Draft mean (Lpp/2)	8.024 m
Mom. change trim	417.570	tonm/cm	Draft aft (App)	8.016 m
Ton/cm immersion	41.705	ton/cm	Draft fore (Fpp)	8.032 m
Density	1.0250	ton/m^3	Trim	0.017 m
Transverse stability			Drafts on the draftmarks :	
KM transverse	13.251	m	T Aft mark(FR20)	8.068 m
VCG	10.314	m	T Mid mark	8.039 m
GM solid	2.936	m	T Fore mark	8.046 m
GG' correction	0.204	m		
G'M liquid	2.733	m	VCG'	10.518 m

The stability values are calculated for the actual trim.

Statical stability, calculated with the effect of VCG on trim:

Angle degrees	Draft mld. m	Trim m	KNsinφ m	VCGsinφ m	TCGcosφ m	GNsinφ m	Area mrad
60.00 PS	3.832	3.650	-11.387	-8.958	-0.056	-2.373	1.650
50.00 PS	5.716	2.319	-10.605	-7.922	-0.071	-2.612	1.208
40.00 PS	6.944	1.425	-9.089	-6.645	-0.082	-2.363	0.766
35.00 PS	7.363	1.124	-8.071	-5.928	-0.085	-2.058	0.573
30.00 PS	7.629	0.845	-6.972	-5.166	-0.086	-1.719	0.408
25.00 PS	7.790	0.595	-5.814	-4.365	-0.083	-1.366	0.273
20.00 PS	7.891	0.385	-4.641	-3.531	-0.076	-1.034	0.169
15.00 PS	7.956	0.221	-3.475	-2.671	-0.065	-0.738	0.092
10.00 PS	7.996	0.106	-2.315	-1.792	-0.052	-0.471	0.039
5.00 PS	8.017	0.039	-1.157	-0.899	-0.036	-0.222	0.009
2.00 PS	8.023	0.020	-0.463	-0.360	-0.026	-0.077	0.001
0.00	8.024	0.017	0.000	0.000	-0.018	0.018	0.000
2.00 SB	8.023	0.020	0.463	0.360	-0.011	0.114	0.002
5.00 SB	8.017	0.039	1.157	0.899	-0.001	0.258	0.012
10.00 SB	7.996	0.106	2.315	1.792	0.015	0.507	0.045
15.00 SB	7.956	0.221	3.475	2.671	0.030	0.774	0.101
20.00 SB	7.891	0.385	4.641	3.531	0.041	1.069	0.181
25.00 SB	7.790	0.595	5.814	4.365	0.050	1.399	0.289
30.00 SB	7.629	0.846	6.972	5.166	0.054	1.751	0.426
35.00 SB	7.363	1.125	8.071	5.928	0.055	2.089	0.594
40.00 SB	6.944	1.426	9.089	6.645	0.053	2.391	0.790
50.00 SB	5.716	2.319	10.605	7.922	0.047	2.636	1.236
60.00 SB	3.832	3.650	11.387	8.958	0.038	2.391	1.682

An example of output of intact stability, page 3/6.



Preview (4/6)

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TRIM AND STABILITY CALCULATION

Loading condition : Example condition

Statical angle of inclination is 0.39 degrees to portside
Contour : ship

Verification against the stability criteria "Standard stability criteria according to IS Code 2008, Part A, ch. 2"

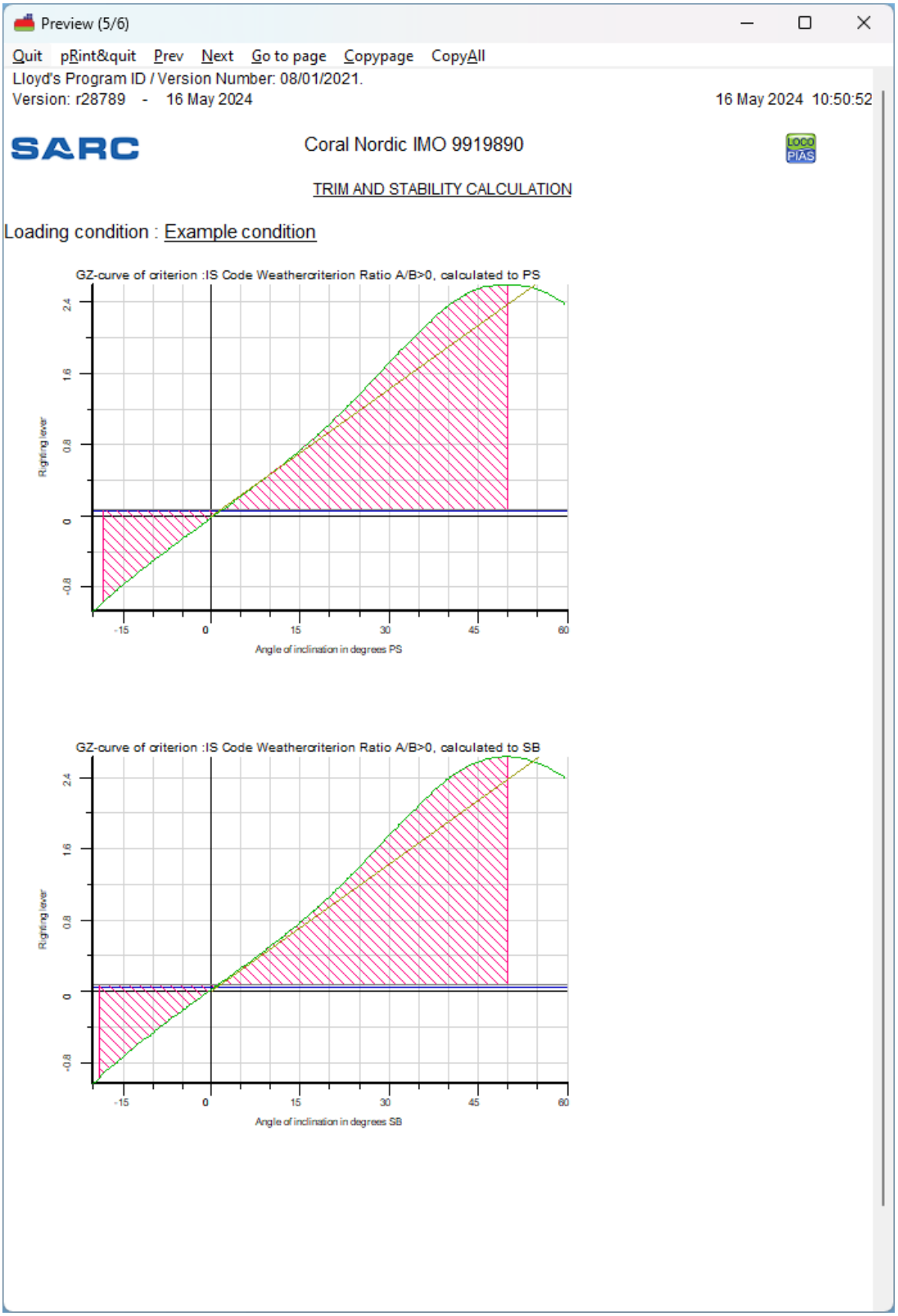
Hydrostatics		Criterion	Value	
Draft summer		8.200	8.024	m
T Aft mark(FR20)	8.068 m			
T Mid mark	8.039 m			
T Fore mark	8.046 m			
T Minimum draft forward (mld), min		6.200	8.032	m
T Minimum draft midship (mld), min		6.700	8.024	m
T Ice belt aft mark PS, max		8.416	8.111	m
T Ice belt aft mark SB, max		8.416	7.954	m
T Ice belt aft mark PS, min		6.816	8.111	m
T Ice belt aft mark SB, min		6.816	7.954	m
T Ice belt fwd mark PS, max		8.416	8.080	m
T Ice belt fwd mark SB, max		8.416	8.013	m
T Ice belt fwd mark PS, min		6.816	8.080	m
T Ice belt fwd mark SB, min		6.816	8.013	m
Trim	0.017 m			
Statical angle of inclination	0.39 degrees PS			
Flooding angle PS	>60.00 degrees			
Flooding angle SB	>60.00 degrees			
Sight line, obscured distance		2.000	0.853	L

Calculated to PS	Criterion	Value	
Minimum metacentric height G'M	0.150	2.733	meter
Maximum GZ at 30 degrees or more	0.200	2.612	meter
Top of the GZ curve at least at	25.000	49.899	degrees PS
Area under the GZ curve up to 30 degrees	0.055	0.408	mrad
Area under the GZ curve up to 40 degrees	0.090	0.766	mrad
Area under the GZ curve between 30 and 40 degrees	0.030	0.358	mrad
IS Code Weathercriterion Ratio A/B>0	1.000	6.460	-
Maximum statical angle due to wind	16.000	1.429	degrees PS
Maximum statical angle 80% of angle of deck immersion	31.099	1.429	degrees PS

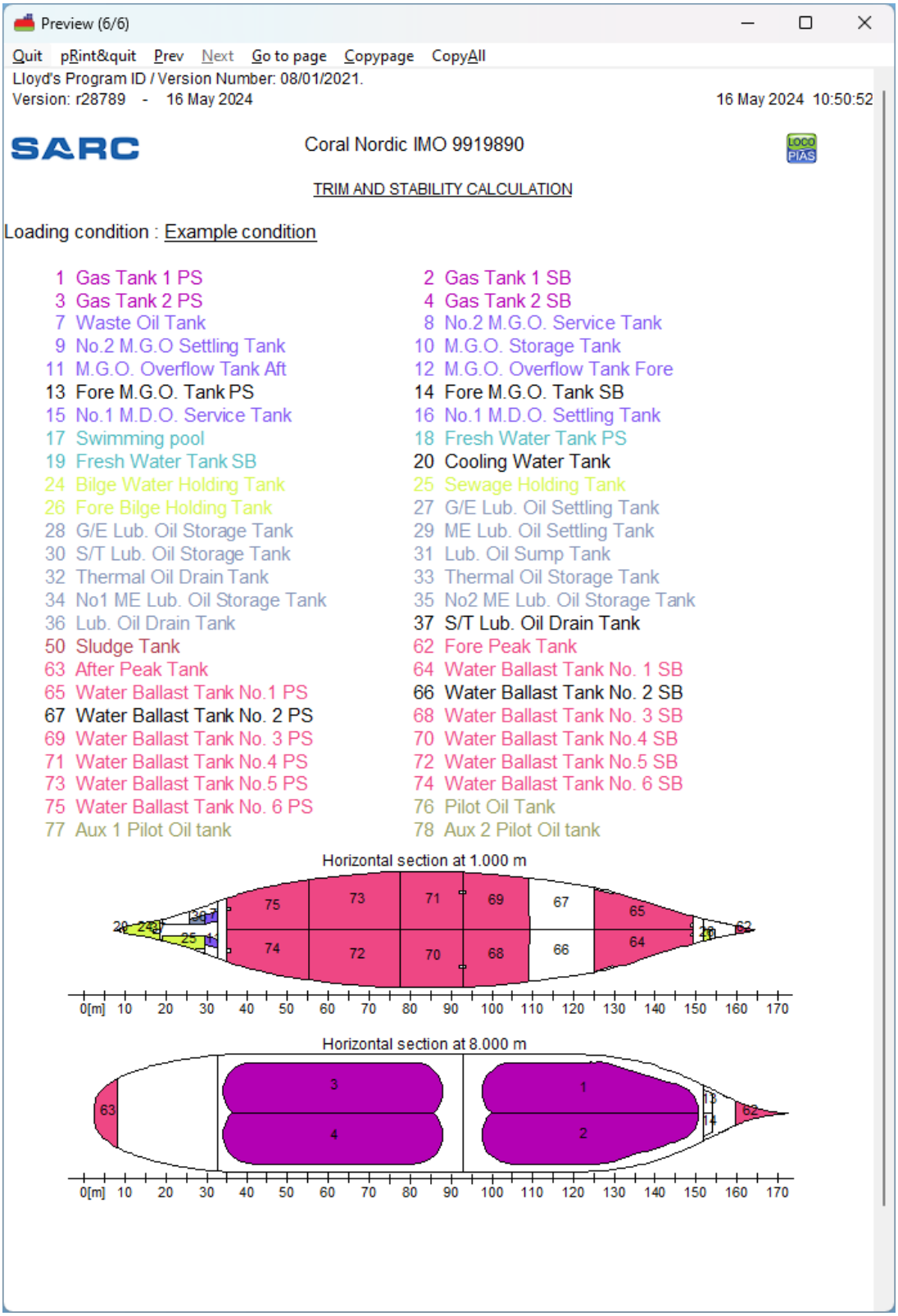
Calculated to SB	Criterion	Value	
Minimum metacentric height G'M	0.150	2.733	meter
Maximum GZ at 30 degrees or more	0.200	2.636	meter
Top of the GZ curve at least at	25.000	49.801	degrees SB
Area under the GZ curve up to 30 degrees	0.055	0.426	mrad
Area under the GZ curve up to 40 degrees	0.090	0.790	mrad
Area under the GZ curve between 30 and 40 degrees	0.030	0.364	mrad
IS Code Weathercriterion Ratio A/B>0	1.000	6.567	-
Maximum statical angle due to wind	16.000	0.655	degrees SB
Maximum statical angle 80% of angle of deck immersion	31.099	0.655	degrees SB

Loading condition complies with the stated criteria.

An example of output of intact stability, page 4/6.



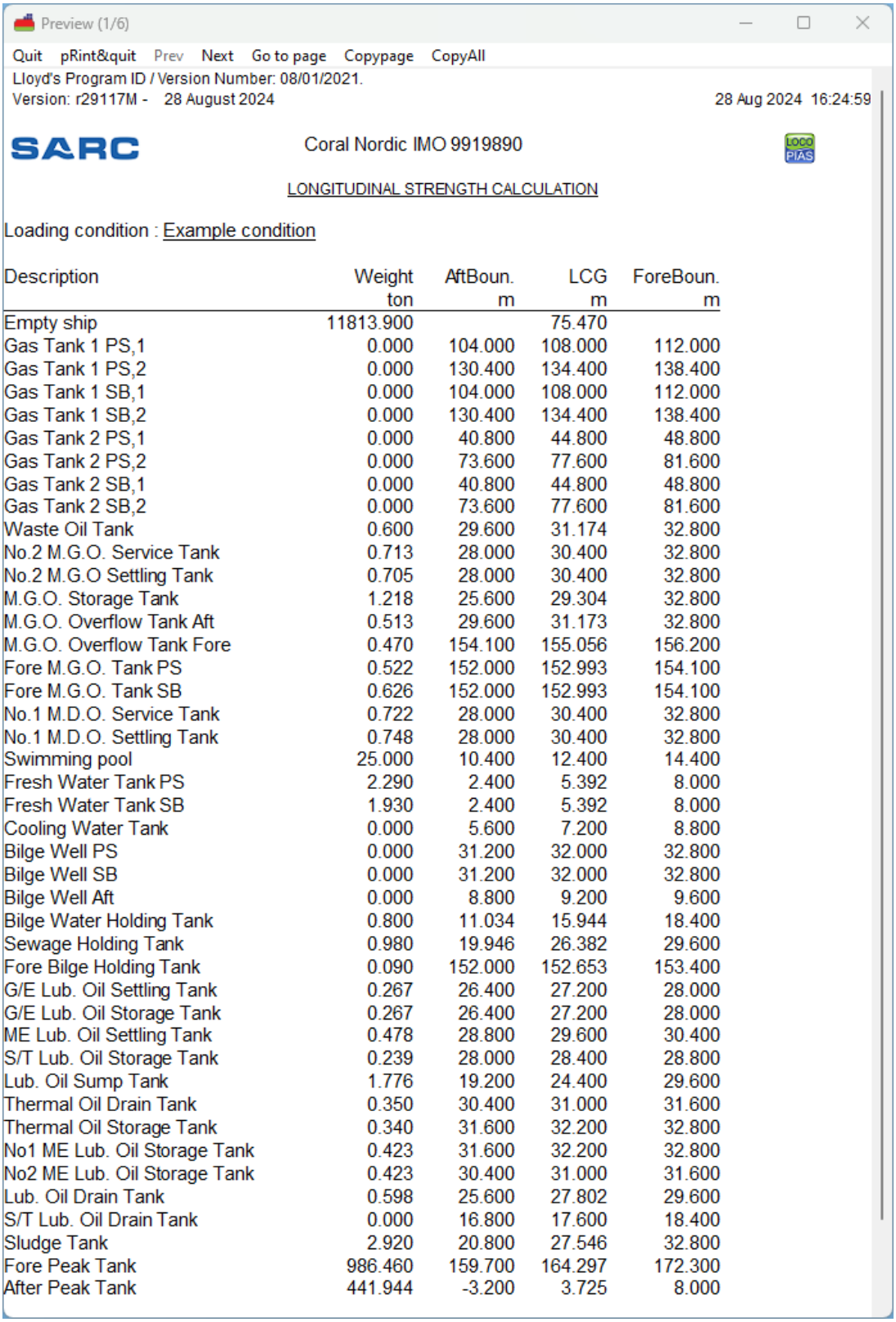
An example of output of intact stability, page 5/6.



An example of output of intact stability, page 6/6.

3.8.2.2 Longitudinal strength

Example of print-out of longitudinal strength. Actual output and/ or results may differ according the choosen calculation, and/ or output settings.



Preview (1/6)

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Lloyd's Program ID / Version Number: 08/01/2021.
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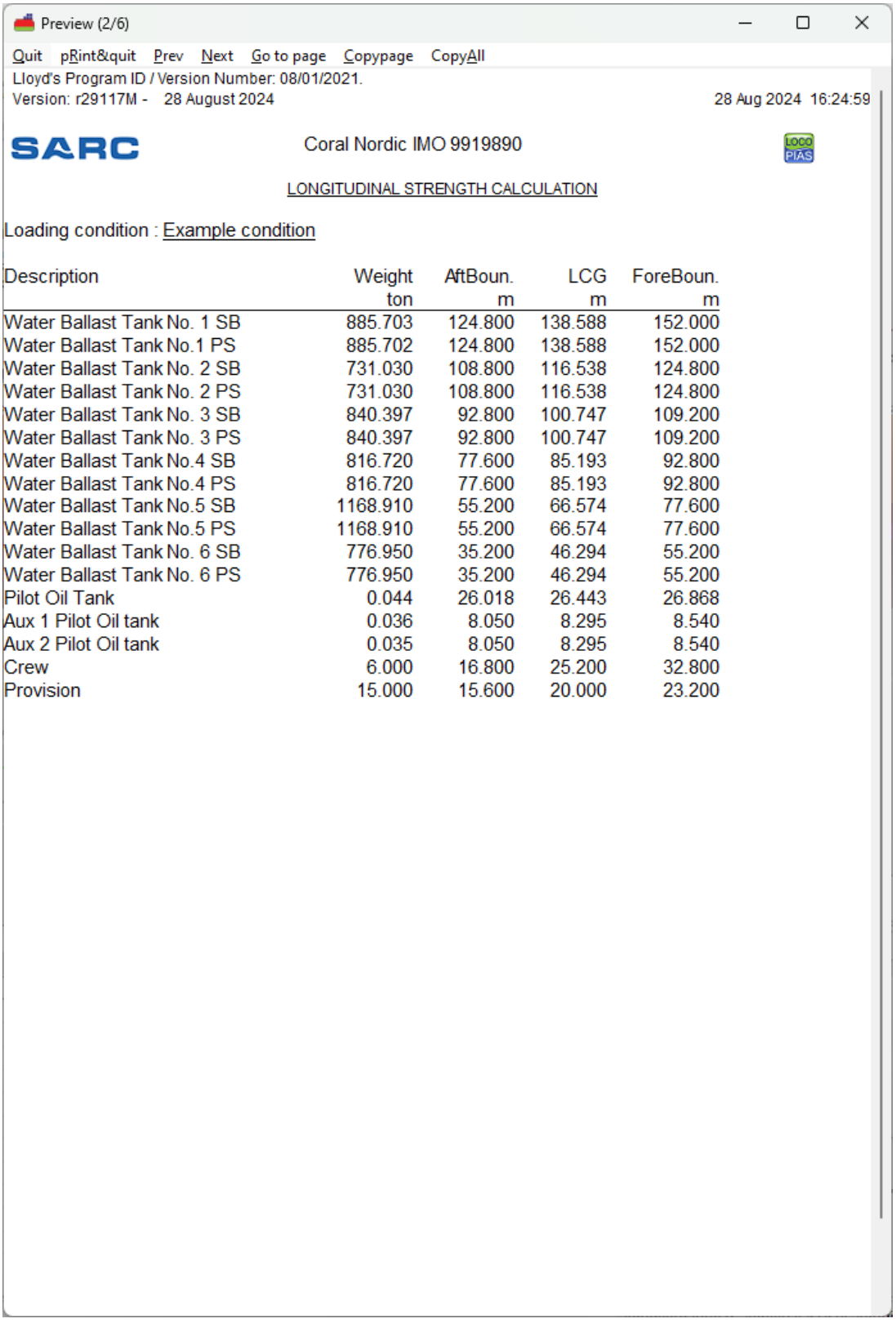
SARC Coral Nordic IMO 9919890

LONGITUDINAL STRENGTH CALCULATION

Loading condition : Example condition

Description	Weight ton	AftBoun. m	LCG m	ForeBoun. m
Empty ship	11813.900		75.470	
Gas Tank 1 PS,1	0.000	104.000	108.000	112.000
Gas Tank 1 PS,2	0.000	130.400	134.400	138.400
Gas Tank 1 SB,1	0.000	104.000	108.000	112.000
Gas Tank 1 SB,2	0.000	130.400	134.400	138.400
Gas Tank 2 PS,1	0.000	40.800	44.800	48.800
Gas Tank 2 PS,2	0.000	73.600	77.600	81.600
Gas Tank 2 SB,1	0.000	40.800	44.800	48.800
Gas Tank 2 SB,2	0.000	73.600	77.600	81.600
Waste Oil Tank	0.600	29.600	31.174	32.800
No.2 M.G.O. Service Tank	0.713	28.000	30.400	32.800
No.2 M.G.O Settling Tank	0.705	28.000	30.400	32.800
M.G.O. Storage Tank	1.218	25.600	29.304	32.800
M.G.O. Overflow Tank Aft	0.513	29.600	31.173	32.800
M.G.O. Overflow Tank Fore	0.470	154.100	155.056	156.200
Fore M.G.O. Tank PS	0.522	152.000	152.993	154.100
Fore M.G.O. Tank SB	0.626	152.000	152.993	154.100
No.1 M.D.O. Service Tank	0.722	28.000	30.400	32.800
No.1 M.D.O. Settling Tank	0.748	28.000	30.400	32.800
Swimming pool	25.000	10.400	12.400	14.400
Fresh Water Tank PS	2.290	2.400	5.392	8.000
Fresh Water Tank SB	1.930	2.400	5.392	8.000
Cooling Water Tank	0.000	5.600	7.200	8.800
Bilge Well PS	0.000	31.200	32.000	32.800
Bilge Well SB	0.000	31.200	32.000	32.800
Bilge Well Aft	0.000	8.800	9.200	9.600
Bilge Water Holding Tank	0.800	11.034	15.944	18.400
Sewage Holding Tank	0.980	19.946	26.382	29.600
Fore Bilge Holding Tank	0.090	152.000	152.653	153.400
G/E Lub. Oil Settling Tank	0.267	26.400	27.200	28.000
G/E Lub. Oil Storage Tank	0.267	26.400	27.200	28.000
ME Lub. Oil Settling Tank	0.478	28.800	29.600	30.400
S/T Lub. Oil Storage Tank	0.239	28.000	28.400	28.800
Lub. Oil Sump Tank	1.776	19.200	24.400	29.600
Thermal Oil Drain Tank	0.350	30.400	31.000	31.600
Thermal Oil Storage Tank	0.340	31.600	32.200	32.800
No1 ME Lub. Oil Storage Tank	0.423	31.600	32.200	32.800
No2 ME Lub. Oil Storage Tank	0.423	30.400	31.000	31.600
Lub. Oil Drain Tank	0.598	25.600	27.802	29.600
S/T Lub. Oil Drain Tank	0.000	16.800	17.600	18.400
Sludge Tank	2.920	20.800	27.546	32.800
Fore Peak Tank	986.460	159.700	164.297	172.300
After Peak Tank	441.944	-3.200	3.725	8.000

An example of output of longitudinal strength page 1/6.



Preview (2/6)

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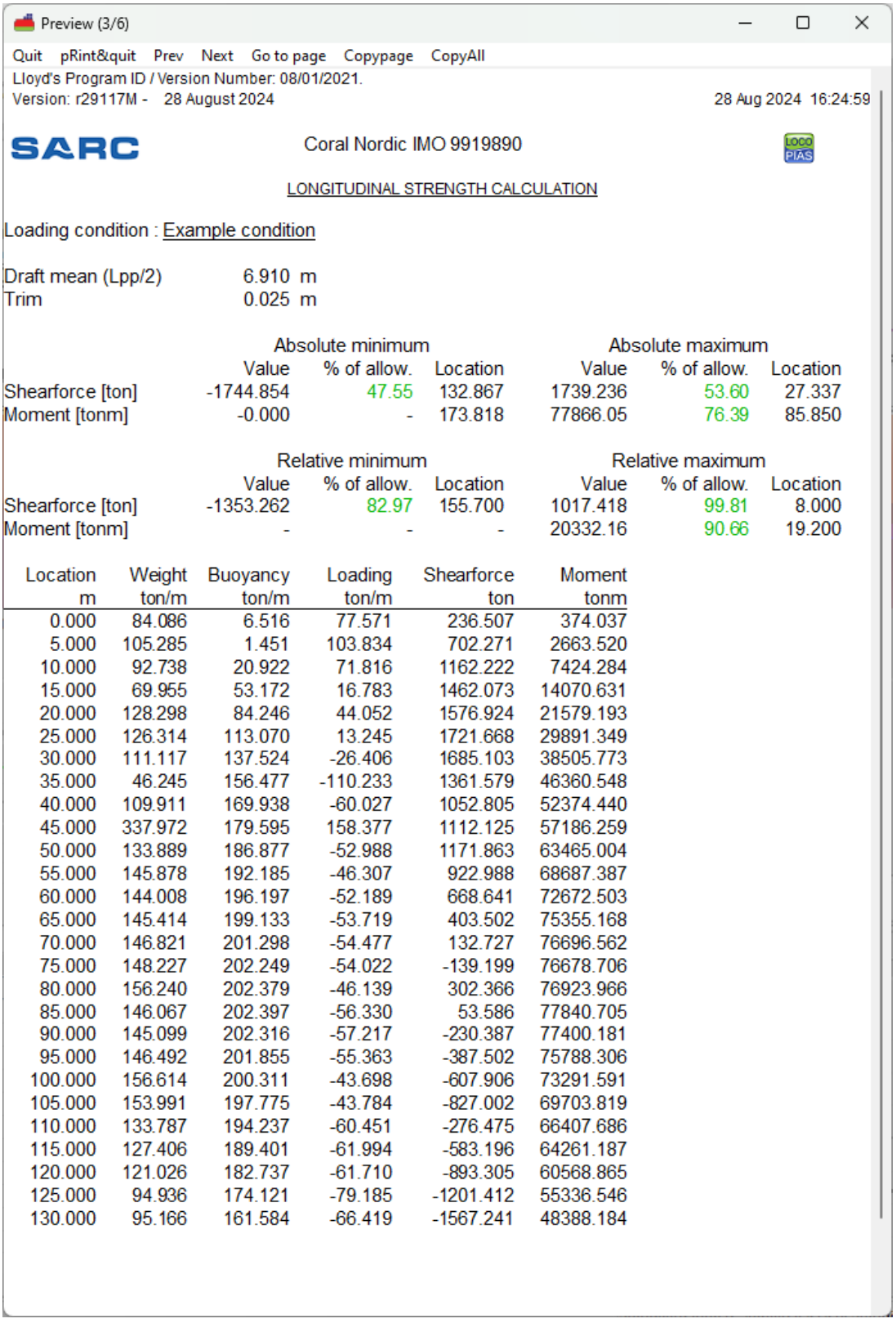
SARC Coral Nordic IMO 9919890 LOCO PIAS

LONGITUDINAL STRENGTH CALCULATION

Loading condition : Example condition

Description	Weight ton	AftBoun. m	LCG m	ForeBoun. m
Water Ballast Tank No. 1 SB	885.703	124.800	138.588	152.000
Water Ballast Tank No.1 PS	885.702	124.800	138.588	152.000
Water Ballast Tank No. 2 SB	731.030	108.800	116.538	124.800
Water Ballast Tank No. 2 PS	731.030	108.800	116.538	124.800
Water Ballast Tank No. 3 SB	840.397	92.800	100.747	109.200
Water Ballast Tank No. 3 PS	840.397	92.800	100.747	109.200
Water Ballast Tank No.4 SB	816.720	77.600	85.193	92.800
Water Ballast Tank No.4 PS	816.720	77.600	85.193	92.800
Water Ballast Tank No.5 SB	1168.910	55.200	66.574	77.600
Water Ballast Tank No.5 PS	1168.910	55.200	66.574	77.600
Water Ballast Tank No. 6 SB	776.950	35.200	46.294	55.200
Water Ballast Tank No. 6 PS	776.950	35.200	46.294	55.200
Pilot Oil Tank	0.044	26.018	26.443	26.868
Aux 1 Pilot Oil tank	0.036	8.050	8.295	8.540
Aux 2 Pilot Oil tank	0.035	8.050	8.295	8.540
Crew	6.000	16.800	25.200	32.800
Provision	15.000	15.600	20.000	23.200

An example of output of longitudinal strength page 2/6.



Preview (3/6)

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Lloyd's Program ID / Version Number: 08/01/2021.
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SARC Coral Nordic IMO 9919890 LOCO PIAS

LONGITUDINAL STRENGTH CALCULATION

Loading condition : Example condition

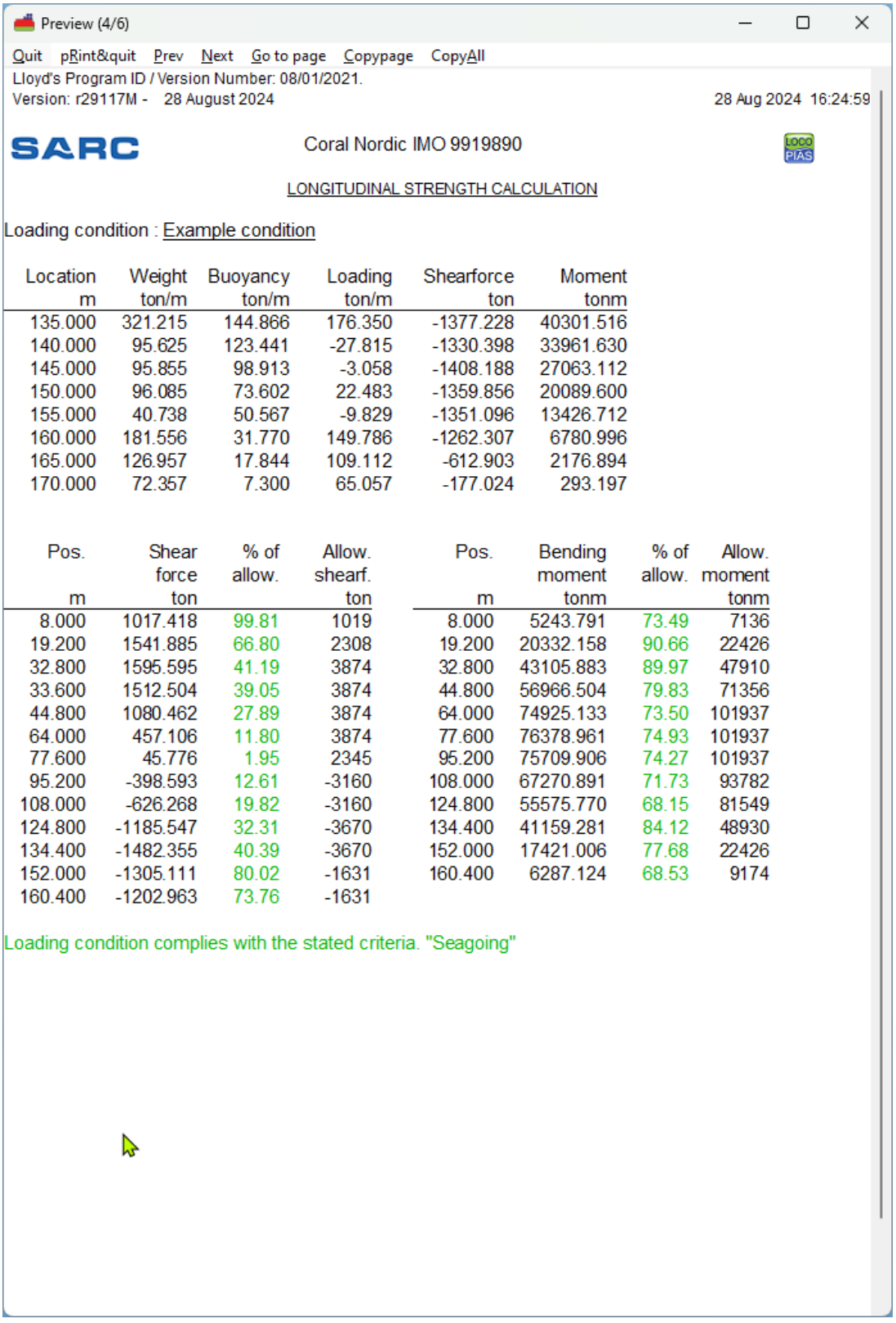
Draft mean (Lpp/2) 6.910 m
Trim 0.025 m

	Absolute minimum			Absolute maximum		
	Value	% of allow.	Location	Value	% of allow.	Location
Shearforce [ton]	-1744.854	47.55	132.867	1739.236	53.60	27.337
Moment [tonm]	-0.000	-	173.818	77866.05	76.39	85.850

	Relative minimum			Relative maximum		
	Value	% of allow.	Location	Value	% of allow.	Location
Shearforce [ton]	-1353.262	82.97	155.700	1017.418	99.81	8.000
Moment [tonm]	-	-	-	20332.16	90.66	19.200

Location m	Weight ton/m	Buoyancy ton/m	Loading ton/m	Shearforce ton	Moment tonm
0.000	84.086	6.516	77.571	236.507	374.037
5.000	105.285	1.451	103.834	702.271	2663.520
10.000	92.738	20.922	71.816	1162.222	7424.284
15.000	69.955	53.172	16.783	1462.073	14070.631
20.000	128.298	84.246	44.052	1576.924	21579.193
25.000	126.314	113.070	13.245	1721.668	29891.349
30.000	111.117	137.524	-26.406	1685.103	38505.773
35.000	46.245	156.477	-110.233	1361.579	46360.548
40.000	109.911	169.938	-60.027	1052.805	52374.440
45.000	337.972	179.595	158.377	1112.125	57186.259
50.000	133.889	186.877	-52.988	1171.863	63465.004
55.000	145.878	192.185	-46.307	922.988	68687.387
60.000	144.008	196.197	-52.189	668.641	72672.503
65.000	145.414	199.133	-53.719	403.502	75355.168
70.000	146.821	201.298	-54.477	132.727	76696.562
75.000	148.227	202.249	-54.022	-139.199	76678.706
80.000	156.240	202.379	-46.139	302.366	76923.966
85.000	146.067	202.397	-56.330	53.586	77840.705
90.000	145.099	202.316	-57.217	-230.387	77400.181
95.000	146.492	201.855	-55.363	-387.502	75788.306
100.000	156.614	200.311	-43.698	-607.906	73291.591
105.000	153.991	197.775	-43.784	-827.002	69703.819
110.000	133.787	194.237	-60.451	-276.475	66407.686
115.000	127.406	189.401	-61.994	-583.196	64261.187
120.000	121.026	182.737	-61.710	-893.305	60568.865
125.000	94.936	174.121	-79.185	-1201.412	55336.546
130.000	95.166	161.584	-66.419	-1567.241	48388.184

An example of output of longitudinal strength page 3/6.



Preview (4/6)

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Lloyd's Program ID / Version Number: 08/01/2021.
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SARC Coral Nordic IMO 9919890 LOCO PIAS

LONGITUDINAL STRENGTH CALCULATION

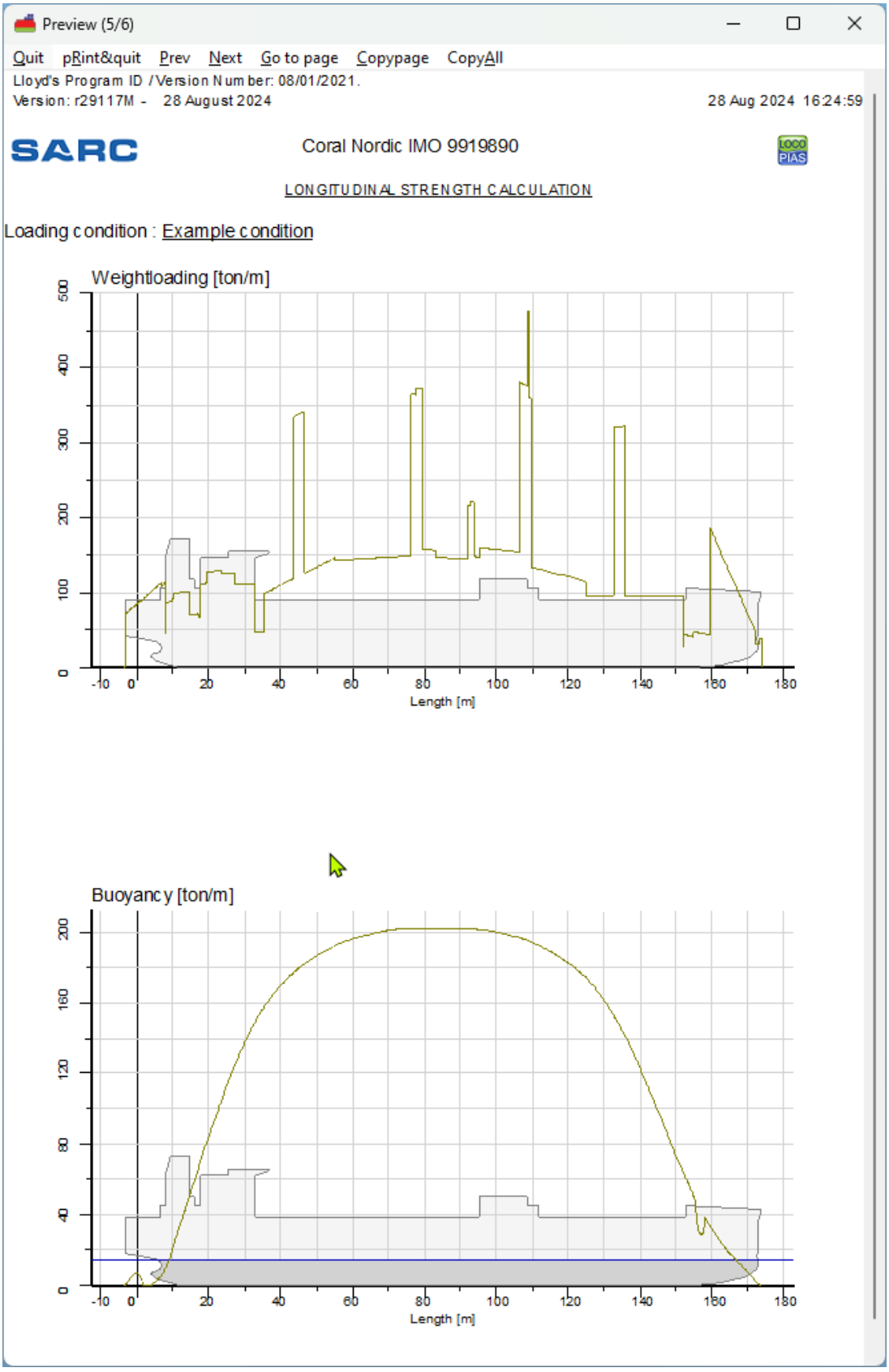
Loading condition : Example condition

Location m	Weight ton/m	Buoyancy ton/m	Loading ton/m	Shearforce ton	Moment tonm
135.000	321.215	144.866	176.350	-1377.228	40301.516
140.000	95.625	123.441	-27.815	-1330.398	33961.630
145.000	95.855	98.913	-3.058	-1408.188	27063.112
150.000	96.085	73.602	22.483	-1359.856	20089.600
155.000	40.738	50.567	-9.829	-1351.096	13426.712
160.000	181.556	31.770	149.786	-1262.307	6780.996
165.000	126.957	17.844	109.112	-612.903	2176.894
170.000	72.357	7.300	65.057	-177.024	293.197

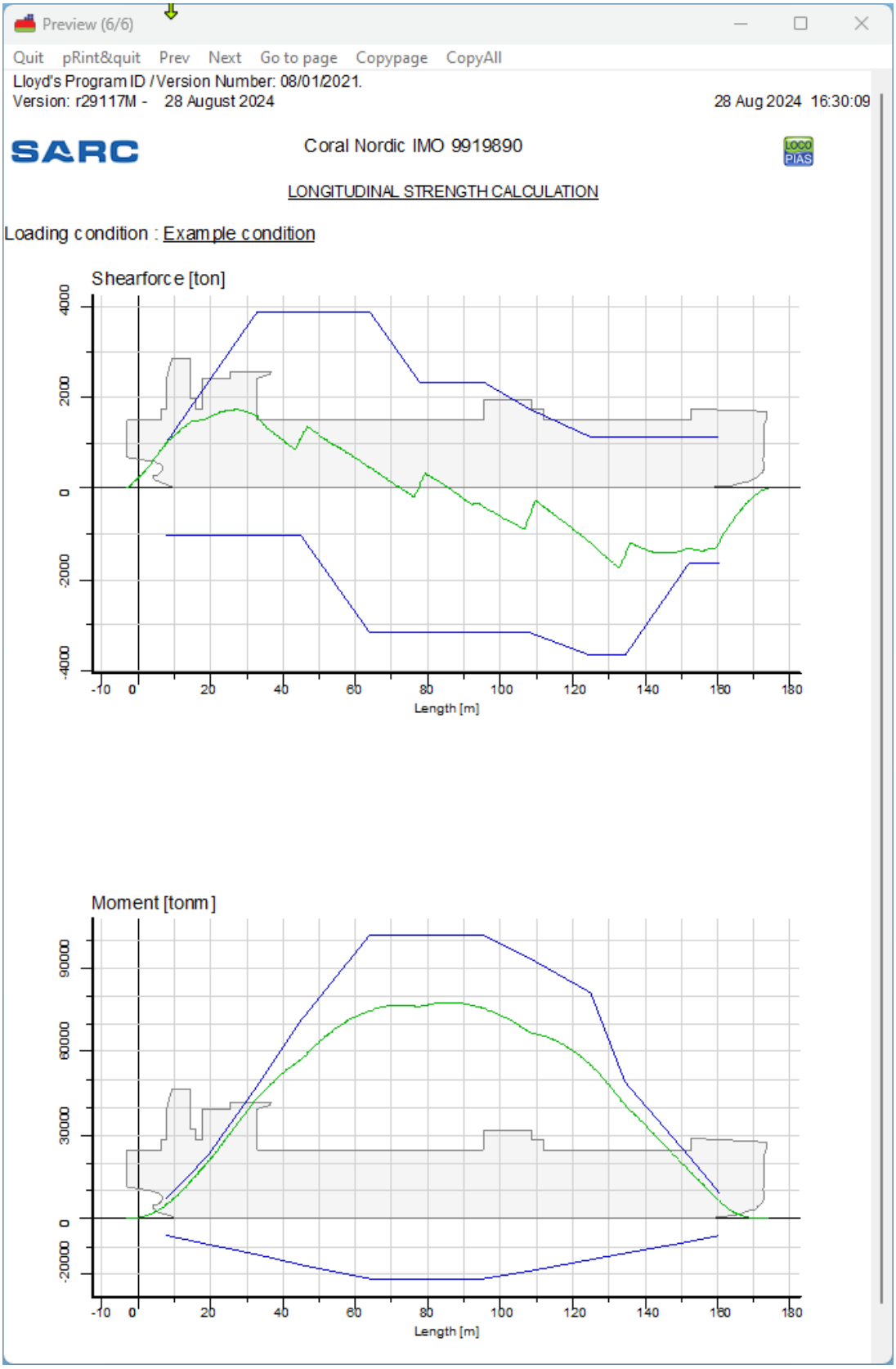
Pos. m	Shear force ton	% of allow.	Allow. shearf. ton	Pos. m	Bending moment tonm	% of allow.	Allow. moment tonm
8.000	1017.418	99.81	1019	8.000	5243.791	73.49	7136
19.200	1541.885	66.80	2308	19.200	20332.158	90.66	22426
32.800	1595.595	41.19	3874	32.800	43105.883	89.97	47910
33.600	1512.504	39.05	3874	44.800	56966.504	79.83	71356
44.800	1080.462	27.89	3874	64.000	74925.133	73.50	101937
64.000	457.106	11.80	3874	77.600	76378.961	74.93	101937
77.600	45.776	1.95	2345	95.200	75709.906	74.27	101937
95.200	-398.593	12.61	-3160	108.000	67270.891	71.73	93782
108.000	-626.268	19.82	-3160	124.800	55575.770	68.15	81549
124.800	-1185.547	32.31	-3670	134.400	41159.281	84.12	48930
134.400	-1482.355	40.39	-3670	152.000	17421.006	77.68	22426
152.000	-1305.111	80.02	-1631	160.400	6287.124	68.53	9174
160.400	-1202.963	73.76	-1631				

Loading condition complies with the stated criteria. "Seagoing"

An example of output of longitudinal strength page 4/6.



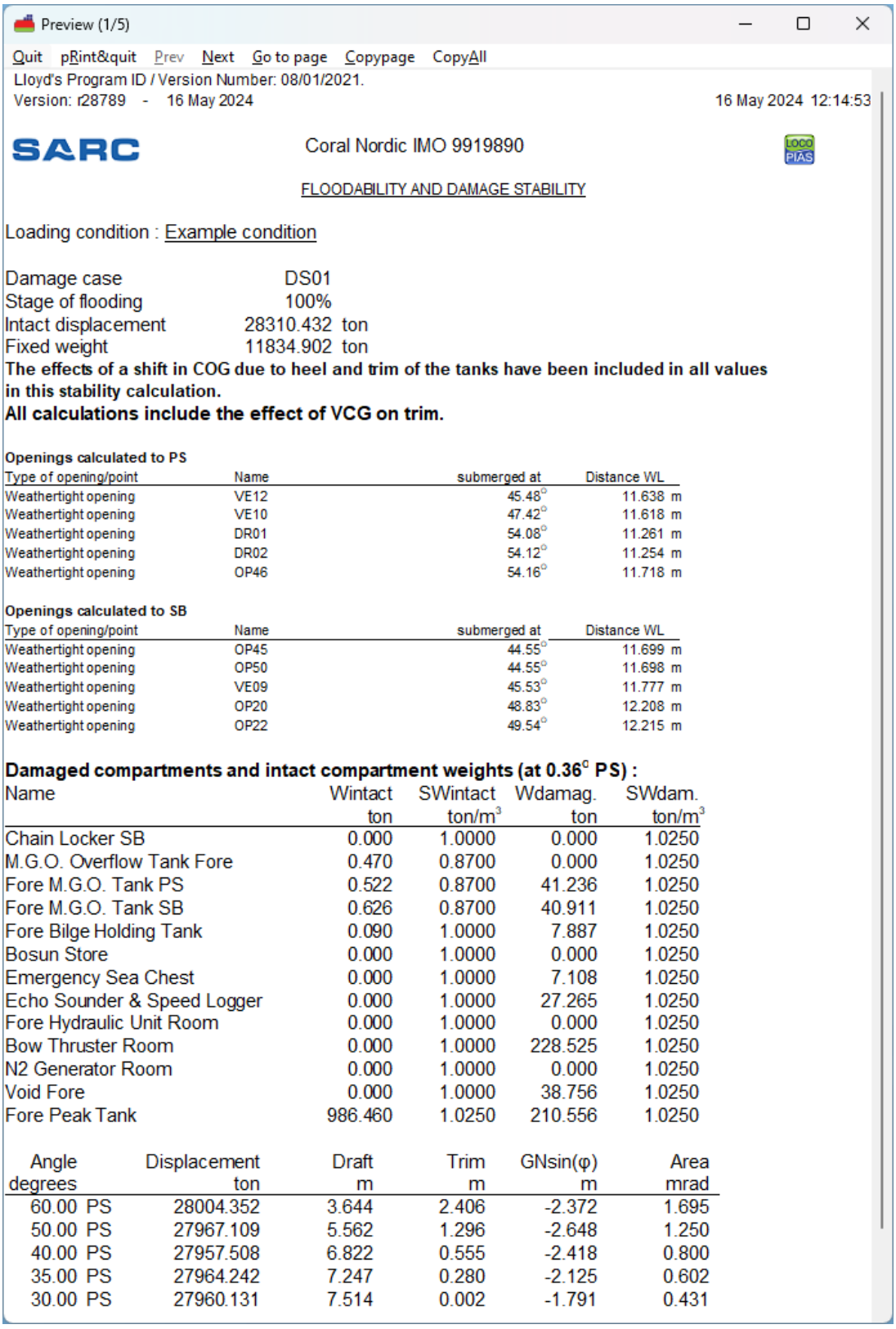
An example of output of longitudinal strength page 5/6.



An example of output of longitudinal strength page 6/6.

3.8.2.3 Damage stability

Example of print-out of damage stability. Actual output and/ or results may differ according the choosen calculation, and/ or output settings.



Preview (1/5)

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Lloyd's Program ID / Version Number: 08/01/2021.
Version: r28789 - 16 May 2024 16 May 2024 12:14:53

SARC Coral Nordic IMO 9919890

FLOODABILITY AND DAMAGE STABILITY

Loading condition : Example condition

Damage case	DS01	
Stage of flooding	100%	
Intact displacement	28310.432	ton
Fixed weight	11834.902	ton

The effects of a shift in COG due to heel and trim of the tanks have been included in all values in this stability calculation.
All calculations include the effect of VCG on trim.

Openings calculated to PS

Type of opening/point	Name	submerged at	Distance WL
Weathertight opening	VE12	45.48°	11.638 m
Weathertight opening	VE10	47.42°	11.618 m
Weathertight opening	DR01	54.08°	11.261 m
Weathertight opening	DR02	54.12°	11.254 m
Weathertight opening	OP46	54.16°	11.718 m

Openings calculated to SB

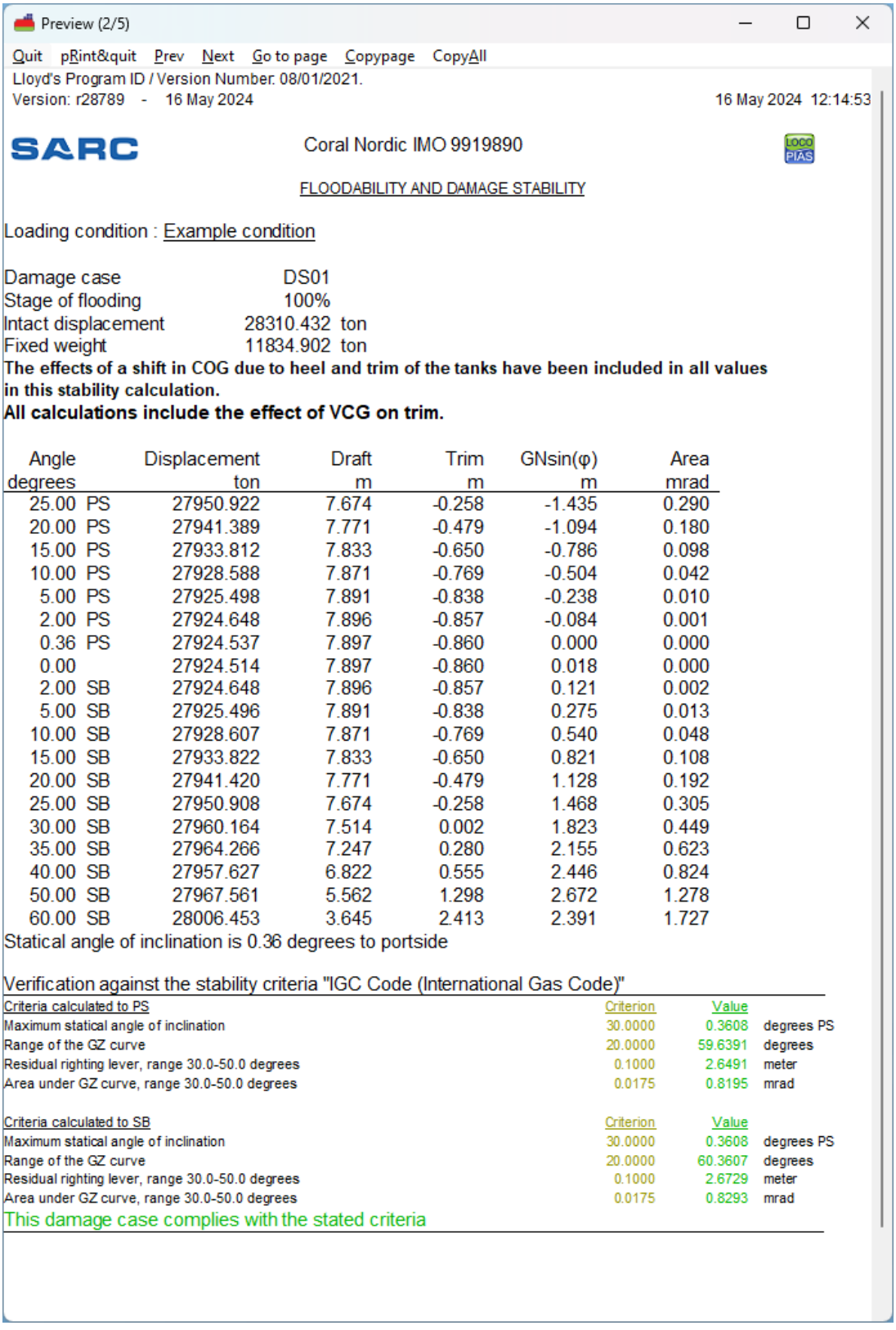
Type of opening/point	Name	submerged at	Distance WL
Weathertight opening	OP45	44.55°	11.699 m
Weathertight opening	OP50	44.55°	11.698 m
Weathertight opening	VE09	45.53°	11.777 m
Weathertight opening	OP20	48.83°	12.208 m
Weathertight opening	OP22	49.54°	12.215 m

Damaged compartments and intact compartment weights (at 0.36° PS) :

Name	Wintact ton	SWintact ton/m³	Wdamag. ton	SWdam. ton/m³
Chain Locker SB	0.000	1.0000	0.000	1.0250
M.G.O. Overflow Tank Fore	0.470	0.8700	0.000	1.0250
Fore M.G.O. Tank PS	0.522	0.8700	41.236	1.0250
Fore M.G.O. Tank SB	0.626	0.8700	40.911	1.0250
Fore Bilge Holding Tank	0.090	1.0000	7.887	1.0250
Bosun Store	0.000	1.0000	0.000	1.0250
Emergency Sea Chest	0.000	1.0000	7.108	1.0250
Echo Sounder & Speed Logger	0.000	1.0000	27.265	1.0250
Fore Hydraulic Unit Room	0.000	1.0000	0.000	1.0250
Bow Thruster Room	0.000	1.0000	228.525	1.0250
N2 Generator Room	0.000	1.0000	0.000	1.0250
Void Fore	0.000	1.0000	38.756	1.0250
Fore Peak Tank	986.460	1.0250	210.556	1.0250

Angle degrees	Displacement ton	Draft m	Trim m	GNsin(φ) m	Area mrad
60.00 PS	28004.352	3.644	2.406	-2.372	1.695
50.00 PS	27967.109	5.562	1.296	-2.648	1.250
40.00 PS	27957.508	6.822	0.555	-2.418	0.800
35.00 PS	27964.242	7.247	0.280	-2.125	0.602
30.00 PS	27960.131	7.514	0.002	-1.791	0.431

An example of output of damage stability, page 1/5.



Preview (2/5)

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Lloyd's Program ID / Version Number: 08/01/2021.
Version: r28789 - 16 May 2024 16 May 2024 12:14:53

SARC Coral Nordic IMO 9919890 LOCO PIAS

FLOODABILITY AND DAMAGE STABILITY

Loading condition : Example condition

Damage case	DS01
Stage of flooding	100%
Intact displacement	28310.432 ton
Fixed weight	11834.902 ton

The effects of a shift in COG due to heel and trim of the tanks have been included in all values in this stability calculation.
All calculations include the effect of VCG on trim.

Angle degrees		Displacement ton	Draft m	Trim m	GNsin(φ) m	Area mrad
25.00	PS	27950.922	7.674	-0.258	-1.435	0.290
20.00	PS	27941.389	7.771	-0.479	-1.094	0.180
15.00	PS	27933.812	7.833	-0.650	-0.786	0.098
10.00	PS	27928.588	7.871	-0.769	-0.504	0.042
5.00	PS	27925.498	7.891	-0.838	-0.238	0.010
2.00	PS	27924.648	7.896	-0.857	-0.084	0.001
0.36	PS	27924.537	7.897	-0.860	0.000	0.000
0.00		27924.514	7.897	-0.860	0.018	0.000
2.00	SB	27924.648	7.896	-0.857	0.121	0.002
5.00	SB	27925.496	7.891	-0.838	0.275	0.013
10.00	SB	27928.607	7.871	-0.769	0.540	0.048
15.00	SB	27933.822	7.833	-0.650	0.821	0.108
20.00	SB	27941.420	7.771	-0.479	1.128	0.192
25.00	SB	27950.908	7.674	-0.258	1.468	0.305
30.00	SB	27960.164	7.514	0.002	1.823	0.449
35.00	SB	27964.266	7.247	0.280	2.155	0.623
40.00	SB	27957.627	6.822	0.555	2.446	0.824
50.00	SB	27967.561	5.562	1.298	2.672	1.278
60.00	SB	28006.453	3.645	2.413	2.391	1.727

Statical angle of inclination is 0.36 degrees to portside

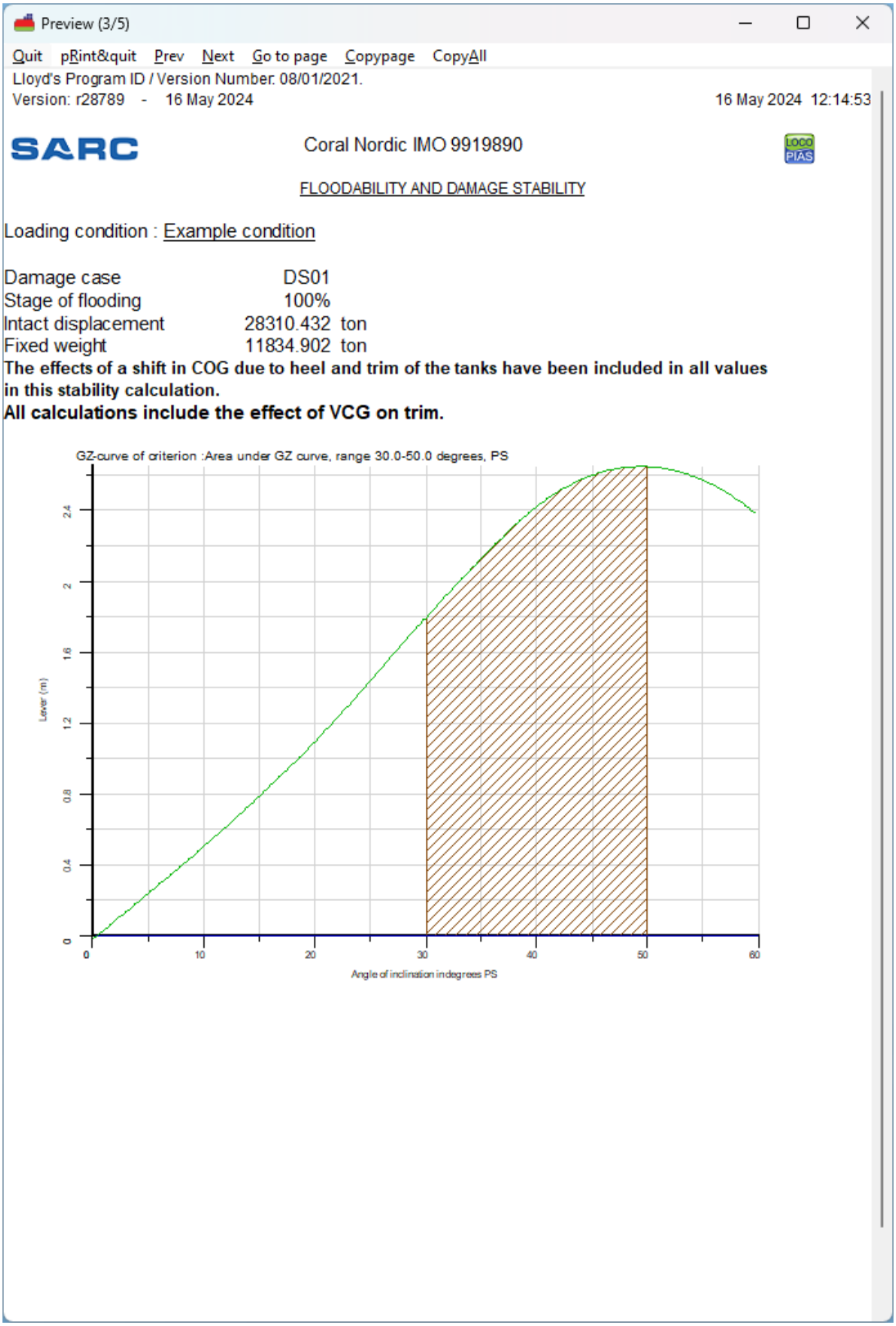
Verification against the stability criteria "IGC Code (International Gas Code)"

Criteria calculated to PS	Criterion	Value	
Maximum statical angle of inclination	30.0000	0.3608	degrees PS
Range of the GZ curve	20.0000	59.6391	degrees
Residual righting lever, range 30.0-50.0 degrees	0.1000	2.6491	meter
Area under GZ curve, range 30.0-50.0 degrees	0.0175	0.8195	mrad

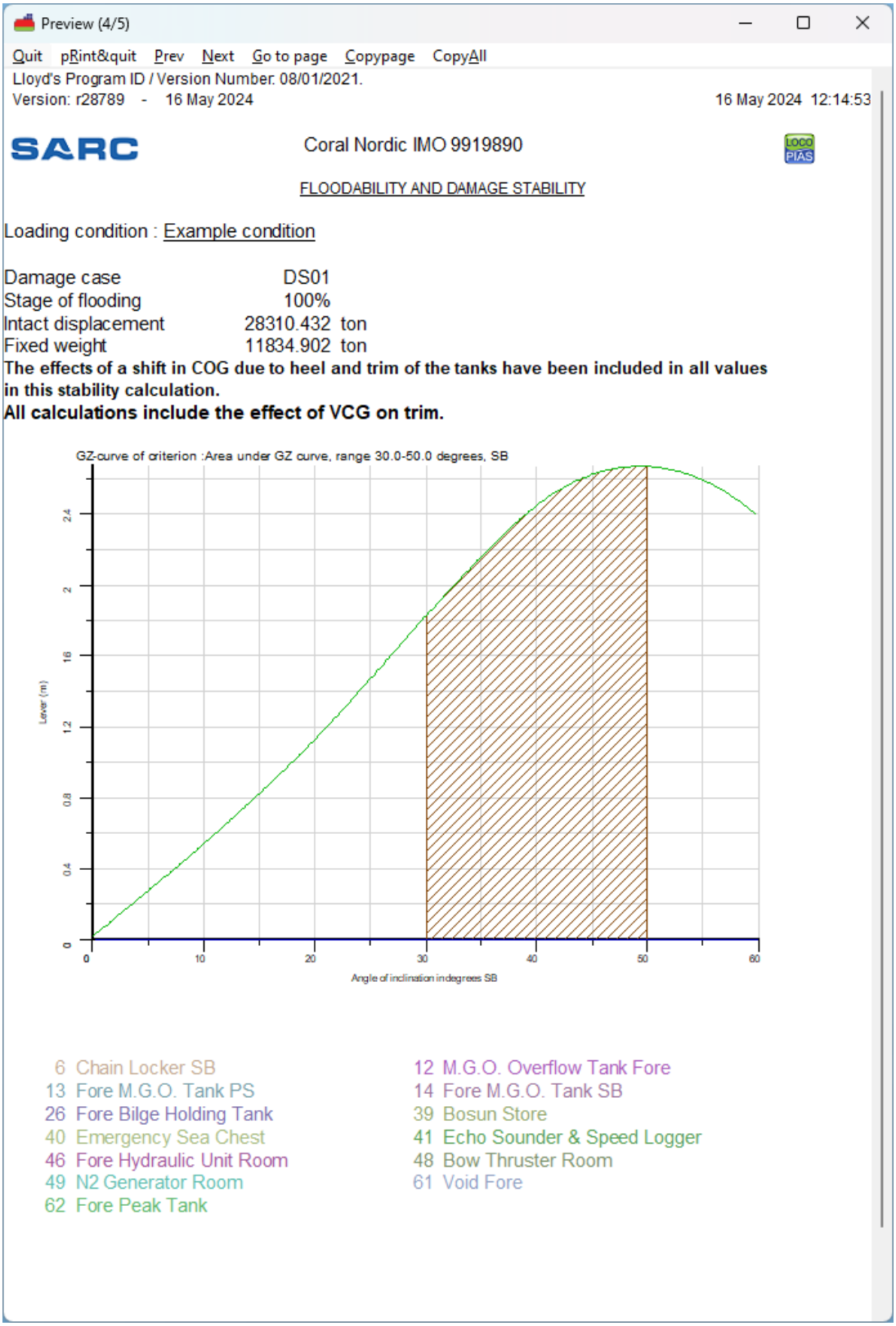
Criteria calculated to SB	Criterion	Value	
Maximum statical angle of inclination	30.0000	0.3608	degrees PS
Range of the GZ curve	20.0000	60.3607	degrees
Residual righting lever, range 30.0-50.0 degrees	0.1000	2.6729	meter
Area under GZ curve, range 30.0-50.0 degrees	0.0175	0.8293	mrad

This damage case complies with the stated criteria

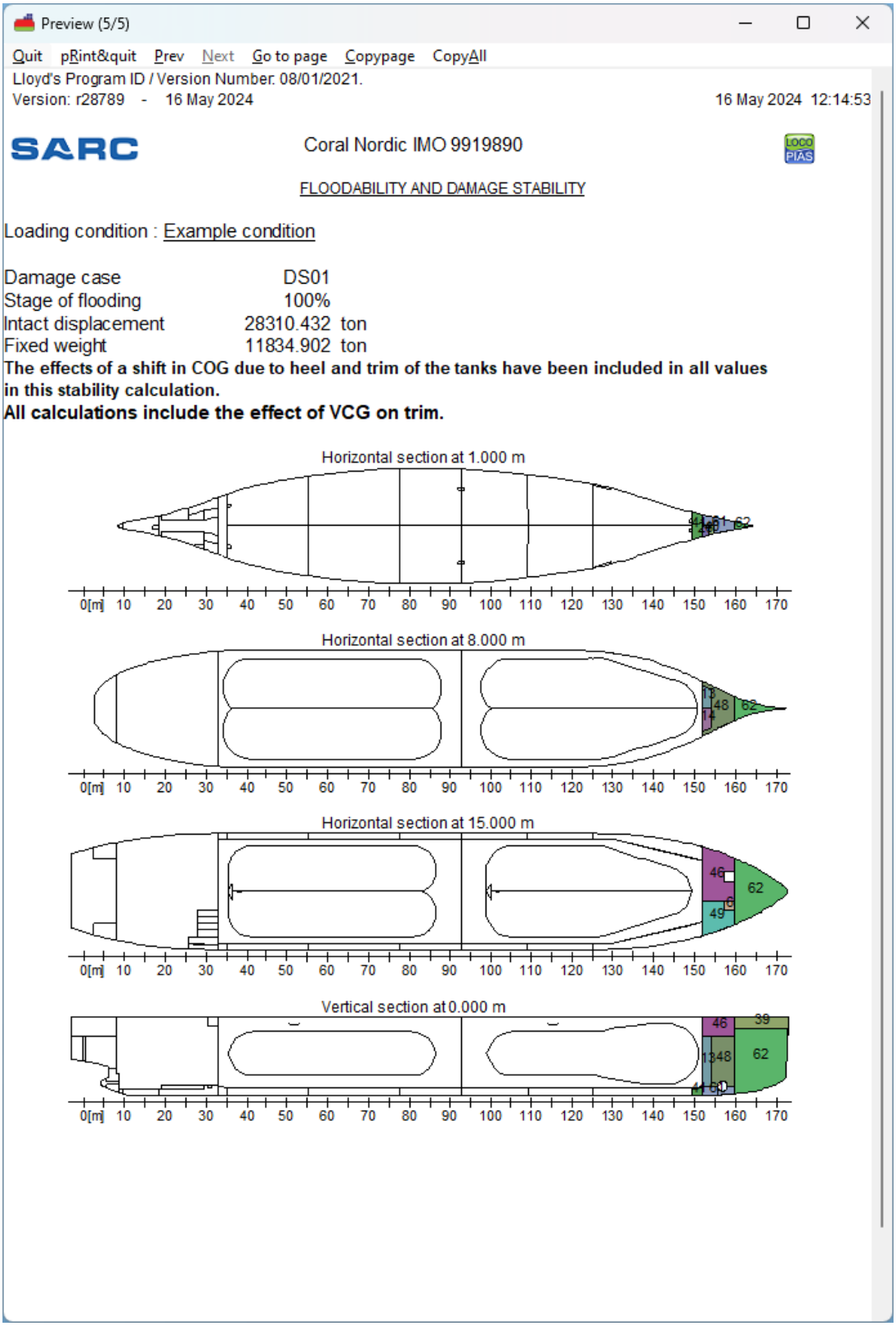
An example of output of damage stability, page 2/5.



An example of output of damage stability, page 3/5.



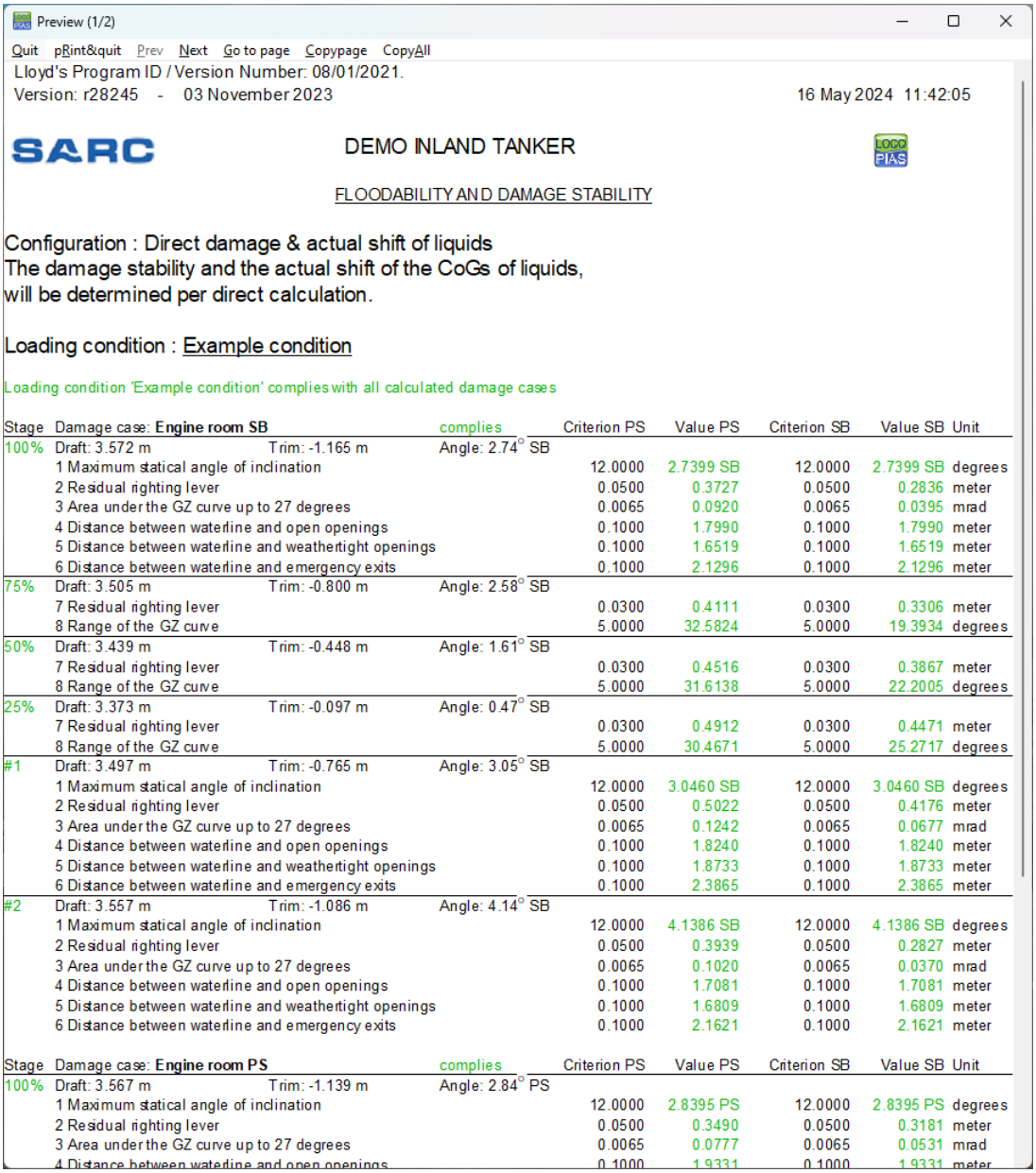
An example of output of damage stability, page 4/5.



An example of output of damage stability, page 5/5.

3.8.2.4 Damage stability (summary)

Example of print-out of summarized damage stability. Actual output and/ or results may differ according the choosen calculation, and/ or output settings.



Preview (1/2)

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Version: r28245 - 03 November 2023 16 May 2024 11:42:05

SARC DEMO INLAND TANKER

FLOODABILITY AND DAMAGE STABILITY

Configuration : Direct damage & actual shift of liquids
The damage stability and the actual shift of the CoGs of liquids,
will be determined per direct calculation.

Loading condition : Example condition

Loading condition 'Example condition' complies with all calculated damage cases

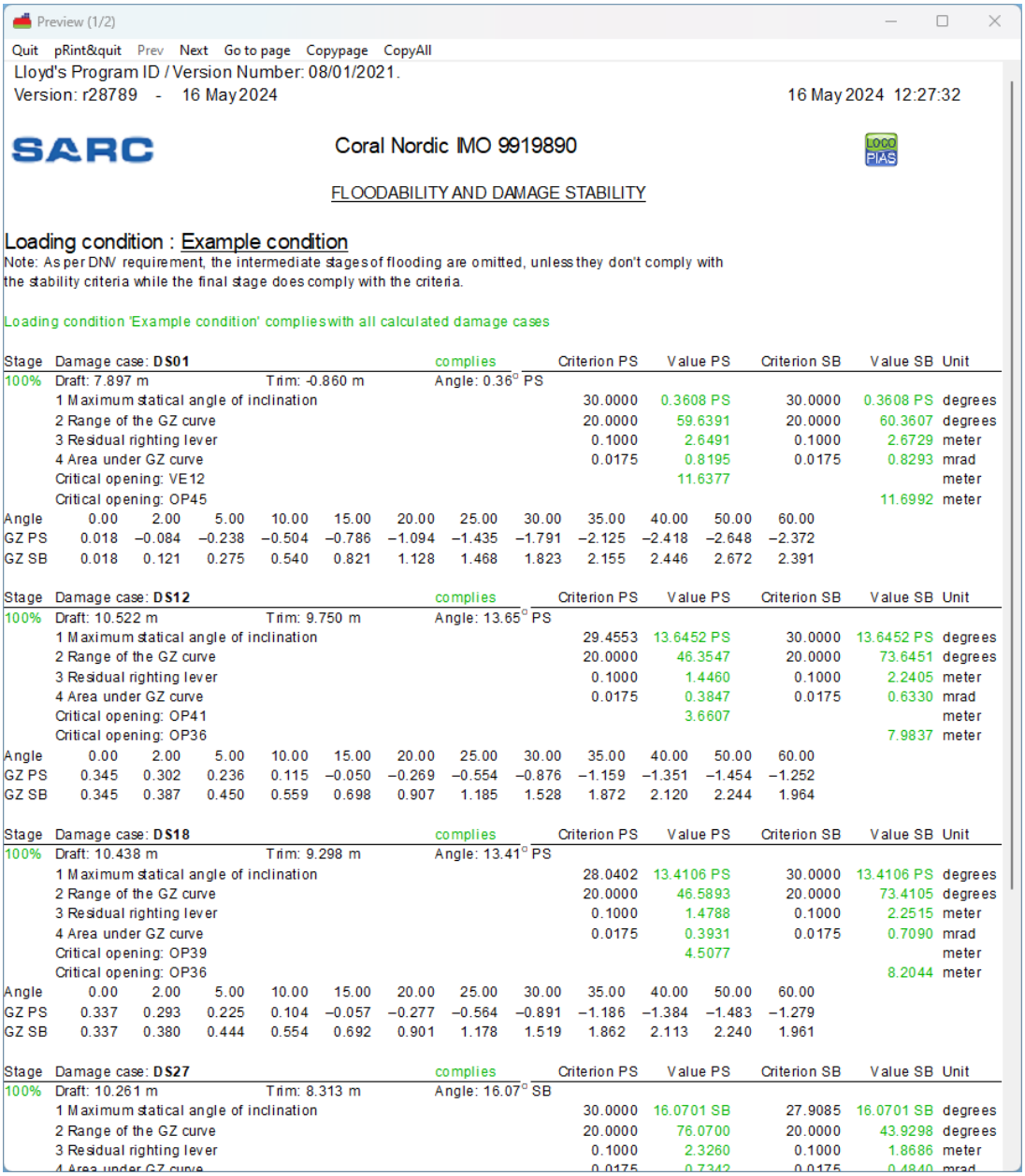
Stage	Damage case: **Engine room SB**		complies	Criterion PS	Value PS	Criterion SB	Value SB	Unit
100%	Draft: 3.572 m	Trim: -1.165 m	Angle: 2.74° SB					
	1 Maximum statical angle of inclination			12.0000	2.7399 SB	12.0000	2.7399 SB	degrees
	2 Residual righting lever			0.0500	0.3727	0.0500	0.2836	meter
	3 Area under the GZ curve up to 27 degrees			0.0065	0.0920	0.0065	0.0395	mrad
	4 Distance between waterline and open openings			0.1000	1.7990	0.1000	1.7990	meter
	5 Distance between waterline and weathertight openings			0.1000	1.6519	0.1000	1.6519	meter
	6 Distance between waterline and emergency exits			0.1000	2.1296	0.1000	2.1296	meter
75%	Draft: 3.505 m	Trim: -0.800 m	Angle: 2.58° SB					
	7 Residual righting lever			0.0300	0.4111	0.0300	0.3306	meter
	8 Range of the GZ curve			5.0000	32.5824	5.0000	19.3934	degrees
50%	Draft: 3.439 m	Trim: -0.448 m	Angle: 1.61° SB					
	7 Residual righting lever			0.0300	0.4516	0.0300	0.3867	meter
	8 Range of the GZ curve			5.0000	31.6138	5.0000	22.2005	degrees
25%	Draft: 3.373 m	Trim: -0.097 m	Angle: 0.47° SB					
	7 Residual righting lever			0.0300	0.4912	0.0300	0.4471	meter
	8 Range of the GZ curve			5.0000	30.4671	5.0000	25.2717	degrees
#1	Draft: 3.497 m	Trim: -0.765 m	Angle: 3.05° SB					
	1 Maximum statical angle of inclination			12.0000	3.0460 SB	12.0000	3.0460 SB	degrees
	2 Residual righting lever			0.0500	0.5022	0.0500	0.4176	meter
	3 Area under the GZ curve up to 27 degrees			0.0065	0.1242	0.0065	0.0677	mrad
	4 Distance between waterline and open openings			0.1000	1.8240	0.1000	1.8240	meter
	5 Distance between waterline and weathertight openings			0.1000	1.8733	0.1000	1.8733	meter
	6 Distance between waterline and emergency exits			0.1000	2.3865	0.1000	2.3865	meter
#2	Draft: 3.557 m	Trim: -1.086 m	Angle: 4.14° SB					
	1 Maximum statical angle of inclination			12.0000	4.1386 SB	12.0000	4.1386 SB	degrees
	2 Residual righting lever			0.0500	0.3939	0.0500	0.2827	meter
	3 Area under the GZ curve up to 27 degrees			0.0065	0.1020	0.0065	0.0370	mrad
	4 Distance between waterline and open openings			0.1000	1.7081	0.1000	1.7081	meter
	5 Distance between waterline and weathertight openings			0.1000	1.6809	0.1000	1.6809	meter
	6 Distance between waterline and emergency exits			0.1000	2.1621	0.1000	2.1621	meter

Stage	Damage case: **Engine room PS**		complies	Criterion PS	Value PS	Criterion SB	Value SB	Unit
100%	Draft: 3.567 m	Trim: -1.139 m	Angle: 2.84° PS					
	1 Maximum statical angle of inclination			12.0000	2.8395 PS	12.0000	2.8395 PS	degrees
	2 Residual righting lever			0.0500	0.3490	0.0500	0.3181	meter
	3 Area under the GZ curve up to 27 degrees			0.0065	0.0777	0.0065	0.0531	mrad
	4 Distance between waterline and open openings			0.1000	1.9331	0.1000	1.9331	meter

An example of output of sumarized damage stability.

3.8.2.5 Damage stability (summary DNV)

Example of print-out of summarized damage stability according the format of Det Norske Veritas (DNV). As per DNV requirement, the intermediate stages of flooding are omitted, unless they don't comply with the stability criteria while the final stage does comply with the criteria. Actual output and/ or results may differ according the choosen calculation, and/ or output settings.



Preview (1/2)

Quit pRint&quit Prev Next Go to page Copypage CopyAll

Lloyd's Program ID / Version Number: 08/01/2021.
Version: r28789 - 16 May 2024 16 May 2024 12:27:32

SARC Coral Nordic IMO 9919890

FLOODABILITY AND DAMAGE STABILITY

Loading condition : Example condition

Note: As per DNV requirement, the intermediate stages of flooding are omitted, unless they don't comply with the stability criteria while the final stage does comply with the criteria.

Loading condition 'Example condition' complies with all calculated damage cases

Stage	Damage case: **DS01**						complies		Criterion PS	Value PS	Criterion SB	Value SB	Unit
100%	Draft: 7.897 m		Trim: -0.860 m				Angle: 0.36° PS						
	1 Maximum statical angle of inclination								30.0000	0.3608 PS	30.0000	0.3608 PS	degrees
	2 Range of the GZ curve								20.0000	59.6391	20.0000	60.3607	degrees
	3 Residual righting lever								0.1000	2.6491	0.1000	2.6729	meter
	4 Area under GZ curve								0.0175	0.8195	0.0175	0.8293	mrad
	Critical opening: VE12									11.6377			meter
	Critical opening: OP45											11.6992	meter
Angle	0.00	2.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	50.00	60.00	
GZ PS	0.018	−0.084	−0.238	−0.504	−0.786	−1.094	−1.435	−1.791	−2.125	−2.418	−2.648	−2.372	
GZ SB	0.018	0.121	0.275	0.540	0.821	1.128	1.468	1.823	2.155	2.446	2.672	2.391	

Stage	Damage case: **DS12**						complies		Criterion PS	Value PS	Criterion SB	Value SB	Unit
100%	Draft: 10.522 m		Trim: 9.750 m				Angle: 13.65° PS						
	1 Maximum statical angle of inclination								29.4553	13.6452 PS	30.0000	13.6452 PS	degrees
	2 Range of the GZ curve								20.0000	46.3547	20.0000	73.6451	degrees
	3 Residual righting lever								0.1000	1.4460	0.1000	2.2405	meter
	4 Area under GZ curve								0.0175	0.3847	0.0175	0.6330	mrad
	Critical opening: OP41									3.6607			meter
	Critical opening: OP36											7.9837	meter
Angle	0.00	2.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	50.00	60.00	
GZ PS	0.345	0.302	0.236	0.115	−0.050	−0.269	−0.554	−0.876	−1.159	−1.351	−1.454	−1.252	
GZ SB	0.345	0.387	0.450	0.559	0.698	0.907	1.185	1.528	1.872	2.120	2.244	1.964	

Stage	Damage case: **DS18**						complies		Criterion PS	Value PS	Criterion SB	Value SB	Unit
100%	Draft: 10.438 m		Trim: 9.298 m				Angle: 13.41° PS						
	1 Maximum statical angle of inclination								28.0402	13.4106 PS	30.0000	13.4106 PS	degrees
	2 Range of the GZ curve								20.0000	46.5893	20.0000	73.4105	degrees
	3 Residual righting lever								0.1000	1.4788	0.1000	2.2515	meter
	4 Area under GZ curve								0.0175	0.3931	0.0175	0.7090	mrad
	Critical opening: OP39									4.5077			meter
	Critical opening: OP36											8.2044	meter
Angle	0.00	2.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	50.00	60.00	
GZ PS	0.337	0.293	0.225	0.104	−0.057	−0.277	−0.564	−0.891	−1.186	−1.384	−1.483	−1.279	
GZ SB	0.337	0.380	0.444	0.554	0.692	0.901	1.178	1.519	1.862	2.113	2.240	1.961	

Stage	Damage case: **DS27**						complies		Criterion PS	Value PS	Criterion SB	Value SB	Unit
100%	Draft: 10.261 m		Trim: 8.313 m				Angle: 16.07° SB						
	1 Maximum statical angle of inclination								30.0000	16.0701 SB	27.9085	16.0701 SB	degrees
	2 Range of the GZ curve								20.0000	76.0700	20.0000	43.9298	degrees
	3 Residual righting lever								0.1000	2.3260	0.1000	1.8686	meter
	4 Area under GZ curve								0.0175	0.7342	0.0175	0.4840	mrad

An example of output of sumarized damage stability, according DNV.

Chapter 4

Modules

LOCOPIAS can be equipped with modules to define specific weight items in a loading condition. LOCOPIAS for a specific vessel can be equipped with a selection of modules required for the purpose of the vessel. You can navigate to the modules by clicking one of the Module buttons (see section 3.1 on page 8, Main window layout, element 2). Depending on your installation, the following modules are available in LOCOPIAS:

- Tanks
- Containers
- Weight list
- Damages
- Cargo weight determination

4.1 Common operations in modules

The modules with a graphical interface have the following common functions.

4.1.1 Genereral operations

Zoom
Zoom in views and cross sections by using the scroll wheel (third, or middle mouse button).

Pan
Pan in views and cross sections by pressing and holding the scroll wheel.

Select
Standard selection methods in the views:

- Left-click an item to select it.
- Drag selection box to select a series of items.
- <Ctrl+left-click> to toggle the selection status of (multiple)items.
- <Ctrl+A> to select all items.

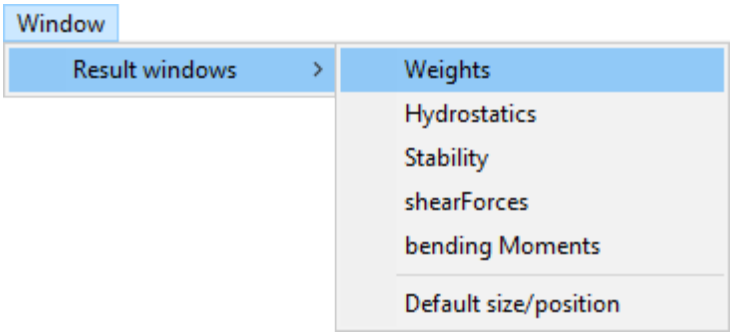
Edit
Right-click a selected item

4.1.2 Verification

In every module the [Check]-button is available to find out if the loading condition complies with requirements for intact stability, and, if applicable, longitudinal strength, torsion moments, air draft and damage stability. More information about the [Check]-button can be found in section 3.7 on page 14, Check.

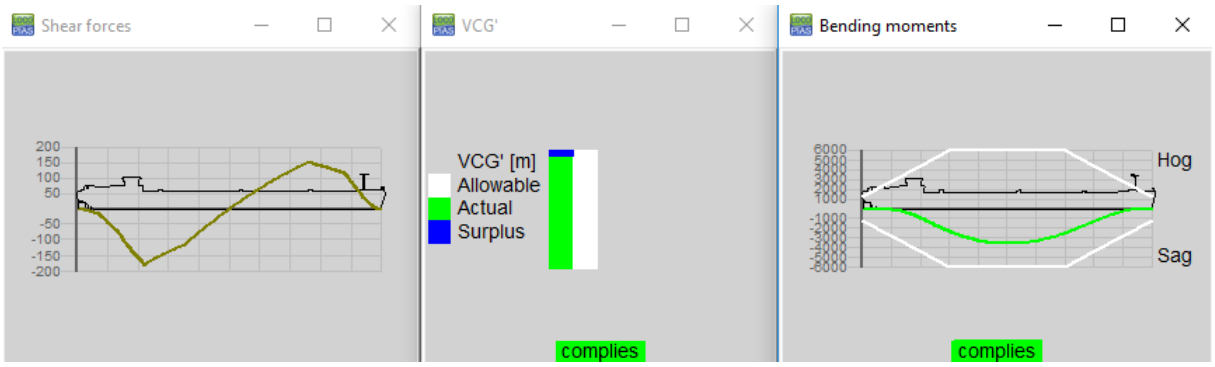
4.1.3 Result windows

You can find the [Window]→[Result windows] submenu in the module menu bar (see for example section 4.2 on page 40, Tanks, element 1).



Result windows submenu.

Choose ‘Hydrostatics’, ‘Stability’, ‘Shear forces’, ‘Bending moments’, ‘Weights’, or, if available, ‘Torsion Moments’ or ‘Trim optimization’ to display the corresponding graph in a separate window. These graphs give real-time feedback while loading cargo or modifying contents of tanks. The option Default size/position restores the size and position of the compliance windows to the default size and position.



Stability and strength compliance windows.

4.2 Tanks

In the Tanks module you can manipulate the filling of tanks of the vessel for the loading condition under consideration.

Note

A video[1] exists in which the operation of this module is demonstrated.

4.2.1 Layout

Graphical tank filling.

1 Menu bar
Basic functionalities are accessible through the menu bar.

2 Module-buttons
These buttons navigate to other modules, or back to the [Main screen].

3 Function-buttons
Special functions of the tank module.

4 Tank group buttons
Click to display a group of tanks of the same type.

5 List of tanks
Displays the list of tanks of the selected tank group.

6 Tank information
This window gives information of the selected tank. If multiple tanks are selected it gives the following message: Multiple tanks selected. The window lists the name, weight, volume, center of gravity, etc. of the selected tank. The center of gravity is calculated from the other input, which can be changed by clicking the appropriate line. An input box will appear to define the desired value.

7 Track bar
The track bar can be used to change the filling percentage of the selected tank(s).

[1] https://youtu.be/qSkZHbM2lp4

8 Section windows
Displays top view, vertical section, and cross section. Active sections show a section of the vessel at the center of gravity of the selected tank. Fixed sections show sections at predefined locations.

9 Status bar
Gives information about the total weight of the selected tank group and which information is visible in the graphical tanks.

4.2.2 General approach

1. Select. A tank can be selected by left-clicking a tank in a *section* window 8 . Tanks can be selected by clicking near their center of gravity. A selected tank will be hatched black and white in the views. In the cross section, the actual fluid level in a tank is indicated.
2. Edit. The contents of a tank can be edited by right-clicking a tank after selecting it.
3. Check. The floating position (draft, trim and list) is directly calculated and the vessel is displayed with the actual waterline in cross section and side view. The values for draft, trim, list and G'M are displayed in the relevant section window 8 . Hit the Checkbutton to check if the ship's stability and longitudinal strength comply with your criteria.
4. Output/Totals. Go to the menu [Output]→[Totals] for an overview of total weight of the selected tank group on screen.

4.2.2.1 Select

You can select tanks in one of the ways below. A selected tank is marked by black on white cross-hatching in the section windows.

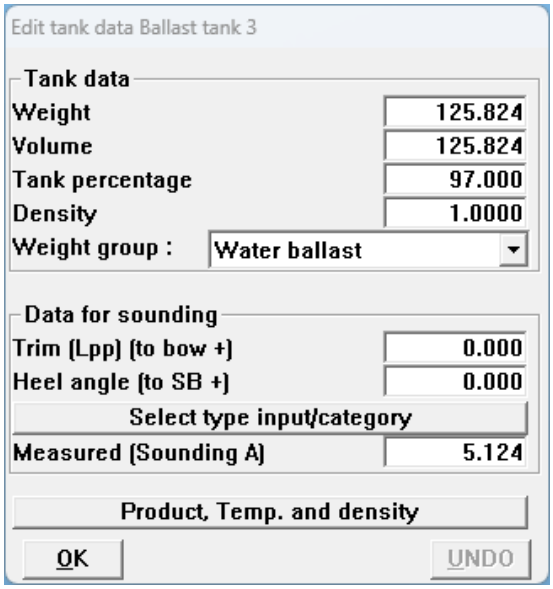
- Left-click a tank in the List of tanks-window 5 .
- Left-click a tank in one of the Section windows 8 .
- Select multiple tanks by holding the left mouse button to drag a selection box in one of the Section windows 8 .
- Select all visible tanks by pressing <Ctrl+a>.
- Add or remove a tank to/from a selection by holding Ctrl and clicking the tank in a Section window 8 , or in the List of tanks-window 5 .

The information of this tank is now shown in de Tank information-window 6 .

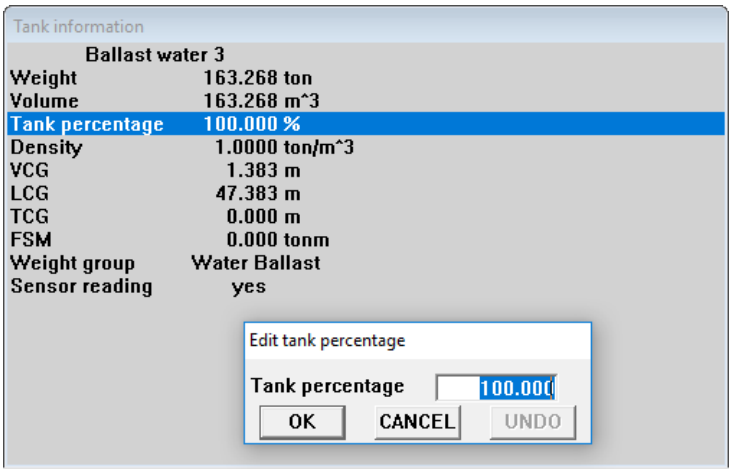
4.2.2.2 Edit

Once a tank has been selected, there are several ways to edit tank data:

- Double-click a tank in the [List of tanks]-window 5 to open the input form 'Edit tank data'.
- Right-click a tank in one of the Section windows 8 to open the input form 'Edit tank data' of the selected tank(s). When only one tank is selected, all tank data can be edited. When more than one tank is selected, only filling percentage and density of the content can be changed.
- Double-click a value in the [Tank information]-window 6 to edit that specific value, see figure below.
- Drag the track bar 7 to change the amount of fluid of the selected tank.
- Drag the surface of the content of a selected tank.
- Double click a tank to empty it or fill it to the maximum filling percentage. Use [Settings]→[Filling percentages] from the menu bar to edit the default filling percentage.
- Enter a sounding, ullage or pressure and apply temperature corrections. By right-clicking in the Section window 8 , additional fields become available in the 'Edit tank data'-window when a sounding pipe or pressure sensor has been defined. By entering trim and heeling angle together with the measured value, the tank volume is calculated according to the sounding data and input for floating position. For temperature corrections see section 4.4.2.1 on page 59, Product, temperature and density.
- Pump with track bar. Select two tanks from the same weight group, with the same density and go to [Pump] in the upright corner. Now the track bar enables you to pump fluid from one tank to another tank.



Edit tank data from List of tanks/Section-windows.



Edit tank data from Tank information.

4.2.3 Menu bar

4.2.3.1 Output/Totals

With the [Output]→[Totals] option an overview of the weights of the tanks of the selected tank group is presented, as well as the total weight (at the bottom of the popup box that appears). By the way, the total weight of the selected weight group is always printed in the status bar 9 of this module.

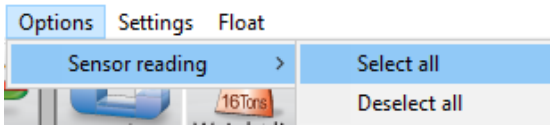
Overview all tanks

Name	Perc	Weight	FSM
Fuel oil Fore PS	43.0	4.687	3.528
Fuel oil Fore SB	43.0	4.687	3.528
Fuel oil PS	98.0	24.127	5.266
Fuel oil SB	98.0	24.127	5.266
Fresh water PS	98.0	14.023	0.645
Fresh water SB	98.0	15.416	0.716
Lub oil Fore PS	50.0	0.614	0.149
Dirty oil Fore PS	50.0	0.670	0.173
Dirty oil PS	50.0	0.628	0.393
Dirty waterr PS	50.0	0.681	0.071
Lub oil Aft SB	50.0	0.585	0.063
Ballast water FP	0.0	0.000	0.000
Ballast water 1	0.0	0.000	0.000
Ballast water 2	0.0	0.000	0.000
Ballast water 3	0.0	0.000	0.000
Ballast water 4	0.0	0.000	0.000
Ballast water 5	6.0	9.350	979.476
Ballast water Aft PS	85.6	9.302	6.207
Ballast water Aft SB	86.0	9.346	6.233
Total		1808.414	4110.711

OK UNDO

4.2.3.2 Options

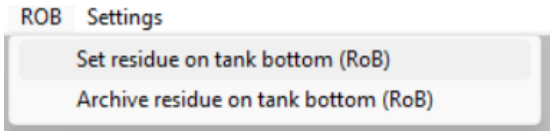
4.2.3.2.1 Sensor Reading



With this option tanks can be selected of which the data must be read from the tank measuring system.

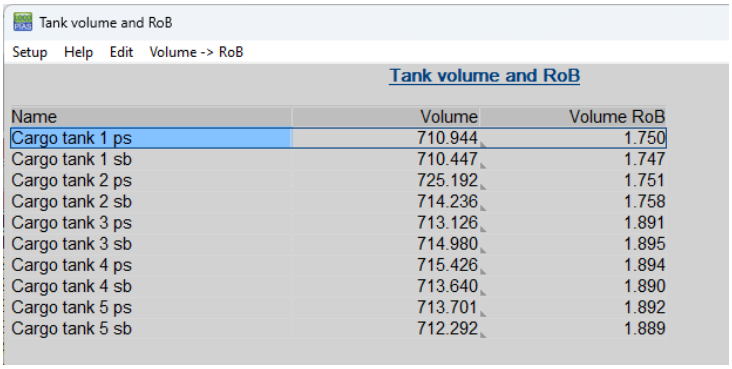
4.2.3.3 RoB (Residue on tank bottom)

4.2.3.3.1 Set residue on tank bottom (RoB)



This option allows users to set the residue on bottom (RoB) values for each cargo tank in a single menu. The purpose of this functionality is to assist users to manually adjust the RoB value of each tank, or initialize it by copying the tank volume value in it.

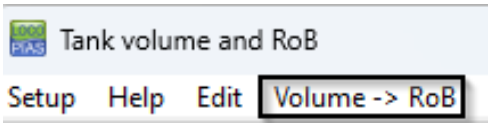
By selecting [RoB]→[Set residue on tank bottom (RoB)] from the toolbar, the user is transferred in a menu where all the tanks are listed, with their volume and RoB values in the corresponding columns. The user is allowed to adjust only the RoB values of the menu. However, giving a new RoB value to a tank, it may affect the tank volume field as well.



Residue on tank bottom (RoB) menu.

The user is able to adjust the RoB values in two ways:

1. By copying the volume value of the tank in the RoB value. This can be done by using the [Volume -> RoB] option from the toolbar.

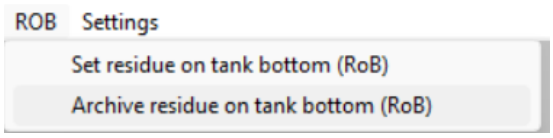


2. By manually entering the RoB values in the corresponding cell.

Both ways can be applied on a single tank or on a multiple tank selection. In both cases, the new input value is being checked and if it exceeds the 10% of the total tank volume, a confirmation message pops up in order to inform the user about the current adjustment. By confirming the popup message, the new RoB value is being assigned to the tank. Otherwise, the adjustment is dismissed.

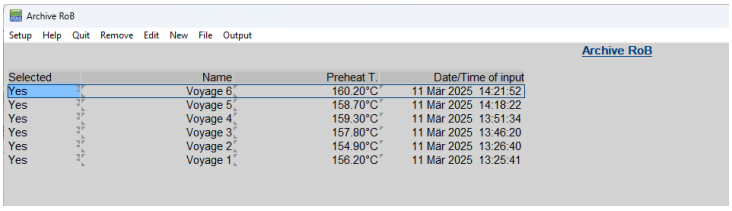
By exiting the menu, all changes are saved and the tanks have now been updated with the new volume and RoB values.

4.2.3.3.2 Archive residue on tank bottom (RoB)



With this option the user is able to see an overview of all RoB archive entries. The purpose of this function is to collect and preview all archive entries in one menu, where each entry contains a set of the main data per tank, for all tanks, which are directly taken for the current loading condition.

By selecting [RoB]→[Archive residue on tank bottom (RoB)] the user is entering into the menu, where he can see all the available archives saved in the system, sorted from the most recent one (on top of the list) to the oldest one (bottom of the list).



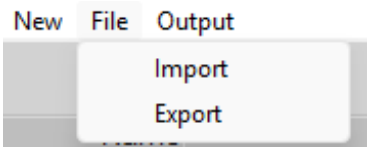
Archive Residue on tank bottom (RoB) menu.

The user is able to create a new archive by selecting the toolbar option [New]. In this way, a new archive entry will be added on top of the list. The name of the entry will initially be filled with the name of the current loading condition. The date and time field is the creation date/time and is filled automatically when the archive entry is

being created. For each archive, the user can edit the name and fill the preheating temperature field, as well as select/deselect the archive for output and/or export.

An archive can be deleted by selecting the [Remove] option from the toolbar, after confirming the action through a popup window.

With the [File]→[Export] option, the user can select a file location and a file name, and export the selected entries in a file with (.rob) extension. In the same way, an (.rob) file can be imported through the [File]→[Import] option and all the archive entries in that file will be added to the list. The archives will be still sorted by date and any double entries will be skipped.



With the [Output] option, a report of the selected entries can be printed. When more than 1 archive is selected for output, 3 graphs are added to the output showing the progression over time.

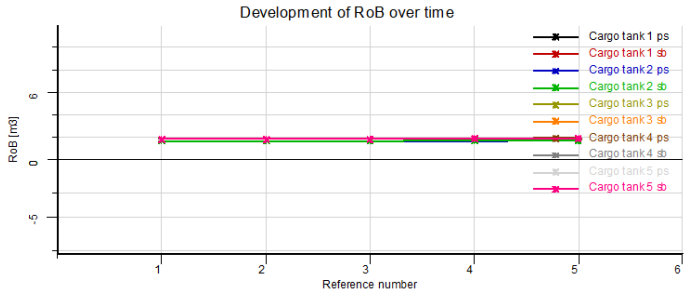
- Reference no. / RoB volume
- Reference no. / Cargo temperature
- Reference no. / Preheat temperature

ARCHIVE OF DEVELOPMENT ROB

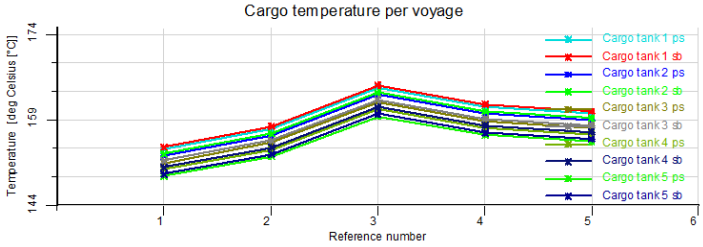
Ref.nr.	Description	Preheat T. deg Celsius [°C]	Date & time of archive
1	Voyage 1	156.20	20 Jan 2025 12:30:08
2	Voyage 2	154.90	20 Jan 2025 12:33:25
3	Voyage 3	157.80	20 Jan 2025 12:35:40
4	Voyage 4	159.30	20 Jan 2025 12:36:56
5	Voyage 5	158.70	20 Jan 2025 12:38:19

Ref.nr.	Compartments	RoB [m3]	Temperature deg Celsius [°C]	Density in air 15°C [t/m3]	Product table	Product
1	Cargo tank 1 ps	1.692	153.8	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
2	Cargo tank 1 ps	1.703	157.3	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
3	Cargo tank 1 ps	1.707	164.6	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
4	Cargo tank 1 ps	1.722	161.3	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
5	Cargo tank 1 ps	1.750	160.1	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
1	Cargo tank 1 sb	1.690	154.2	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
2	Cargo tank 1 sb	1.701	157.7	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
3	Cargo tank 1 sb	1.705	165.0	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
4	Cargo tank 1 sb	1.720	161.7	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
5	Cargo tank 1 sb	1.747	160.5	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
1	Cargo tank 2 ps	1.694	152.6	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
2	Cargo tank 2 ps	1.705	156.1	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
3	Cargo tank 2 ps	1.709	163.3	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
4	Cargo tank 2 ps	1.724	160.0	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
5	Cargo tank 2 ps	1.751	158.8	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
1	Cargo tank 2 sb	1.700	153.0	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
2	Cargo tank 2 sb	1.711	156.5	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
3	Cargo tank 2 sb	1.715	163.7	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
4	Cargo tank 2 sb	1.730	160.5	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
5	Cargo tank 2 sb	1.758	159.3	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
1	Cargo tank 3 ps	1.829	151.4	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
2	Cargo tank 3 ps	1.841	154.9	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
3	Cargo tank 3 ps	1.845	162.1	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
4	Cargo tank 3 ps	1.861	158.8	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen
5	Cargo tank 3 ps	1.891	157.6	0.8739	ASTM Tabelle D4311 (Bitumen)	Bitumen

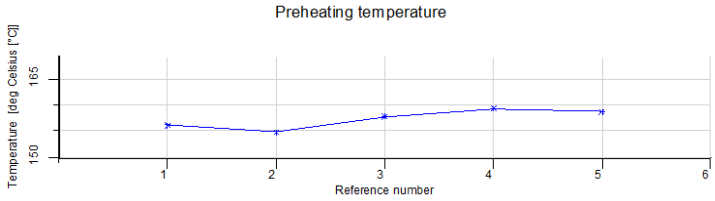
Archive Residue on tank bottom (RoB) output tables.



Archive RoB: Development of RoB over time graph.



Archive RoB: Cargo temperature per voyage graph.

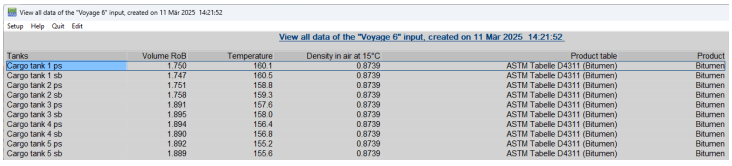


Archive RoB: Preheating temperature graph.

Furthermore, each archive entry can be entered (double-click or [Enter] on the row), and the user is presented the following data for all cargo tanks of that specific entry:

- RoB value
- Temperature
- Density on Air 15 degrees Celsius
- Product table
- Product

Note that in this overview, the information is just for preview and thus, the user cannot modify any values of the archived entries.

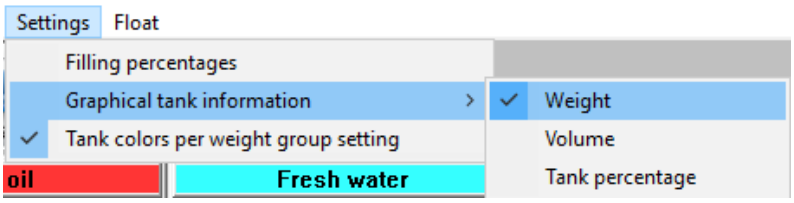


Archive RoB entry menu: Data overview per cargo tank.

By exiting the menu, all adjustments made on the RoB archive entries are being saved.

4.2.3.4 Settings

In [Settings] you can find the option ‘Filling percentages’, an option for displaying graphical tank information and an option to select the color of the tanks: individually or per tank group. Under [Settings] it is also possible to show all tanks of the same weight group in the color of that tank group by enabling the setting in the menu [Settings]→[Tank colours per weight group setting].



4.2.3.5 Result windows

See section 4.1.3 on page 38, Result windows.

4.2.4 Function buttons

4.2.4.1 Sensor reading

With this option the tank volumes, and possibly other data, are automatically read from the tank measurement system which is used on board.

4.2.4.2 Pump

With this option the contents of a tank can be pumped from one tank to another of the same tank group. First select two tanks of the same tank group (with a selection-window or with <Ctrl>), then select the option [Pump] from the Function-buttons. Now it is possible to pump the fluid with the trackbar. In the Tank information window the data of one of these tanks will be displayed. During pumping the total volume of the contents will remain the same.

4.3 Containers

The container loading module is designed to define a particular container loading. LOCOPIAS updates the situation and informs you about the consequences for the vessel. This module is essential for vessels with a significant container capacity. It allows for the interactive positioning of containers of any size, and contains numerous loading options, amongst which electronic data exchange. Some highlights of this module are:

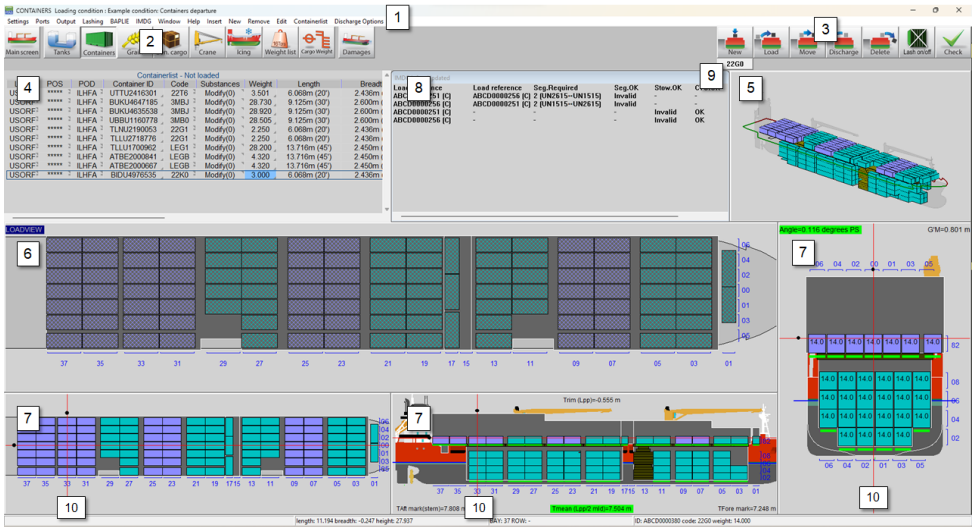
- *The module is founded upon a 3D representation of container distribution. It allows the user to show any desired combination of rows, bays and tiers, and to work in a sequence and orientation selected by the user.*
- *Suitable for all kinds of containers. The module has no restrictions at all with regard to the container type (20', 30', 40', 45', 48', 52' or every other length, with random breadth and height of each container) or loading combination. Refrigerated containers are also supported.*
- *Drawings and lists of container loading details.*
- *At any desired moment, stability or strength particulars can be evaluated and verified against the relevant criteria.*
- *Only consistent container loading is accepted.*
- *Database management functions for import and export of container data and loading conditions.*
- *Integrates seamlessly with LOCOPIAS' line of sight module.*
- *Container cargo positioned above deck is automatically included in the calculation of the wind contour of the vessel.*

Loading, moving or discharging

To load, move or discharge containers, make sure you have selected a function button 3 . Otherwise LOCOPIAS will not respond to your command.

4.3.1 Layout

A typical layout of the [Containers]-module is shown below. Its elements are labeled with a number and described underneath. The slots are generated automatically according to the type of container that is to be loaded.



Container module.

1 Menu bar

Basic functionalities are accessible through the menu bar.

2 Module-buttons
These buttons navigate to another module, or back to the [Main screen].

3 Function buttons
Main functions of the [Container]-module. These functions are also mapped to a keyboard key combination, see section 4.3.2.7 on page 52, Function keys.

4 Containerlist
Displays the containers that match the view options selected from the [Containerlist..]→[View] menu. You can choose between loaded, not loaded and all containers. It is also possible to copy/paste from Excel in this list.

5 3D View
3D view of the full vessel.

6 Loading view
This is the main work window of the container module. All the functions (new, load, move, discharge, delete) happen through this window.

7 Section windows
These windows show the layout of the bay, row and tier of the selected container as well as trim, draft, heeling angle, GM and actual waterline.

8 IMDG
IMDG information. If IMDG is not enabled, this window is omitted.

9 Container type/code button
With these button you can select the container type you want to load.

10 Navigation Lines
The navigation lines are present only in the Section windows 7 . Right-clicking in any of the Section windows will update the views. You can also left-click and drag the black dots.

Note

The bays and rows are always visible. The tiers are drawn when containers are loaded. For the tier numbering, see section 4.3.2.5 on page 51, Tier numbering.

4.3.2 General approach

There are three ways to load containers with the Container module. You can load a new container with the [New]-button, you can create a list of containers and load these with the [Load]-button, or you can use a BAPLIE file, see section 4.3.3.4 on page 53, BAPLIE. In general, the following approach can be used:

1. section 4.3.2.1 on this page, Select. You can select (multiple) containers.
2. section 4.3.2.2 on the next page, Load.
3. section 4.3.2.3 on the following page, Edit. After loading, you can edit the data of a container, discharge a container, switch a container from one container slot to another, discharge a container to the quay or permanently delete a container.
4. Check results and create output. Use the [Check]-button, or the [Window]→[Result windows] windows to verify your loading condition, then print the output.
5. section 4.3.3.3 on page 53, Output.

4.3.2.1 Select

You can select a container in one of these ways:

- Left-click a container in the List of containers 4 .
- Left-click a container in the Loadview 6 or any one of the Section windows 7 . All the function buttons have to be unpressed in order to select.

To select multiple loaded containers, drag cursor in one of the Section windows 7 to create a selection box. You can then right-click and choose your action from the options available. See also section 4.3.2.4 on the following page, Multiple containers. A selected container is highlighted white.

4.3.2.2 Load

Use this function to directly create a new container. You will immediately see the available slots drawn in yellow in the Loadview 6 and Section windows 7 . The type/code of the new container is determined from 9 . You can then left-click in the Loadview 6 on a green slot to position the new container. You cannot position a container in the Section views 7 . To load multiple new containers at once, see section 4.3.2.4 on the current page, Multiple containers.

Use this function to load containers from the list of containers:

1. Go to the menu [Ports]→[Input ports] to enter ports, and optionally a specific color.
2. You can add new containers of type as defined in 9 by pressing [New] in the Menu bar.
3. Edit any container data. You can also copy-paste and/or edit multiple containers at once.
4. Click the [Load]-button. You will immediately see the available slots drawn in yellow in the Loadview 6 and Section windows 7 . You can left-click in the Loadview 6 on a green slot to position the container.

Green indicators under the loaded containers in the Section views 7 turn red when the maximum loading is exceeded. You can zoom in or click on any container on the stack to check the limits. To load using a BAPLIE file, see section 4.3.3.4 on page 53, BAPLIE.

Note

For the selected type of container to be loaded, you will immediately see yellow slots drawn. If you do not see slots drawn then:

- If the vessel is equipped with initial castings and the option [Initial castings] is checked in the [Settings] menu, then there are no available slots for the *selected container type* .
- The vessel is not equipped with initial castings.

In both situations you can still place the container on the bottom, whether with [Placement Assist] (if checked) or freely ([Initial castings] and [Placement Assist] unchecked). After the lowest container has been positioned, the castings will be automatically used for the higher tiers.

4.3.2.3 Edit

To open the [Edit container data] form, you can right-click on a selected loaded container. To edit multiple containers, see section 4.3.2.4 on the current page, Multiple containers.

Use this function to discharge containers from the vessel. Activate the [Discharge] button and left-click on the Loadview 6 to discharge the containers. The discharged containers become available for loading again in the list of containers. You can also go to the menu [Discharge Options]→[Discharge All] and select 'Discharge to containerlist' to discharge the entire ship at once.

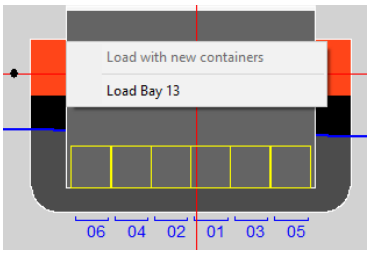
Use this function to delete containers permanently from the vessel. Click the [Delete] button and left-click on the Loadview 6 to delete the container from the vessel, the container cannot be loaded again. You can also go to the menu [Discharge Options]→[Discharge All] and select 'Delete containers' to empty the entire ship at once.

4.3.2.4 Multiple containers

You can load new or edit multiple containers in any one of the Section views 7 .

4.3.2.4.1 Load new containers

While [New] button is pressed, double-click right mouse button to load the lowest tier. The specific tier to be loaded depends on which Section view was clicked.



Load new multiple containers in bayview.

4.3.2.4.2 Edit containers

Drag cursor in any one of the Section views 7 to create a selection box. You can also hold the CTRL (Control) button and left-click on containers. The following menu will pop up after right-click:

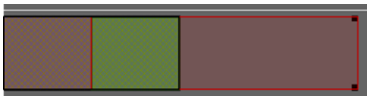
Multiple containers window.

4.3.2.5 Tier numbering

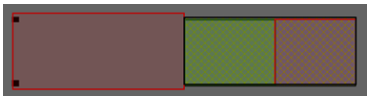
The tier numbering is done according to ISO standards. The tiers start with "02" with the height of an 8 1/2 ft standard container and rise with even numbers for each container height. Tiers on deck start with "82" and rise with even numbers above the hatch covers. Half-height containers are marked with odd numbers. Therefore containers at the same height above the keel have the same tier specification. High-cube containers are treated as standard.

4.3.2.6 Compensation pieces

In cases where containers are to be placed in a specific position but no yellow slot appears there, you can double right-click and try to manually load the container using compensation pieces. The pieces are generated accordingly and the container is positioned. The compensation pieces are automatically removed when the container below them is removed (discharged or deleted). In case this does not occur, they can be manually deleted by the function [Delete]. For proper manual placement using compensation pieces, please refer to the visual guide with 3 examples below.



Case 1. Already loaded 20ft container is highlighted in black outline. The pieces are to be placed in the fore slot to position a 40ft container on top. Green shows the correct area to double right-click.

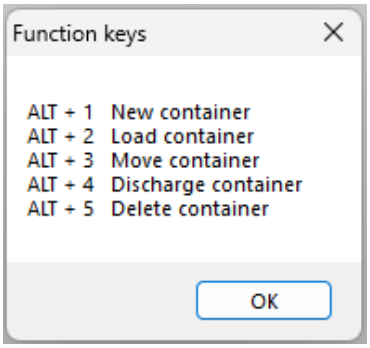


Case 2. Already loaded 20ft container is highlighted in black outline. The pieces are to be placed in the aft slot to position a 40ft container on top. Green shows the correct area to double right-click.

Case 3. No container is loaded underneath. A 45ft is to be loaded using compensation pieces on the fore and the raised tanktop on the aft. Green shows the correct area to double right-click.

4.3.2.7 Function keys

The function buttons are pressed/depressed when the corresponding key combination is used.



Functions keys.

4.3.3 Menu bar

4.3.3.1 Settings

In the [Settings] submenu the following options are available:

[Initial castings]
: You can enable/disable the bottom castings, if the vessel is equipped with them.

[Placement Assist]
: Placement Assist aids in container positioning. The positions add up automatically to accomodate stacking. It is useful in vessels where there are no initial castings. If [Placement Assist] is off, then you can move and place the container freely.

[Show higher tier slots]
: When loading a container, the actual selected slot is always the lowest one. You can enable/disable the display of the rest here.

[Include stacking at extreme ends for types A-P]
: Container types A-P have additional castings, which can generate additional available slot positions. You can enable/disable the use of these additional castings here.

[Rotated slots]
: You can enable/disable the generation of rotated slots (if they exist).

[Edit container spacer]
: Here you can edit the container spacer. You can choose different spacers for different sections of the vessel.

[Unit longitudinal axis]
: Here you can choose your default axis; you can choose between 20ft, 40ft, single bays, frame numbers and meters.

[Bay-Row-Tier conversions]
Here you can define new names for bays, rows or tiers.

[Draw castings]
You can enable/disable the drawing of the castings.

[Edit overlap margin]
Here you can allow a margin for an overlap. It is highly recommended to avoid this, unless necessary.

[Draw cargo]
Here you can select to display all other cargo from other modules.

[Collision check]
Here you can select to check for collision with other cargo upon positioning the container.

4.3.3.2 Input

In the [Input] submenu the following options are available:

[Ports]
Here you can insert the ports where the vessel will load and discharge containers. It is also possible to add a color to a port, this can help to organize the containers.

4.3.3.3 Output

In the [Output] submenu the following options are available:

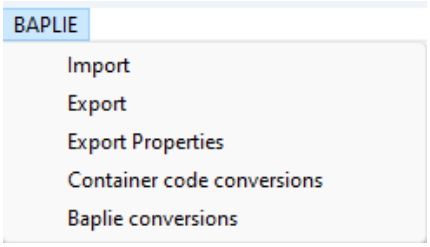
[Settings]
Here you can select container colours depending on port of load, shift, discharge or container type. You can also choose what is displayed on the containers. The selections here will also be visible in the stowage plan. Explanation of coloured circles :

- red : IMDG cargo
- yellow : empty container
- blue : refrigerated container.

[List of containers]
Standard format output of container list with detailed container information.

4.3.3.4 BAPLIE

With the BAPLIE option, you can read and write container data files with the BAPLIE-format (up till version 3.1).



Dropdown menu options BAPLIE.

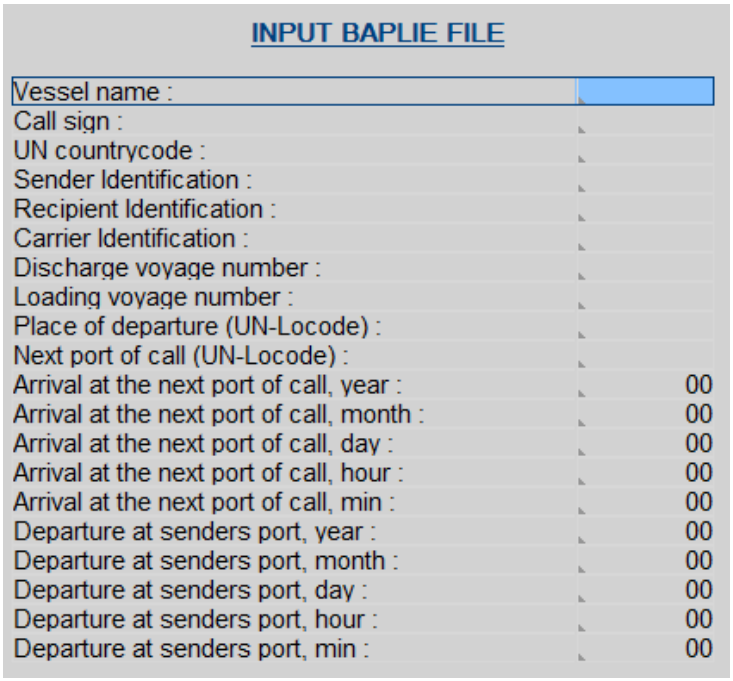
[Import]
After selecting an .edi file, the containers will be automatically loaded. It is possible that there are errors in the file and that some containers cannot be loaded. They will then show up in the Containerlist 4 .

[Export]
Create an .edi BAPLIE file.

[Export Properties]
You can enter the data for writing a BAPLIE file, see figure below. These data will be stored in a file. This information is necessary before you can [Export].

Attention

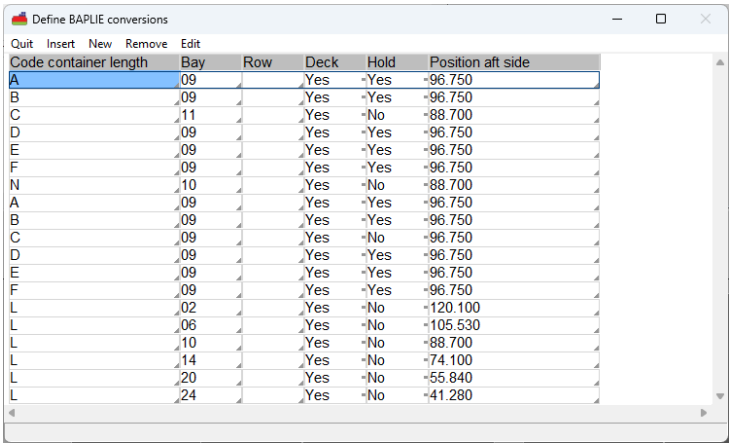
LOCOPIAS will only read those data which will be used in LOCOPIAS itself and write the data which will be available in LOCOPIAS. This means that after reading and writing a BAPLIE-file, some data will be lost.



Menu input BAPLIE file.

[Container code conversions]
This tool will convert any container codes that are non-ISO to the user-specified ISO equivalents.

[Baplie conversions]
This tool will shift containers according to input when importing.



Code container length	Bay	Row	Deck	Hold	Position aft side
A	09		Yes	Yes	96.750
B	09		Yes	Yes	96.750
C	11		Yes	No	88.700
D	09		Yes	Yes	96.750
E	09		Yes	Yes	96.750
F	09		Yes	Yes	96.750
N	10		Yes	No	88.700
A	09		Yes	Yes	96.750
B	09		Yes	Yes	96.750
C	09		Yes	No	96.750
D	09		Yes	Yes	96.750
E	09		Yes	Yes	96.750
F	09		Yes	Yes	96.750
L	02		Yes	No	120.100
L	06		Yes	No	105.530
L	10		Yes	No	88.700
L	14		Yes	No	74.100
L	20		Yes	No	55.840
L	24		Yes	No	41.280

An example of the conversion tool.

In the [Code container length] entry, type the first letter of the container ISO-code. [Row] can either be left blank - meaning all the rows of the corresponding [Bay], or you can type a specific row for the shift to be applied.

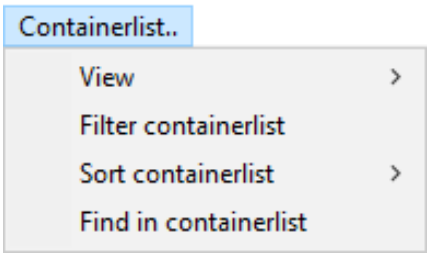
4.3.3.5 Window

Result windows
See section 4.1.3 on page 38, Result windows.

Reset window view
Reset to default zoom and scale.

4.3.3.6 Containerlist

In the [Containerlist] submenu the following options are available:



Dropdown menu options Containerlist.

[View]
You can choose what list you will see in the Containerlist window 4 . If you choose [Loaded] and then select a container from the Containerlist, it will be highlighted in the 3D View 5 and the Section windows 7 . However, the function buttons 3 will not respond. Option [All] opens in a new window.

[Filter containerlist]
You can choose to see only a selected type of containers, filtering by any of the 4-code digits. For example, 4∗∗∗ will show all the 40ft containers, or ∗∗R∗ will show all the refrigerated containers. The filter can be used in all views: loaded, not loaded or all. To reset the filter, type ∗∗∗∗.

[Sort containerlist]
You can sort the containerlist according to the selected column.

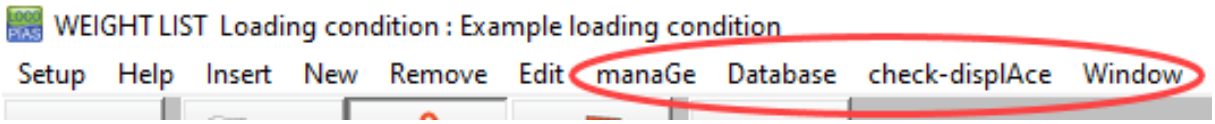
[Find containerlist]
You can find a specific container through its ID.

4.4 Weight list

The [Weight list] has a crucial role in configuring a cargo loading condition because it offers an overview of all weight items of which the current loading condition consists. Weight items can be changed alphanumerically.

4.4.1 Menu bar functions

In the weight list window one can find the menu bar, which contains the 'standard' and 'advanced' functions. The standard functions are described in section 4.1 on page 38, Common operations in modules. The specific functions [manaGe], [Database], [Loading tools], [File], [check-displAce] and [Window] are discussed below.

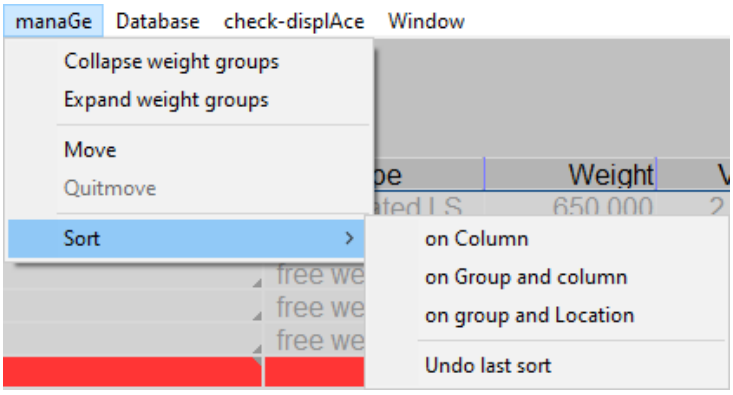


Menu bar functions.

Manage

With [Manage] some visual formatting can be performed:

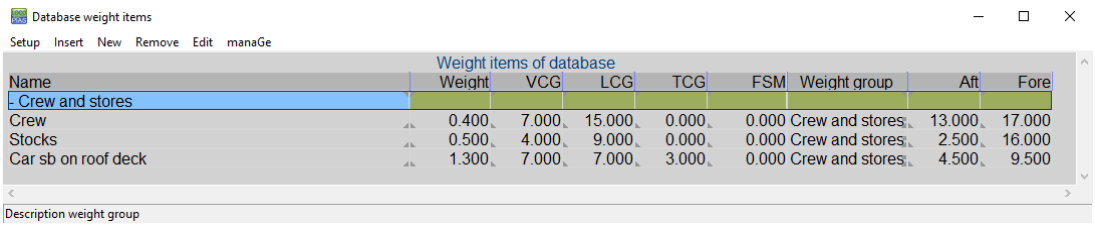
- [Collapse weight groups]. In general, weight items belong to a particular weight group, a concept that is introduced in section 3.1.1 on page 9, Menu bar. In LOCOPIAS subtotals of weights and COG of weight groups are always included in these weight lists. The individual items of a weight group can be obscured, that's what happens when the group is 'Collapsed'
- [Expand weight groups], the opposite of 'Collapse' which makes all items of a group visible. -[Move], to move a weight item in the weight list up or down. Highlight the row with the weight item to move to another position in the list. Now select the [Move] function. Highlight the row **behind which** the weight item is to be positioned, and select [move] again. The weight item is now in the new position.
- [Quitmove], to abort an ongoing [Move] command.
- [Sort], to sort the weight items along different sorting criteria, which are depicted in the figure below.



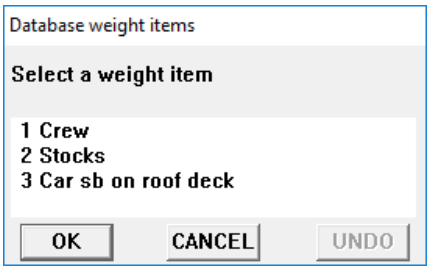
Different sorting methods for weight items.

Database

Use this option to load standard weight items, such as 'crew', 'stores', etc. With this feature you can define a weight item once, and re-use them from this database when needed. Choose [Database]→[Edit database] from the menu bar to open [Database weight items]-window and edit weight items in the database. The option [Database]→[Read database] opens a window with a list of databse items, that can be selected in a loading condition.



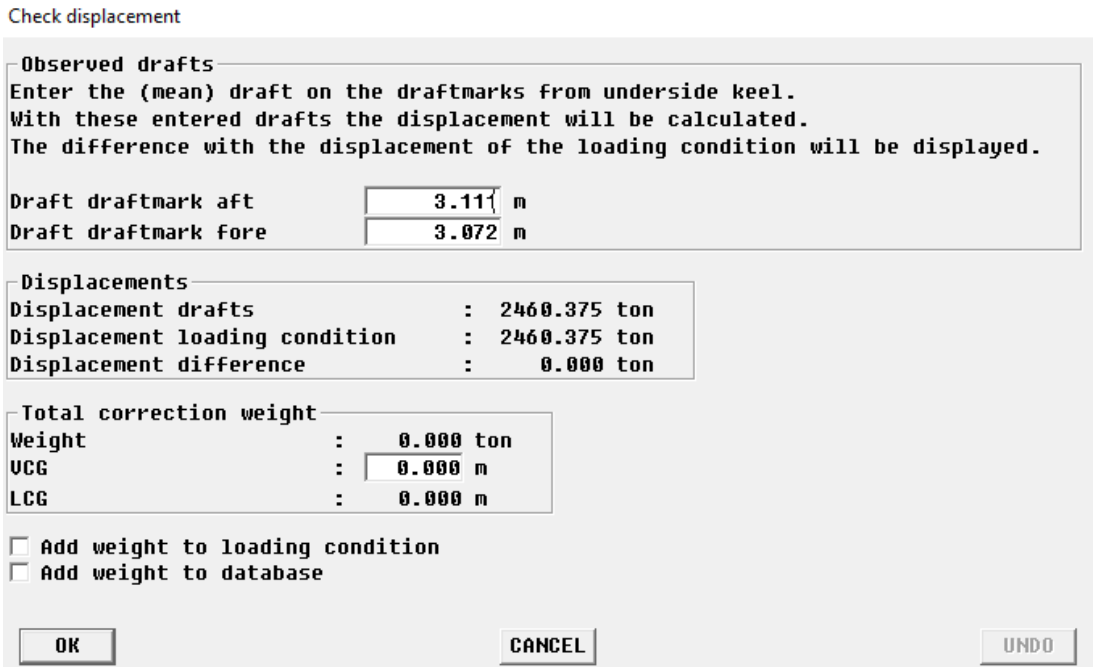
Database of standard weight items.



Select from the database of weight items.

Check-Displacement

In order to simulate the actual loading condition in LOCOPIAS, the function [Check-Displace] can be used to see how well the real (=observed) and simulated displacements are approximating each other. You can enter the real-life draft marks and compare them with the calculated draft marks and check the displacement difference. A correction weight can be added to the weight list to achieve the real displacement.



Check-Displacement.

Window, Result windows

With this function one of the floating result windows — as introduced in section 8.1 on page 85, Operation of LOCOPIAS and general functions — can be opened, such as for intact stability or for longitudinal strength.

4.4.2 Content of the weight list

Columns in the [Weight list] that require explanation are discussed below.

Note

Modifications for the whole weight group can be easily applied via modifing the appropriate value on the sub total line. Possible modifications are: 'FSM type', 'Weight group', 'Tank filling' and 'Density'. Do note that with 'undo' it is possible to restore the modification.

Name	Type	Weight	VCG	LCG	TCG	FSM	Weight group	%	Density	Volume	Aft	Fore
Light ship	aggregated LS	650.000	2.800	39.154	0.000	0.000					0.000	85.000
- Crew and stores		2.200	6.318	8.909	1.773	0.000	Crew and stores					
Crew	free weight item	0.400	7.000	15.000	0.000	0.000	Crew and stores				13.000	17.000
Stocks	free weight item	0.500	4.000	9.000	0.000	0.000	Crew and stores				2.500	16.000
Car sb on roof deck	free weight item	1.300	7.000	7.000	3.000	0.000	Crew and stores				4.500	9.500
- Fuel oil		57.627	1.763	20.669	0.000	11.771	Fuel oil	81.12	0.8500	67.797		
Fuel oil Fore PS	tank	4.687	0.918	78.930	-3.392	3.529	Fuel oil	43.00	0.8500	5.514	76.720	81.220
Fuel oil Fore SB	tank	4.687	0.918	78.930	3.392	3.529	Fuel oil	43.00	0.8500	5.514	76.720	81.220
Fuel oil PS	tank	24.127	1.927	9.351	-3.851	2.357	Fuel oil	98.00	0.8500	28.384	6.000	12.000
Fuel oil SB	tank	24.127	1.927	9.351	3.851	2.357	Fuel oil	98.00	0.8500	28.384	6.000	12.000
- Fresh water		29.439	1.428	15.683	0.217	0.730	Fresh water	98.00	1.0000	29.439		
Fresh water PS	tank	14.023	1.422	15.803	-4.609	0.348	Fresh water	98.00	1.0000	14.023	13.500	18.000
Fresh water SB	tank	15.416	1.434	15.573	4.608	0.382	Fresh water	98.00	1.0000	15.416	13.000	18.000

List of weights of a loading condition.

Name

This column displays the name of the weight item.

If the temperature corrections functionality is purchased then one can double-click on the name of a tank to enter the temperature corrections menu. See section 4.4.2.1 on the following page, Product, temperature and density for more information.

Type

Gives information about the type of weight item.

Weight

Weight in metric tons.

VCG

Vertical center of gravity in meters, related to the baseline.

LCG

Longitudinal center of gravity in meters, related to the aft perpendicular.

TCG

Transverse center of gravity in meters, related to the centreline.

FSM

This column shows the Free Surface Moment for predefined tanks or for a user-defined weight of a fluid in metric tons multiplied by a distance in meters. It is possible to override this standard free surface moment using another free surface option under FSM Type.

FSM Type

With this function you can select the type of free surface moment (FSM) calculation. By default the free surface moment is computed for the actual tank level. Occasionally, the IMO Intact Stability Code may require a different method, so you can choose from the following alternatives:

- Maximum FSM which occurs anywhere in the tank.
- Zero in case the filling is more than 98%.

Please note that LOCOPIAS also offers a more advanced method to compensate for free liquid effects, which is the "actual shift of liquid method". If your LOCOPIAS is configured this way, it will compute the real movement of liquid, including the effects of heel and trim, which overrides the conventional FSM setting as elaborated here.

Weight group

Each weight item may be assigned to a weight group. The name of the group is displayed in this column. If you want to show the difference between weight groups even more clearly, in the menu bar on the [Main screen], under [Edit]→[Edit Weight Groups] you can edit the name and text color of each weight group. This name and color also becomes visible in the overview of weight groups (See 7 in section 3.1 on page 8, Main window layout of [Main screen]).

Measured, Trim sounding and Angle sounding

In the 'Measured' column a *Sounding*, *Ullage* or *Pressure* can be specified, as long as a sounding pipe

and/or pressure sensor is available. With the columns 'Trim sounding' and 'Angle sounding' the trim and angle at the time of "sounding" can be specified. Note: The 'Measured' column contains the measured value associated with the specified trim and angle. Other data, i.e. columns, such as weight, volume and centre of gravity are determined at trim zero and angle zero.
If this functionality is not purchased then the 'Measured' column is only applicable to 'grain hold' weight items only, and depicts the *Ullage*, which is the distance between the top of the coaming and the grain surface. This column might not be available in your LOCOPIAS.

Aft & Fore
These columns contain the forward and aft boundaries of a weight item. These boundaries are required for longitudinal strength calculations only. The distances are given in meters and refer to the aft perpendicular. The weight distribution is a linear function determined by the longitudinal center of gravity and the position of the boundaries (More information on this subject can be found under section 8.5 on page 88, LCG and weight distribution of weight items).

4.4.2.1 Product, temperature and density

If the temperature corrections functionality has been purchased then by double-clicking the name of a weight item, of type tank, in a loading condition, the following menu can be opened. This menu contains all the necessary parameters for processing temperature corrections.

Tank name
Same as the weight item, just for reference.

Include this tank in ullage report
If this compartment should be included in the cargo/ullage report then this field should be set to 'yes'.

Product (substance)
The name of the product, which will be used in the cargo/ullage report. If no substances have been defined yet then these can be created using the menu bar function [Substances].

Conversion table
For the calculation of the cargo weight of heated hydrocarbons, the following conversion tables are available:

- No temperature correction.
- Correction factor per degree. The 'Volume Correction Factor' is calculated according to the defined temperature and the correction factor per degree (coefficient of expansion).
- Volume Correction Factor. The 'Volume Correction Factor' can be defined directly.
- ASTM tables 54(A, B and C), 55, 53(A and B), 23(A and B), 5(A and B). The 'Volume Correction Factor' is determined according to the respective ASTM table.
- Nynas.

In case a conversion table other than *No temperature correction* is selected, this is recognisable in the weight item list by means of the yellow background colour of the name and weight of the weight item.

Temperature
The standard temperature is 15°Celsius. The volume is determined at this temperature. The actual temperature of the substance can be defined here.

Volume (not corrected for expansion)
This is the volume that is calculated according to the sounding, ullage or pressure for this weight item.

Density at 15°Celsius (in air)/(in vacuum)
The density of the substance at 15°Celsius can be defined here. If the density in air is defined, the density in vacuum is calculated automatically. These two densities are connected to each other and cannot be defined separately.

Correction factor per degree Celsius
This factor is used if the conversion table 'Correction factor per degree' has been selected, and calculates the volume correction factor.

Volume Correction Factor
This factor corrects the density at 15°Celsius of the substance for the actual temperature. This factor can be determined in a few different ways:

- This factor is defined manually, using conversion table 'Volume Correction Factor'.
- This factor is calculated with the correction factor per degree and the difference between the standard and actual temperature. The conversion table 'Correction factor per degree' must be selected.

- This factor is taken from one of the other conversion tables.

Temperature Expansion Factor
This factor corrects for the expansion of the tank at a higher temperature than 15°Celsius. This factor is calculated automatically and cannot be defined manually.

Density at {defined temperature} degrees
Density at 15°Celsius × Volume Correction Factor.

Residue On Bottom (ROB)
Volume of the residue which will be subtracted from the volume of the tank contents.

Density × Temperature Expansion Factor
Density at 15°Celsius × Volume Correction Factor × Temperature Expansion Factor.

Weight
The weight is calculated according to: Volume (not corrected for expansion) × Density at 15°Celsius × Volume Correction Factor × Temperature Expansion Factor.

4.4.3 Check

Click the [Check]-button to check if the loading condition complies with the stability and strength requirements. After clicking the Checkbutton, a window opens with several tabs: 'Overview', 'Stability', 'Air draft' and 'Strength'. Damage stability is optional. More information about the [Check]-button can be found in section 3.7 on page 14, Check.

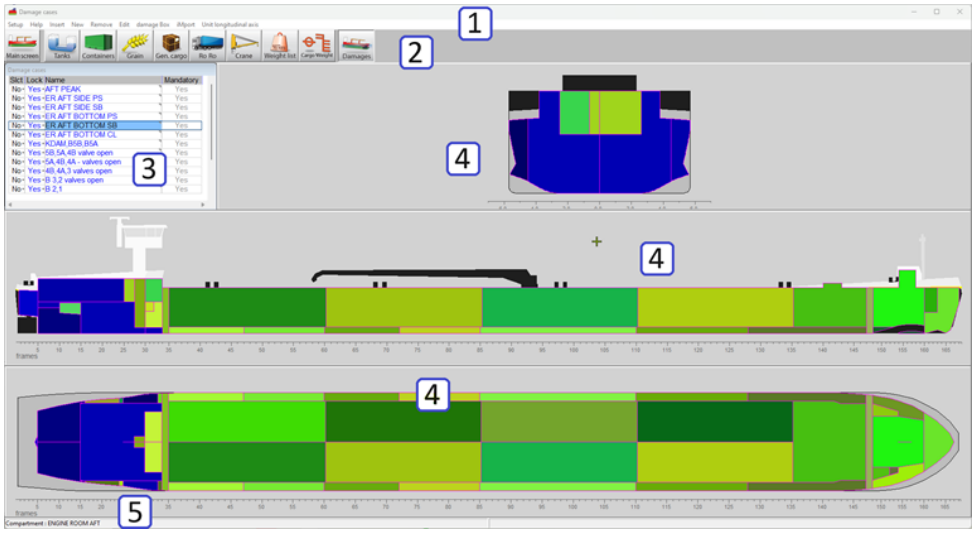
4.5 Damages

Damage stability calculations can be performed for all loading conditions. All mandatory (pre-defined) damage cases (type-3, mainly tankers) can be checked against the relevant criteria. Furthermore, additional damage cases can be defined and computed, for example to be used in case of actual damage (type-4).

A damage case consists of a set of watertight compartments. In damage calculations the initial contents of a damaged tank will be replaced by sea water, up to the level of the outside water for every calculated heel and trim angle. If the [Damages] module is available, a sub-window labelled "Direct damage stability" is present in the main window and a [Damages] button is present amongst the other module buttons. Click the [Calculate damage stability]-button in the [Main Screen] to calculate all mandatory damage cases. After calculation (which may take some time) in the "Direct damage stability" window it is stated whether or not the loading condition complies with the applicable damage stability criteria.

4.5.1 The damage definition window

With the [Damages] button from the main window the damage definition window pops up, from which an example is depicted below:



Damage definition window.

1 Menu bar
Basic functions are accessible through the menu bar.

2 Module buttons
These buttons navigate to another module, or back to the main screen.

3 Damage cases list
This window displays all damages cases, which cases are selected for calculation and which of them are mandatory damage cases.

4 Section windows
Displays cross section, horizontal and vertical section. Views and sections change with selected tank(s); sections are cut through the center of gravity of the selected damage case.

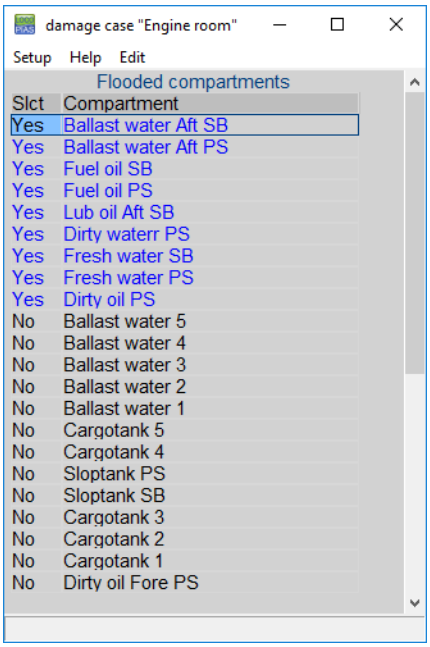
5 Status bar
Move your mouse over a compartment to read information in the status bar.

4.5.2 General approach

1. Review pre-defined damage cases. The pre-defined, mandatory damage cases should all comply with the criteria and cannot be edited. They can, however, be viewed and selected for the output. If desired, a copy of a mandatory damage case can be edited.
2. Define damage cases. You can create new damage cases by setting compartments to be flooded.
3. Select damage cases. To test the loading condition(s) for compliance with the regulations, all pre-defined damage cases should be calculated.
4. Print output. Click the [Check] button on the [Main Screen] to print damage stability output.

4.5.2.1 Review pre-defined damage cases

In the [Damage cases]-list 3 all damage cases are listed, with the pre-defined displayed in blue and marked as 'mandatory'. The sections 4 show all compartments, with the flooded colored in bluish, and the non-flooded greenish. For an alphanumerical list of flooded compartments the damage case in the list of 3 can be double-clicked (or touched with <Enter>), which invokes a popup menu as depicted below.



Alphanumerical list of flooded compartments per damage case.

4.5.2.2 Define damage cases

Clicking [New] or [Insert] in the menu bar creates a new damage case in the list 3 ; this user-defined case is displayed in black. You can left-click in the 'Name' column to enter a new name for this case and make a selection of flooded compartments by:

- Double-clicking, or right-clicking compartments in the section windows 4 , which will toggle compartments between flooded and non-flooded.
- Double-clicking (or press <Space>) the 'Slct' cell in the alphanumerical [Damage cases]-list 3 .
- Clicking [damage Box]→[start damage Box] in the menu bar and dragging a box in one of the section windows. The damage box can also be defined alphanumerically by right-clicking in the section window. Once started use either [damage Box]→[quit damage box Save damaged compartments] or [damage Box]→[quit damage box do Not save damaged compartments] to stop the damage box and, respectively save or not save the changes made to the damage case.

Use [Edit]→[Copy] and [Edit]→[Paste] to create new damage cases with properties of another case.

4.5.2.3 Select damage cases

You can select damage cases for calculation by clicking ‘yes’ or ‘no’ in the [Damage cases]-list 3 and pressing <Space>.

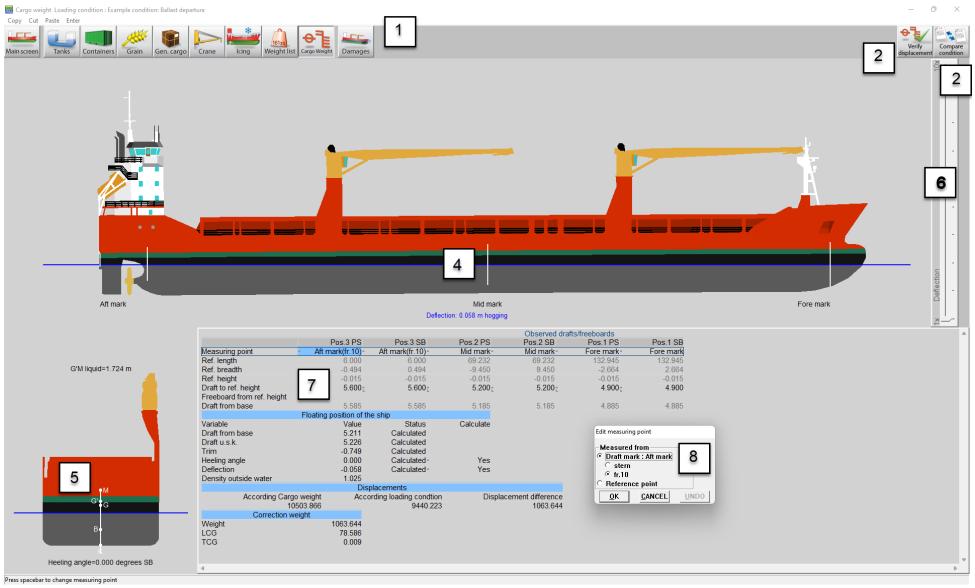
4.5.2.4 Print output

On the [Main Screen], click the [Output]-button and choose damage stability, mandatory damage cases (type 3) or damage stability, selected damage cases. See also section 3.8 on page 15, Output. when the mandatory damage cases have been calculated, the conclusion is printed in the damage stability output and on the main screen.

4.6 Cargo weight determination

The [Cargo weight] module is intended for the calculation or verification of (un)loaded cargo weight. This module can be used on any type of cargo vessel. The module can be used to verify the entered loading condition with the observed drafts / freeboards. Alternatively, the module can also be used to calculate the weight of the (un)loaded cargo, by comparing the draft or freeboard and the deductibles before and after the (un)loading operation.

4.6.1 Layout of the GUI



Layout of the cargo weight determination module.

1 Module buttons
These buttons navigate to another module, or back to the [Main screen].

2 Verify displacement button
Use this button to verify the displacement of this loading condition with the observed draft marks.

3 Compare condition button
Click to print the cargo weight determination report.

4 Side view
Shows the actual wind contour, drafts and actual waterline.

5 Aft view
Shows the aft view of the vessel, heeling angle and initial stability (G'M).

6 Deflection
With this track bar the deflection enlargment factor can be set from 1x to 10x.

7 Observed drafts/freeboards
Enter the observed drafts or freeboards here. Also some results are directly available.

8 Edit measuring point window
Type <Spacebar> at a measuring point cell 7 to open this window.

4.6.2 General approach

There are two ways to use this Cargo weight module. One can verify a loading condition with observed drafts / freeboards. Or one can compare a loading condition before and after (un)loading to calculate the (un)loaded cargo

weight, perhaps better known as a draft survey. Detailed instructions for both methods can be found later on.

In general the following steps have to be done for both methods. For the compare condition method steps 1 and 2 are repeated for the initial and final loading condition.

1. Define loading condition Define the loading condition outside this module
2. Enter drafts / freeboards Enter the observed drafts / freeboards in 7
3. Calculate. For verification of one loading condition press 2 . To compare two loading conditions press 3 to determine the (un)loaded cargo weight.

4.6.3 Verify displacement method

The governing idea of this method is that the displacement of **one** loading condition can be verified by comparing it with the displacement resulting from observed drafts / freeboards. This can for example be used to check the actual cargo loaded weight against the planned loaded cargo weight as entered in the loading condition in LOCOPIAS. Or one could determine a dead weight constant, if the actual displacement always differs from the displacement according to LOCOPIAS.

Below you find the steps that should be taken to determine the difference between the displacement based on the observed drafts and the weight list of the loading condition.

4.6.3.1 Define loading condition

The first step is to define the loading condition. Perhaps this step is already finished. Otherwise go back to the [Main screen] and define the loading condition by using the other modules, see: chapter 4 on page 38, Modules . Enter all details like tank fillings, grain bulkheads, cargo etc., like you would normally do. When finished enter the [Cargo Weight] module again.

4.6.3.2 Enter drafts / freeboards

Now you should enter the observed drafts (default) or freeboards. In 7 you will enter the drafts on the pre-defined draft marks. Alternatively, you can also define a reference point yourself and indicate whether you want to enter drafts or freeboards. Press <Spacebar> or any other keyboard key, in accordance with the LOCOPIAS operation standard as described in section 8.2 on page 85, Content and options in the cells of selection windows and input windows at the measuring point in the [observed drafts / freeboards] window 7 to open the [edit measuring point] window 8 .

After entering the drafts / freeboards you can check in windows 4 and 5 if the vessels position is as expected. Also the expected hogging / sagging can be checked. If the hogging / sagging is not very clear, the deflection can be exaggerated by using 6 .

4.6.3.3 Calculate

Press the 'verify displacement button' 2 to make the calculation. A popup will be displayed showing the displacement according the observed drafts / freeboards, and the displacement as entered in LOCOPIAS and the weight difference between these two. If the user wants to add the weight difference as a correction weight to the loading condition, they should tick the tickbox at the bottom of the popup window. The user should give their best estimation of the vertical center of gravity of this weight difference.

If the weight difference is deemed to be a deadweight constant, the user can also tick the box 'Database'. Then this correction weight will be stored in the database for use in new loading conditions. Please refer to section 4.4 on page 56, Weight list for further explanation of the database.

Click on OK to add the correction weight if desired and print the 'displacement verification report' from which an example is depicted below.

DISPLACEMENT VERIFICATION REPORT

Loading conditions
Example condition: Containers

	Loading condition			Cargo weight		
Drafts [m]	Aft	Center	Fore	Aft	Center	Fore
Starboard	8.141	8.049	7.783	8.030	7.850	7.730
Portside	7.947	7.630	7.704	8.020	7.840	7.720
Mean	8.044	7.840	7.744	8.025	7.845	7.725

Hydrostatics		
Draft mean of means [m]	7.828	7.843
Trim on Lpp [m]	-0.201	-0.322
Angle [degrees]	1.270	0.033
Deflection [m]	0.000	-0.034
Density water [ton/m3]	1.025	1.025
Actual displacement [ton]	16662.930	16716.682

Deductibles [ton]	
Water ballast	4329.977
Gasoil	248.966
Heavy fuel oil	597.180
Lub oil	39.374
Freshwater	75.934
Various	35.028
Sewage / Sludge	3.045
Miscellaneous	27.000
Grain bulkheads	0.000
Tweendeck panels/hatch covers	789.026
Crane rotating part	120.092
Zone 1	0.000
Zone 2	0.000
Zone 3	0.000
Other	0.000
Total deductibles	6265.621

Cargo [ton]	
Cargo	0.000
Grain / bulk cargo	0.000
General cargo	0.000
Container cargo	6020.000
Crane load / rigging	0.000
Total cargo	6020.000

Total light ship	4377.288
Total displacement [ton]	16662.930

Correction weight [ton]	**53.770**	
LCG [m]	1.666	
VCG* [m]	7.204	
TCG [m]	-5.676	

* The VCG is estimated by the crew.

Example of displacement verification report.

4.6.4 Compare load method

The method is also known as a draft survey. The governing idea of this method is that **two** loading conditions are compared. One condition is before and the other is after the (un)loading operation. The difference in displacement (resulting from observed drafts) will be the (un)loaded cargo weight. Besides a difference in cargo weight there could also be a difference in other weight items, such as ballast and consumables. To correctly calculate the (un)loaded cargo weight, these deductibles are taken into account by identifying two loading conditions in LO↩ COPIAS, which will be labelled ‘initial’ and ‘final’. To distinguish between cargo and deductibles, every cargo

weight item must be assigned to a cargo weight group. Special care should be taken when the cargo is defined in the weight list as a free weight item, since these weight items are not automatically assigned to a weight group.

Below you find the steps that should be taken to determine the (un)loaded weight.

4.6.4.1 Define the initial loading condition

Go back to the [Main screen] and define the condition before the (un)loading operation, including tank fillings, configuration of grain bulkheads, cargo etc. This is later referred to as the initial loading condition.

Note: The 'initial' and 'final' qualifiers are not fixed to a particular loading condition.

4.6.4.2 Enter the observed drafts of the initial condition

Open the [Cargo weight] module again and enter the observed drafts in this condition. Details can be found in the section 'enter drafts / freeboards'.

Now we are finished with preparing the initial loading condition.

4.6.4.3 Define the final loading condition

Now go back to the [Main screen] and create a new loading condition that will represent the situation after (un)loading. This is later referred to as the final loading condition. This new loading condition could also be a copy of the 'initial' condition. Please go to section 3.3 on page 11, Conditions if you need more information on how to create or copy a loading condition.

Now define this loading condition correctly, adjusting the tank fillings, grain bulkhead positions etc.

4.6.4.4 Enter the observed drafts of the final condition

Open the [Cargo weight] module again and enter the observed drafts (or freeboards) of the (un)loaded vessel.

4.6.4.5 Calculate

Click the [Compare load] button to produce a cargo weight determination report. You will be asked to select the initial condition. Only loading conditions where the observed drafts are entered are selectable as 'initial' for a weight determination computation. So if your initial loading condition is not visible, please go back to the [Main screen], switch to the initial loading condition (or create one) and follow steps 1 and 2 to set up the initial loading condition correctly. After that switch to the final loading condition again the print the cargo weight determination report.

Click on Ok to print the report from which an example is depicted below.

CARGO WEIGHT REPORT

Loading conditions
Initial : Arrival Rotterdam
Final : Departure from Rotterdam after discharging

	Initial			Final		
Observed drafts [m]	Aft	Center	Fore	Aft	Center	Fore
Starboard	8.195	7.930	7.740	4.560	4.470	4.385
Portside	8.200	7.900	7.720	4.550	4.460	4.370
Mean	8.198	7.915	7.730	4.555	4.465	4.378

Hydrostatics		
Draft mean of means [m]	7.915	4.453
Trim on Lpp [m]	-0.458	-0.188
Angle [degrees]	0.099	0.040
Deflection [m]	-0.033	-0.002
Density water [ton/m3]	1.025	1.025
Actual displacement [ton]	16906.506	8816.624
Deductables [ton]		
Waterballast	849.583	2811.201
Gasoil	17.041	17.041
Heavy fuel oil	76.993	530.306
Luboil	18.572	29.487
Freshwater	7.594	46.491
Various	59.412	59.412
Sewage / Sludge	15.224	3.045
Miscellaneous	27.000	27.000
Grain bulkheads	54.472	54.472
Tweendeck panels/hatch covers	734.554	734.554
Crane rotating part	120.092	120.092
Zone 1	0.000	0.000
Zone 2	0.000	0.000
Zone 3	0.000	0.000
Other	0.000	0.000
Total deductables	1980.537	4433.101
NET Displacement [ton]	14925.969	4383.523
Empty ship	4377.288	4377.288
Constant/cargo on board [ton]	10548.681	6.235

Total discharged [ton] **10542.446**

Example of weight determination report.

4.6.5 Read draft sensors

To read out the sensors, click the [Sensor reading] button. The read values are copied in the measured drafts/freeboards menu. The positions for which no sensor value is available, are set to Not measured. Now the read values are used to calculate the position, deplacement and correction weight.

Chapter 5

Tank soundings including effects of list and trim

This module allows calculation of tank volumes and other tank data based on the actual list and trim of the vessel. Temperature corrections can be computed according to common product data tables or to manual input. Different output formats are available, including output to intact stability and longitudinal strength calculations. Furthermore, this module can retrieve data from an automatic draft and tank gauge system. The main menu for this module is opened from the main window, and shows:

This module has been integrated into LOCOPIAS from April 2023, see section 4.4.2 on page 58, Content of the weight list and section 4.2.2.2 on page 41, Edit for the new implementation.

Tank contents with heel and trim

1	Specify list and trim
2	Calculate tank particulars
3	Print all tank particulars on paper
4	Cargo/ullage report, and historical cargo summary
5	Export tank data to a loading condition
6	Import tank data from tank measurement systeem
7	Up-to-date overview of filling and flow rate per tank

5.1 Specify list and trim

An input window pops up, where the following data can be given:

- *Trim in meters* (Trim by bow positive), which is the difference in draft on the FPP and the APP (Tfpp - Tapp).
- *Angle of inclination in degrees* only positive angles can be filled in here.
- *The above given heeling angle is to* PS or SB.
- *Mean draft*. This draft is read out by the draft sensor, which is an option in the context of LOCOPIAS. For calculating the tank capacities only, it is not required to give a draft.

5.2 Calculate tank particulars

In this menu, the calculated tank particulars are listed: Sounding, volume, density, weight, ullage, LCG, VCG, TCG, FSM, Pressure (if pressure gauges are defined) and ROB (Residue On Bottom). If one of these items is changed, the other items will be adjusted automatically. Note that the ullage is printed only if the sounding pipe is defined, otherwise a "-" will be printed. When no sounding pipe is defined, the column [sounding] displays the liquid level (relative to baseline, CL and App). If no sounding pipe is defined, the effect of trim cannot be established. If the tank name is selected the menu 'Product, temperature and density' will appear. The following data can be given:

Tank name
: As defined in the LOCOPIAS vessel model.

Include this tank in ullage report
If this compartment should be included in the cargo/ullage report (for an example see section 5.4.1 on the next page, Print Cargo/Ullage report on screen) then this field should be set to 'yes'.

Product (substance)
The name of the product, which will be used in the cargo/ullage report.

Conversion table
For the calculation of the cargo weight of heated hydrocarbons, the following conversion tables are available:

- No temperature correction.
- Correction factor per degree. The 'Volume Correction Factor' is calculated according to the defined temperature and the correction factor per degree (coefficient of expansion).
- Volume Correction Factor. The 'Volume Correction Factor' can be defined directly.
- Table 54B. The 'Volume Correction Factor' is determined according to ASTM table 54B.
- Table 55. The 'Volume Correction Factor' is determined according to ASTM table 55.

Data link
This is the value that is sent by the tank measurement system (section 5.6 on page 73, Import tank data from tank measurement systeem). The data link value is for checking purposes only.

Temperature
The standard temperature is 15°Celsius. The volume is determined at this temperature. The actual temperature of the substance can be defined here.

Volume (not corrected for expansion)
This is the volume that is calculated according to the sounding or ullage for this compartment. This volume comes from the previous window with the list of all the compartments.

Density at 15°Celsius (in air)/(in vacuum)
The density of the substance at 15°Celsius can be defined here. If the density in air is defined, the density in vacuum is calculated automatically. These two densities are connected to each other and cannot be defined separately.

Correction factor per degree Celsius
This factor is used if the conversion table 'Correction factor per degree' has been selected, and calculates the volume correction factor.

Volume Correction Factor
This factor can be determined with four different methods:

- This factor is defined manually, using conversion table 'Volume Correction Factor'.
- This factor is calculated with the correction factor per degree and the difference between the standard and actual temperature. The conversion table 'Correction factor per degree' must be selected.
- This factor is read out from the conversion table 'Table 54B'.
- This factor is read out from the conversion table 'Table 55'. This factor corrects the density at 15°Celsius of the substance for the actual temperature.

Temperature Expansion Factor
This factor corrects for the expansion of the tank at a higher temperature than 15°Celsius. This factor is calculated automatically and cannot be defined manually.

Density at {defined temperature} degrees
Density at 15°Celsius × Volume Correction Factor.

Residue On Bottom (ROB)
Volume of the residue which will be subtracted from the volume of the tank contents.

Density × Temperature Expansion Factor
Density at 15°Celsius × Volume Correction Factor × Temperature Expansion Factor.

Weight
The weight is calculated according to: Volume (not corrected for expansion) × Density at 15°Celsius × Volume Correction Factor × Temperature Expansion Factor.

5.3 Print all tank particulars on paper

With this option the tank volumes etc. (the same as in the input window of the previous option, see section 5.2 on the previous page, Calculate tank particulars) will be printed. An example is pasted just below.

TANKCONTENTS, INCLUDING EFFECTS OF HEEL AND LIST
M.v. Exempli Gratia

28 Sep 2017 15:53:21

Trim = 1.000 m (trim by bow)
Draft from baseline on FPP = 4.100 m
Draft from baseline on APP = 3.100 m
Angle of inclination = 1.000 degrees (to SB)

Compartment	Sounding m	Volume m^3	S.W. ton/m^3	Weight ton	VCG m	LCG m	TCG m	FSM tonm	Ullage m	Press. mmwater
1 FP WB CL	-0.360	0.000	1.0250	0.000	0.985	131.856	0.015	0.001	15.824	0
2 DT WB CL	-0.065	0.000	1.0250	0.000	0.079	125.002	0.092	0.000	11.201	0
3 DB 1 WB CL	-0.212	0.000	1.0250	0.000	0.023	118.711	0.934	0.001	12.572	0
4 LT 1 WB PS	-0.084	0.000	1.0250	0.000	0.081	113.411	-3.177	0.005	12.443	0
5 LT 1 WB SB	-0.061	0.000	1.0250	0.000	0.080	113.128	3.294	0.005	12.396	0
6 DB 2 WB CL	-0.264	0.000	1.0250	0.000	0.023	106.299	3.658	0.006	12.048	0
7 LT 2 WB PS	-0.179	0.000	1.0250	0.000	0.062	101.220	-5.811	0.009	11.522	0
8 LT 2 WB SB	-0.114	0.000	1.0250	0.000	0.058	100.780	5.986	0.010	11.456	0
10 DB 3 WB CL	-0.143	0.000	1.0250	0.000	0.026	92.508	3.859	0.007	11.683	0
11 LT 3 WB PS	-0.163	0.000	1.0250	0.000	0.029	91.591	-6.245	0.010	11.330	0
12 LT 3 WB SB	-0.090	0.000	1.0250	0.000	0.027	91.339	6.991	0.012	11.236	0
13 AH 4 WB PS	-0.231	0.000	1.0250	0.000	1.333	77.459	-8.606	0.013	10.054	0
14 AH 4 WB SB	-0.228	0.000	1.0250	0.000	1.333	77.461	8.740	0.013	10.051	0
19 DB 5 WB PS	-0.245	0.000	1.0250	0.000	0.024	52.968	-1.387	0.000	11.413	0
20 DB 5 WB SB	-0.105	0.000	1.0250	0.000	0.026	53.070	6.948	0.012	11.273	0
21 WT 5 WB PS	-0.114	0.000	1.0250	0.000	1.333	51.586	-8.606	0.013	9.945	0
22 WT 5 WB SB	-0.127	0.000	1.0250	0.000	1.333	51.587	8.739	0.014	9.958	0
23 DB 6 WB PS	-0.191	0.000	1.0250	0.000	0.024	38.830	-1.386	0.000	11.610	0
24 DB 6 WB SB	-0.075	0.000	1.0250	0.000	0.029	39.659	6.506	0.011	11.494	0
25 WT 6 WB PS	-0.125	0.000	1.0250	0.000	1.335	37.737	-8.575	0.013	9.956	0
26 WT 6 WB SB	-0.140	0.000	1.0250	0.000	1.337	37.929	8.674	0.013	9.971	0
27 AP WB PS	-1.998	0.000	1.0250	0.000	6.711	2.425	-1.524	0.000	10.151	0
28 AP WB SB	-1.991	0.000	1.0250	0.000	6.711	2.470	1.928	0.000	10.142	0
30 GO PS	3.386	33.393	1.0312	34.345	5.813	11.719	-6.975	0.014	3.826	3214
31 GO SB	4.348	52.829	0.8998	47.356	5.338	14.794	7.112	0.000	3.848	3819
32 GO DAY 1 PS	7.680	0.000	0.9000	0.000	7.949	9.904	-5.174	0.007		*
33 GO DAY 2 PS	7.657	0.000	0.9000	0.000	7.923	9.904	-3.925	0.005		*
40 HFO MID PS	11.133	192.327	0.9794	187.388	3.313	79.423	-5.186	0.000	0.000	977985
41 HFO MID SB	11.151	181.832	0.9710	176.564	3.721	79.597	5.642	0.000	0.000	969324
42 HFO OVERFL CL	-0.100	0.000	0.9500	0.000	4.301	80.554	0.263	0.002	6.971	0
43 DB 4 HFO PS	1.082	200.000	0.9919	198.370	0.611	65.779	-4.446	1125.585	10.086	1101
44 DB 4 HFO SB	1.262	150.000	0.9921	148.822	0.645	65.735	5.917	311.143	9.907	1029
45 HFO SETTLLING PS	6.947	0.000	0.9500	0.000	7.083	19.537	-5.273	0.005		*
46 HFO DAY PS	9.842	20.000	0.9702	18.919	8.837	18.903	-6.235	8.573		*
50 LO CIRC CL	0.926	10.000	0.8602	8.389	1.282	16.569	0.005	2.547	1.066	790
51 LO ME STORE PS	7.085	0.000	0.9000	0.000	7.163	9.615	-7.788	0.010		*
52 LO AE STORE SB	7.408	0.000	0.9000	0.000	7.950	4.801	4.567	0.005		*
53 LO GB STORE SB	7.399	0.000	0.9000	0.000	7.950	6.001	4.567	0.005		*
60 DB CW DRAIN SB	-0.119	0.000	1.0000	0.000	0.436	16.055	1.816	0.002	4.069	
61 TO DRAIN SB	-0.049	0.000	0.9000	0.000	0.476	18.348	1.956	0.002	11.249	
62 DB LEAK OIL SB	-0.040	0.000	0.9000	0.000	0.905	19.503	2.246	0.002	11.289	0
63 DB DIRTY OIL CL	-0.875	0.000	0.9000	0.000	0.087	11.027	0.072	0.001	4.194	0
64 OVERFLOW PS	-0.123	0.000	0.9000	0.000	4.379	17.408	-7.029	0.008	7.130	
65 SEWAGE SB	-0.143	0.000	1.0000	0.000	4.731	11.283	6.153	0.007	6.985	0
66 TO STORE SB	7.417	0.000	0.9000	0.000	7.950	3.601	4.567	0.005		*
68 BILGE WATER PS	-0.081	0.000	1.0000	0.000	0.257	17.664	-1.811	0.002	11.299	
69A SEPARATOR WATER PS	-0.130	0.000	1.0000	0.000	4.685	14.727	-6.857	0.009	6.782	0
69B SLUDGE FO/LO PS	-0.116	0.000	1.0000	0.000	4.374	16.210	-6.926	0.009	7.129	0
70 AP STERN CL	-0.057	0.000	1.0000	0.000	0.270	8.170	0.027	0.001	8.463	
75 AP FW PS	4.184	0.000	1.0000	0.000	4.589	7.491	-0.512	0.000		0 *
76 AP FW SB	4.164	0.000	1.0000	0.000	4.584	7.530	0.558	0.001		0 *

The tanks marked with an '*' are not corrected for list

Table with tank volumes and COGs.

5.4 Cargo/ullage report, and historical cargo summary

Cargo/ullage report, and historical cargo summary

1	Print Cargo/Ullage report on screen
2	Print Cargo/Ullage report on paper
3	Print historical cargo summary
4	View and maintain historical cargo summary

5.4.1 Print Cargo/Ullage report on screen

This option allows you to print an overview of all onboard cargoes, including their weight, temperature effect, sounding and ullage etc., see example below. This list includes only those tanks of which the detail particulars (as discussed in section 5.2 on page 69, Calculate tank particulars), at the second row 'include this tank in ullage report' is switched on. Before this report is created some more questions might be asked, such as the Bill of Lading weight, and whether this list should be stored at the historical cargo summary.

CARGO, SOUNDING AND ULLAGE REPORT
M.v. Exempli Gratia

28 Sep 2017 15:50:47

Trim = 1.000 m (trim by bow)
Draft from baseline on FPP = 4.100 m
Draft from baseline on APP = 3.100 m
Angle of inclination = 1.000 degrees (to SB)

Port of loading / discharge: Rotterdam
Berth: Alexander
Voyage number: 354

Tank	Product	Ullage	Sounding	Press.	Temp.	Volume	TEF	ROB	Obs.Volume	Method
30 GO PS	Gas Oil	3.826	3.386	3214	55.0	33.393	1.15522	0.100	38.476	MANUAL
31 GO SB	Gas Oil	3.848	4.348	3819	50.0	52.829	1.00423	0.200	52.852	MANUAL
43 DB 4 HFO PS	Heavy Fuel Oil	10.086	1.082	1101	50.0	200.000	1.05406	0.000	210.813	MANUAL
44 DB 4 HFO SB	Heavy Fuel Oil	9.907	1.262	1029	60.0	150.000	1.06954	0.000	160.431	MANUAL
46 HFO DAY PS	Heavy Fuel Oil		9.842		50.0	20.000	1.00082	0.500	19.516	MANUAL
50 LO CIRC CL	Lub Oil	1.066	0.926	790	80.0	10.000	1.00687	0.250	9.819	MANUAL

Tank	Table	Corr./degr.	VCF	Volume 15	Density 15 Vacuum	Density 15 Air	Weight Vacuum	Weight Air
30 GO PS	Nynas		0.9702	37.332	0.9211	0.9200	34.383	34.345
31 GO SB	Nynas		0.9739	51.474	0.9211	0.9200	47.408	47.356
43 DB 4 HFO PS		0.001000	0.9641	203.253	0.9771	0.9760	198.589	198.370
44 DB 4 HFO SB		0.001000	0.9537	153.008	0.9737	0.9726	148.985	148.822
46 HFO DAY PS	ASTM55		0.9782	19.091	0.9921	0.9910	18.940	18.919
50 LO CIRC CL	ASTM54B		0.9493	9.321	0.9011	0.9000	8.398	8.389

Volume : Volume corrected for list and trim
Obs.Volume : "Observed" volume: corrected for tank expansion (TEF)
Volume 15 : Volume at 15 degrees (corrected for cargo expansion)
Density 15 : Density at 15 degrees Celsius
TEF : Temperature Expansion Factor
ROB : Residu On Bottom
Table : Table used for temperature correction
Corr./degr. : Volume correction per degree Celsius
VCF : Volume Correctie Factor

Product	Density Air	Mean Temp.	Observed Volume	Volume 15	Barrels	Weight Vacuum	Weight Air	B/L Weight	Diff. %
Gas Oil	0.92000	52.1	91.328	88.805	558.5	81.791	81.701	81.000	0.86
Heavy Fuel Oil	0.97538	54.1	390.760	375.352	2360.7	366.514	366.111	370.000	1.06
Lub Oil	0.90000	80.0	9.819	9.321	58.6	8.398	8.389	8.250	1.65
Totals :			491.907	473.478	2977.8	456.703	456.201	459.250	0.67

For stabilised crude oil K0 = 613.9723 and K1 = 0 (for metric units)

Shipper / Receiver (On behalf of) the master

....

Example of a cargo/ullage report.

5.4.2 Print Cargo/Ullage report on paper

The same as previous option, albeit with output to paper.

5.4.3 Print historical cargo summary

5.4.4 View and maintain historical cargo summary

These options will speak for themselves.

5.5 Export tank data to a loading condition

A list of all defined loading conditions appears. One of these loading conditions can be selected. The selected loading condition will be copied and the tank data of the sounding module will be sent to this copy. The name of this new loading condition will be: name of selected loading condition + ‘tank reading’ + date + time.

5.6 Import tank data from tank measurement systeem

With this option the soundings or ullages of the tank measurement system can be read out and processed in the list of all tanks (section 5.2 on page 69, Calculate tank particulars).

5.7 Up-to-date overview of filling and flow rate per tank

This option opens a window in which the current filling and flow rates are displayed for each tank, as well as the remaining time until the desired filling percentage will be reached. These values are refreshed by default every five minutes, but that interval is adjustable. Obviously, this option can only work if there a connection with a tank measurement system is available.

Chapter 6

Verification of the calculation results

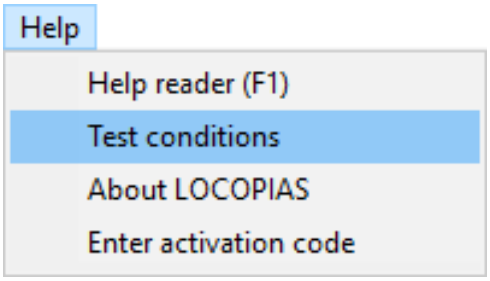
According to classification societies the check of correct working of the software on board is essential for the vessel's safety. Therefore, these societies have rules and guidelines for periodical testing of the loading and stability software. These guidelines can also be found in, amongst others, "IMO — Maritime Safety Committee (MSC) Circ.1108", "IA↩ CS S1 Requirements for Loading Conditions, Loading Manuals and Loading Instruments" and "EBIS questionnaire edition 8".

6.1 Verify calculation results

A "Ship-specific data and test conditions booklet" is included with the class-approved loading software. It is of vital importance that the input data for the test conditions in the computer are equal to those in this booklet. Therefore, the results from the test calculations should be identical to those in this booklet.

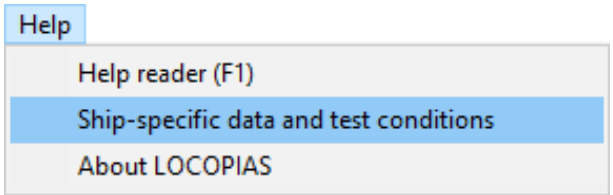
6.1.1 Ship-specific data and test conditions booklet

This booklet can be found through clicking the [Help] button and click on [Test conditions]. A PDF reader is required.



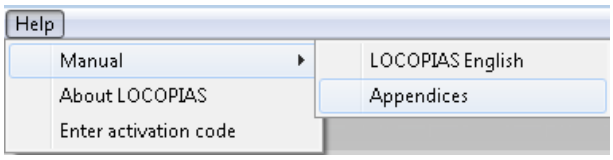
Help menu

In pre-June 2019 versions it can be found through clicking [Help] button, [Manual] button and click on [Ship-specific data and test conditions booklet].



Help menu

In pre-October 2017 versions it can be found through clicking [Help] button, [Manual] button and click on [Appendices].

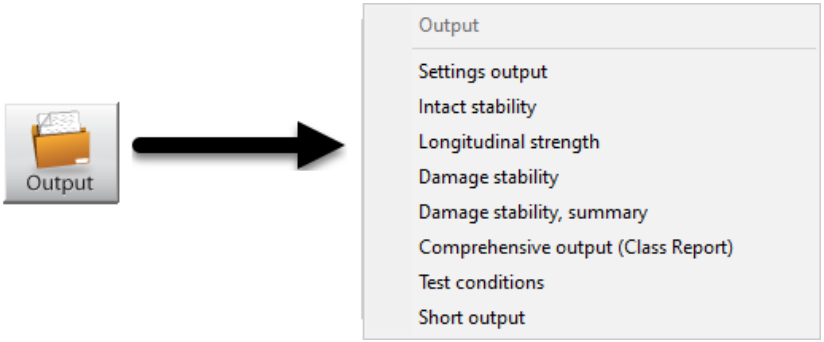


Help menu

The booklet can also be found in the following directory `C:\locopias\SHIPNAME\manual\`. A stamped and approved booklet is also obligatory on board. This stamped and approved copy is not included in LOCOPIAS.

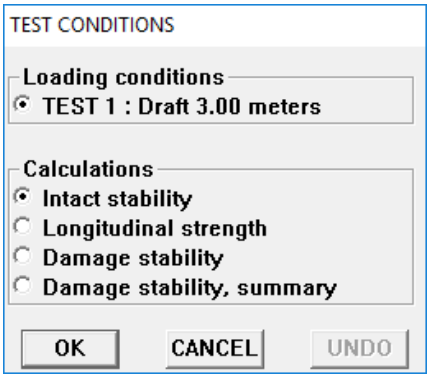
6.1.2 Calculate test conditions

To calculate the predefined "Test conditions" click the Output icon followed by [Test conditions].



Output test conditions

In the "TEST CONDITIONS" pop-up window you can select a specific condition by clicking the radio buttons and a corresponding calculation type. By clicking the [OK] button LOCOPIAS will calculate the selected condition and calculation type.



Test conditions

6.1.3 Compare and verify

For each predefined loading condition all types of calculations must be compared with the "Ship-specific data and test conditions booklet". All results must be compared and verified. In the example below only the summary is shown. However, in reality the complete calculation must be compared and verified.

LOCOPIAS OUTPUT

TRIM AND STABILITY CALCULATION

Condition : TEST 1 :

Summary

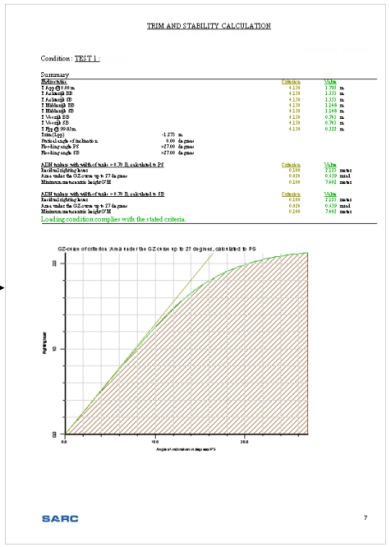
Hydrostatics		Criterion	Value
T App @ 0.00m		4.150	1.795 m
T Achterrijk BB		4.150	1.553 m
T Achterrijk SB		4.150	1.553 m
T Middenrijk BB		4.150	1.148 m
T Middenrijk SB		4.150	1.148 m
T Voorrijk BB		4.150	0.743 m
T Voorrijk SB		4.150	0.743 m
T Fpp @ 90.85m		4.150	0.522 m
Trim (Lpp)	-1.273 m		
Statical angle of inclination	0.00 degrees		
Flooding angle PS	>27.00 degrees		
Flooding angle SB	>27.00 degrees		

ADN tankers with width of tanks > 0.70 B, calculated to PS	Criterion	Value
Residual righting lever	0.100	2.123 meter
Area under the GZ curve up to 27 degrees	0.024	0.659 mrad
Minimum metacentric height GYM	0.100	7.402 meter

ADN tankers with width of tanks > 0.70 B, calculated to SB	Criterion	Value
Residual righting lever	0.100	2.123 meter
Area under the GZ curve up to 27 degrees	0.024	0.659 mrad
Minimum metacentric height GYM	0.100	7.402 meter

Loading condition complies with the stated criteria.

Ship-specific data and test conditions booklet output



Compare calculation results

6.1.4 Verification forms

Verification forms are included in chapter “Verification forms” of the “Ship-specific data and test conditions booklet” to keep a record of these checks.

3. VERIFICATION FORMS

Date verification	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	Checked by

SARC

Verification form

Chapter 7

Correction of the light ship weight

You have noticed that the drafts you see on your screen in LOCOPIAS do not match the actual drafts. Possibly the actual weight of the vessel may differ from the data entered in LOCOPIAS. As the light ship weight is approved by the Classification Authorities, it is not allowed to simply change them. However it is possible to add a correction weight, so that the drafts in LOCOPIAS match better. This manual describes a step-by-step procedure to check the defined loading condition in LOCOPIAS and create and use correction weights.

7.1 Procedure correction of light ship weight according the actual drafts

7.1.1 Step 1: Measurement of the drafts

The first step is to measure the drafts on all six draft marks, i.e. both starboard and port. Points of attention:

- Determine the drafts by means of a freeboard measurement (digital measuring devices can deviate!)

7.1.2 Step 2: Check tank filling

Now it is important to check whether all tanks have been filled correctly, in accordance with reality. Otherwise, the creation of correction weights is of little use. In another loading condition, this correction will no longer be correct. Points of attention:

- Use the correct filling for all tanks, including potable water, gas oil, waste water, water ballast, etc.
- Do not forget the residual water in the ballast tanks.
- The weight of the cargo must correspond with the loading list.
- If required, adjust density for current temperature (density = weight / liters at actual temperature)

7.1.3 Step 3: Observation of the problem

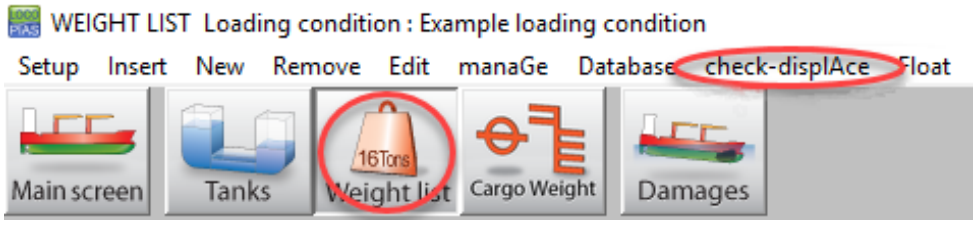
Now the input data in LOCOPIAS correspond exactly to reality and the actual drafts have been measured, you can observe what the problem is. Possible deviations:

- Draft
- Trim
- List

7.1.4 Step 4: Definition of correction weights

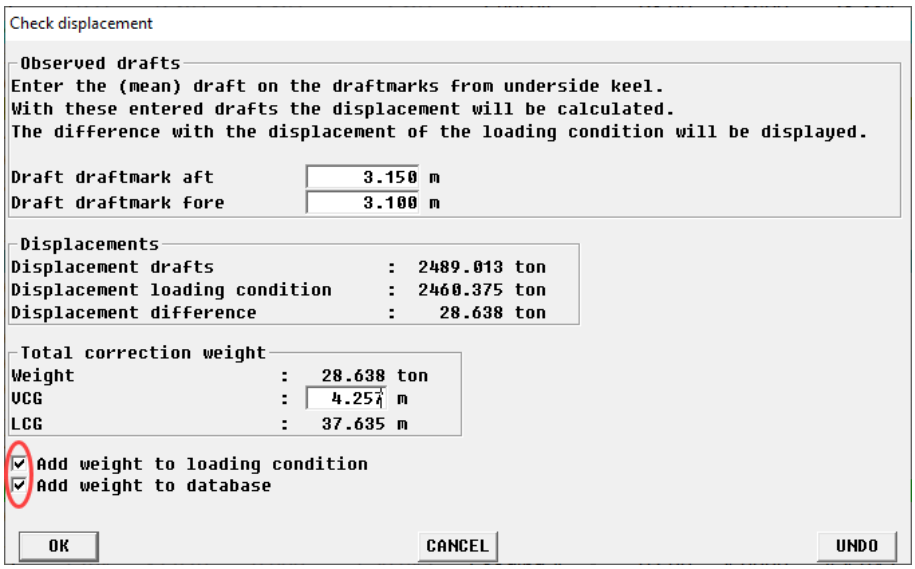
Now the correction weights will be created.

First click on [weights] and then click on the [check-displAce] function.



Weights, check-displAce

You must specify the actually measured drafts of the front and rear draft marks. Note: Here the mean of starboard and port side is requested. List is taken into account later on. By clicking on [OK] the correction weight is calculated.



Correction weight calculated

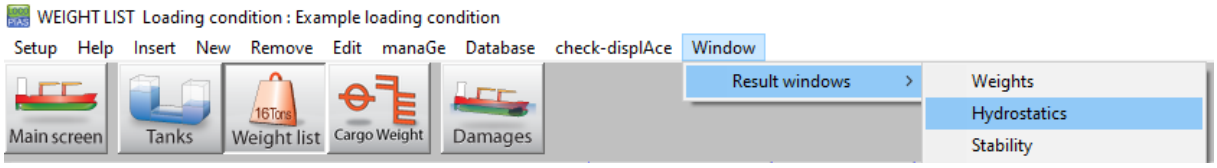
Now select **both check marks** and click [OK]. You will now see your correction weights in the loading condition: Note: You may need to scroll down because the corrector weights are added at the bottom of the list.

Cofferdam Aft	tank	0.000	0.000	18.400	0.000	0.000
Correction weight aft	-	17.503	4.257	21.250	0.000	0.000
Correction weight fore	-	10.896	4.257	63.750	0.000	0.000

Correction weights in the loading condition

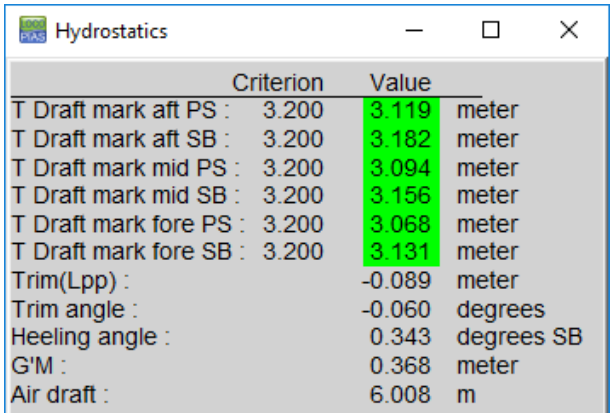
7.1.5 Step 5: Fine-tuning correction weights

Now we turn on the hydrostatics window in the weight module to look at the results. This can be found at the top of [Window]→[Result windows].



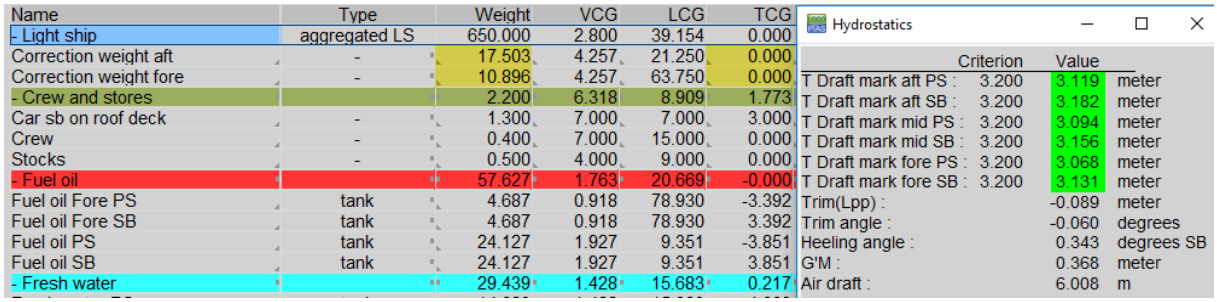
Result window

It then appears as follows: (You can reposition this window) Sometimes only the mean value per draft mark is shown, not starboard and port side separately.



Hydrostatics

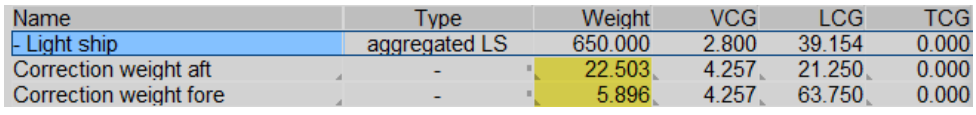
You may not be satisfied with the results yet. For example, because the ship has list, or because the ship is deflected. We can now "play" with the properties (weight, Center of gravity in Width) of the correction weights until we are satisfied with the results. The effect of the changes can be seen directly in the hydrostatics window. Examples for the specific cases, such as list and hogging/sagging, are given below. Here too, you can continue to tweak until you are satisfied with the results.



Adjusting weight and centre of gravity in width

7.1.5.1 Trim

You can adjust the trim by adjusting the weight of the correction weights. For example, if you increase the weight aft with 5 tons and decrease the weight fore by 5 tons, the ship will trim astern. You can adjust these weights with small steps until the desired trim is reached.



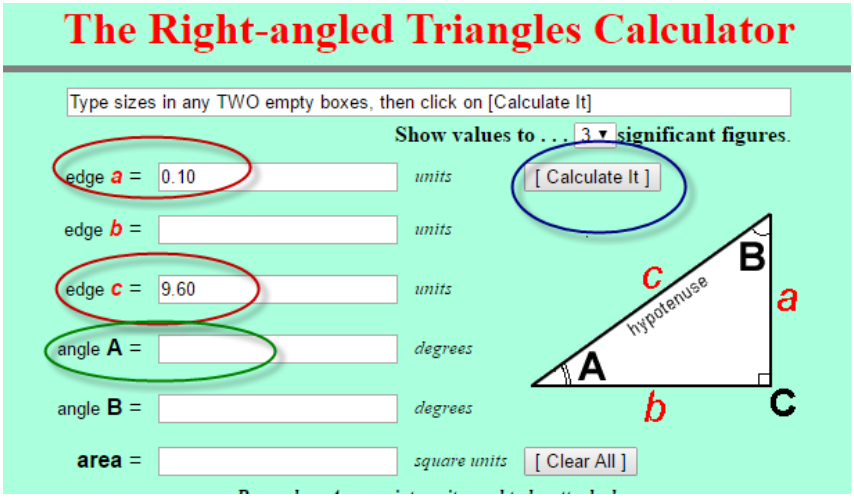
Adjusting trim with weight

7.1.5.2 List

The actual list may differ from LOCOPIAS. We can correct this by adjusting the position of the correction weights in transverse direction. If you do not have separate starboard and port draft marks in LOCOPIAS, we will first have to calculate the actual angle of inclination. If separate PS and SB draft marks have been defined in LOCOPIAS you can skip this step. As an example, we assume that your ship is 10cm deeper on port side. Assume you have measured:

	SB	PS	Difference
Draft mark aft	2.60m	2.49m	0.11m
Draft mark mid	2.55m	2.45m	0.10m
Draft mark fore	2.40m	2.31m	0.09m

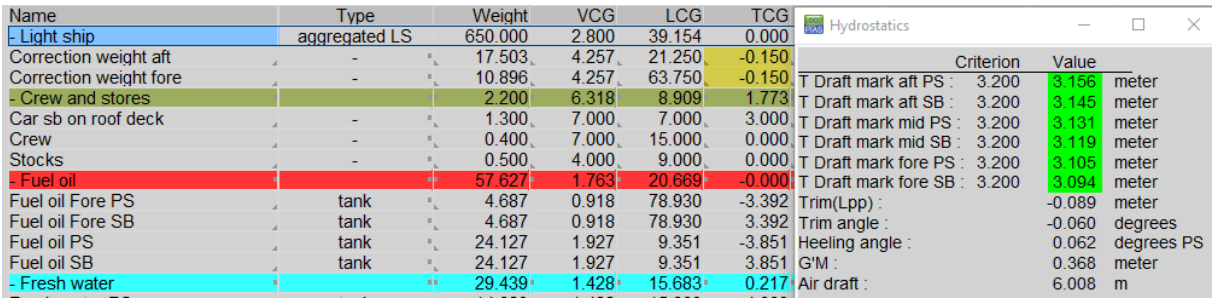
We first calculate the average difference on all marks: (0.11 + 0.10 + 0.09) ÷ 3 = 0.10m If your ship is 9.60m in breadth, the angle of heel is now: inclination = $\sin^{-1}$ (0.10 ÷ 9.60) = 0.549 degrees. If you have trouble with this calculation, you can also perform this calculation online at this website[1].



Calculate angle of inclination online

Then enter the two numbers in the red circles. Use the button in the blue circle to perform the calculation. The angle of inclination can now be read in the green circle.

In this case, the desired heeling angle is 0 degrees. We move the correction weight to port side (negative) and observe the effect.



Name	Type	Weight	VCG	LCG	TCG
- Light ship	aggregated LS	650.000	2.800	39.154	0.000
Correction weight aft	-	17.503	4.257	21.250	-0.150
Correction weight fore	-	10.896	4.257	63.750	-0.150
- Crew and stores		2.200	6.318	8.909	1.773
Car sb on roof deck	-	1.300	7.000	7.000	3.000
Crew	-	0.400	7.000	15.000	0.000
Stocks	-	0.500	4.000	9.000	0.000
- Fuel oil		57.627	1.763	20.669	-0.000
Fuel oil Fore PS	tank	4.687	0.918	78.930	-3.392
Fuel oil Fore SB	tank	4.687	0.918	78.930	3.392
Fuel oil PS	tank	24.127	1.927	9.351	-3.851
Fuel oil SB	tank	24.127	1.927	9.351	3.851
- Fresh water		29.439	1.428	15.683	0.217

Hydrostatics

	Criterion	Value	
T Draft mark aft PS :	3.200	3.156	meter
T Draft mark aft SB :	3.200	3.145	meter
T Draft mark mid PS :	3.200	3.131	meter
T Draft mark mid SB :	3.200	3.119	meter
T Draft mark fore PS :	3.200	3.105	meter
T Draft mark fore SB :	3.200	3.094	meter
Trim(Lpp) :		-0.089	meter
Trim angle :		-0.060	degrees
Heeling angle :		0.062	degrees PS
G'M :		0.368	meter
Air draft :		6.008	m

Corrective weight to port side

Now we adjust the transverse center of gravity until we find the desired heeling angle. After several tries, we find the desired position in breadth of the correction weight:

[1] http://www.cleavebooks.co.uk/scol/calrtri.htm

Name	Type	Weight	VCG	LCG	TCG
- Light ship	aggregated LS	650.000	2.800	39.154	0.000
Correction weight aft	-	17.503	4.257	21.250	-0.133
Correction weight fore	-	10.896	4.257	63.750	-0.133
- Crew and stores		2.200	6.318	8.909	1.773
Car sb on roof deck	-	1.300	7.000	7.000	3.000
Crew	-	0.400	7.000	15.000	0.000
Stocks	-	0.500	4.000	9.000	0.000
- Fuel oil		57.627	1.763	20.669	-0.000
Fuel oil Fore PS	tank	4.687	0.918	78.930	-3.392
Fuel oil Fore SB	tank	4.687	0.918	78.930	3.392
Fuel oil PS	tank	24.127	1.927	9.351	-3.851
Fuel oil SB	tank	24.127	1.927	9.351	3.851
- Fresh water		29.439	1.428	15.683	0.217

Hydrostatics

	Criterion	Value	
T Draft mark aft PS :	3.200	3.150	meter
T Draft mark aft SB :	3.200	3.150	meter
T Draft mark mid PS :	3.200	3.125	meter
T Draft mark mid SB :	3.200	3.125	meter
T Draft mark fore PS :	3.200	3.100	meter
T Draft mark fore SB :	3.200	3.100	meter
Trim(Lpp) :		-0.089	meter
Trim angle :		-0.060	degrees
Heeling angle :		0.000	degrees
G'M :		0.368	meter
Air draft :		6.008	m

Desired breadth

7.1.5.3 Hogging / Sagging

In LOCOPIAS the ship is simply assumed as a straight beam, which is a standard approach for loading software. A correction on the draft as a result of deflection (Hogging / sagging) is therefore not taken into account. You will have to adjust the correction weights such that the deviation on all draft marks is minimized.

An example Assume you have measured:

	SB	BB	Mean
draft mark aft	3.120m	3.120m	3.120m
draft mark mid	3.155m	3.155m	3.155m
draft mark fore	3.100m	3.100m	3.100m

Below you can see the correction weights that LOCOPIAS has created with corresponding drafts. So on the mid draftmark there is a deviation of 4.5cm, on the other draft marks there is 0cm deviation. The mean of all draft marks in LOCOPIAS is (3.120 + 3.110 + 3.100) ÷ 3 = 3.110m. This should be (3.120 + 3.155 + 3.100) ÷ 3 = 3.125m.

Name	Type	Weight	VCG	LCG	TCG
- Light ship	aggregated LS	650.000	2.800	39.154	0.000
Correction weight aft	-	17.503	4.257	21.250	0.000
Correction weight fore	-	10.896	4.257	63.750	0.000
- Crew and stores		2.200	6.318	8.909	1.773
Car sb on roof deck	-	1.300	7.000	7.000	3.000
Crew	-	0.400	7.000	15.000	0.000
Stocks	-	0.500	4.000	9.000	0.000
- Fuel oil		57.627	1.763	20.669	-0.000
Fuel oil Fore PS	tank	4.687	0.918	78.930	-3.392
Fuel oil Fore SB	tank	4.687	0.918	78.930	3.392
Fuel oil PS	tank	24.127	1.927	9.351	-3.851
Fuel oil SB	tank	24.127	1.927	9.351	3.851
- Fresh water		29.439	1.428	15.683	0.217

Hydrostatics

	Criterion	Value	
T Draft mark aft PS :	3.200	3.120	meter
T Draft mark aft SB :	3.200	3.120	meter
T Draft mark mid PS :	3.200	3.110	meter
T Draft mark mid SB :	3.200	3.110	meter
T Draft mark fore PS :	3.200	3.100	meter
T Draft mark fore SB :	3.200	3.100	meter
Trim(Lpp) :		-0.035	meter
Trim angle :		-0.024	degrees
Heeling angle :		0.000	degrees
G'M :		0.746	meter
Air draft :		6.038	m

Created correction weights

So the draft of the vessel must slightly increase, or in other words, the correction weights have to be heavier. We make both correction weights a little heavier. After trying a few times we find the following situation:

Name	Type	Weight	VCG	LCG	TCG
- Light ship	aggregated LS	650.000	2.800	39.154	0.000
Correction weight aft	-	24.000	4.257	21.250	0.000
Correction weight fore	-	17.000	4.257	63.750	0.000
- Crew and stores		2.200	6.318	8.909	1.773
Car sb on roof deck	-	1.300	7.000	7.000	3.000
Crew	-	0.400	7.000	15.000	0.000
Stocks	-	0.500	4.000	9.000	0.000
- Fuel oil		57.627	1.763	20.669	-0.000
Fuel oil Fore PS	tank	4.687	0.918	78.930	-3.392
Fuel oil Fore SB	tank	4.687	0.918	78.930	3.392
Fuel oil PS	tank	24.127	1.927	9.351	-3.851
Fuel oil SB	tank	24.127	1.927	9.351	3.851
- Fresh water		29.439	1.428	15.683	0.217

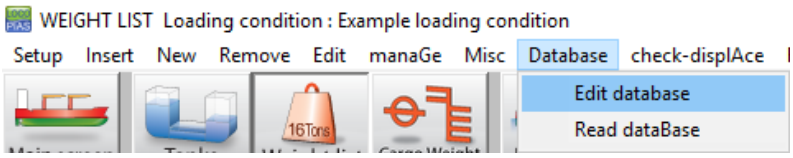
Hydrostatics

	Criterion	Value	
T Draft mark aft PS :	3.200	3.135	meter
T Draft mark aft SB :	3.200	3.135	meter
T Draft mark mid PS :	3.200	3.125	meter
T Draft mark mid SB :	3.200	3.125	meter
T Draft mark fore PS :	3.200	3.115	meter
T Draft mark fore SB :	3.200	3.115	meter
Trim(Lpp) :		-0.035	meter
Trim angle :		-0.023	degrees
Heeling angle :		0.000	degrees
G'M :		0.739	meter
Air draft :		6.024	m

Desired situation

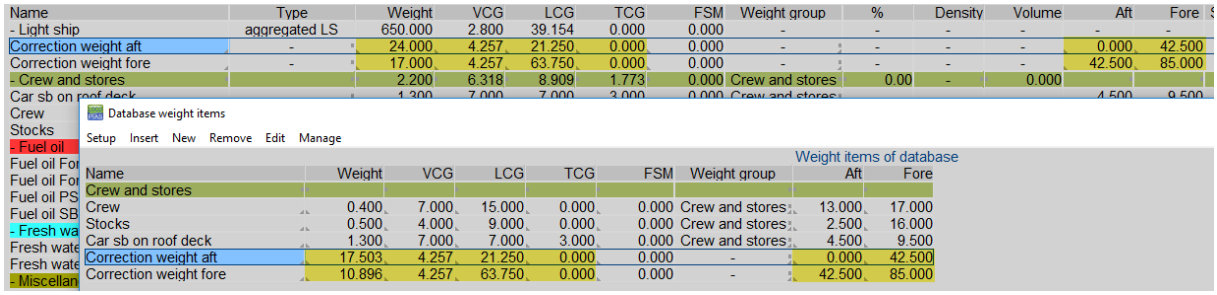
7.1.6 Modify correction weights in the database

Now that you are satisfied with the determined correction weights, these must be saved in the database. The database can be accessed via the ‘Weights’, ‘Database’ and ’Edit database’.



Edit database

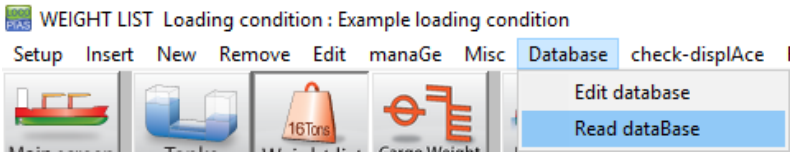
If all is correct, you will already see the correct correction weights. In Step 2 you have already placed these correction weights in the database by checking a check mark. However, the adjustments in step 5 have only been made in the current loading condition. We now take over all values of the correction weights in the “database weight items”.



Edit database

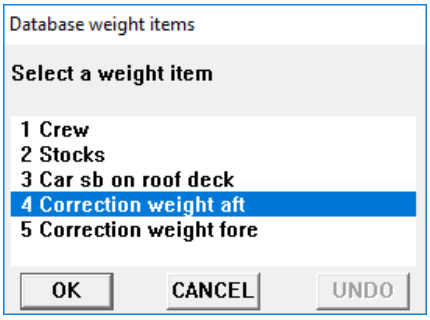
7.1.7 Use the correction weights for every new loading condition

In case of **any** new voyage/loading condition, the correction weights must be used again. You can retrieve the correction weights from the Weights module in the database with the [Read dataBase].



Read database

The following window will now appear:



Read database

By selecting a correction weight and clicking on [OK], the correction weight is added to the current load condition. You should do this twice so that both correction weights are included in the new loading condition.

Chapter 8

Miscellaneous subjects

8.1 Operation of LOCOPIAS and general functions

General functions in the menu bar are described in this section. Note that not all general functions are included in each and every menu bar. Specific options are described in the appropriate sections of the manual. Options can be selected by clicking the desired option on the menu bar or by pressing the underlined letter of the function (in combination with the <Alt>).

Help
: This option opens a help reader. This is context-sensitive, so opens the manual page related to the menu or function from where [Help] was activated.

Insert
: This option will insert a new row in the menu, just above the location of the text cursor. Occasionally, it might not be allowed to add a new row, for instance if the maximum number of rows has been reached. In that case nothing will happen.

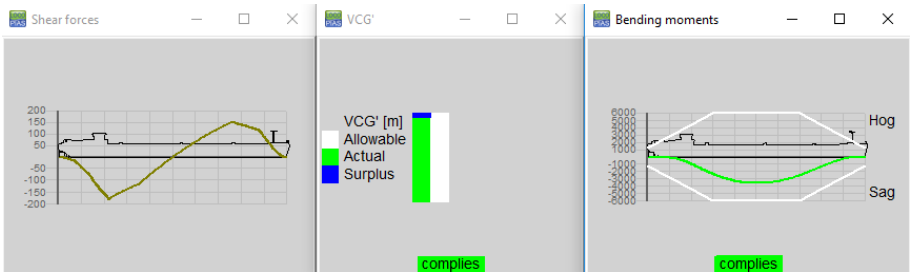
New
: Similar to [Insert], however now the row will be inserted just *below* the text cursor.

Remove
: This option deletes the row of the text cursor (unless that row is not allowed to be removed).

Edit

- Copy. This option will copy the data from the text cursor to Window's *clipboard*
- Paste. To paste the *clipboard* content to the text cursor cell.

Window, Result windows
: Choose stability, shear forces, bending moments or torsional moments to display the corresponding graph in a overlay window. These graphs give real-time feedback while loading cargo or modifying contents of tanks.



Examples of result windows.

8.2 Content and options in the cells of selection windows and input windows

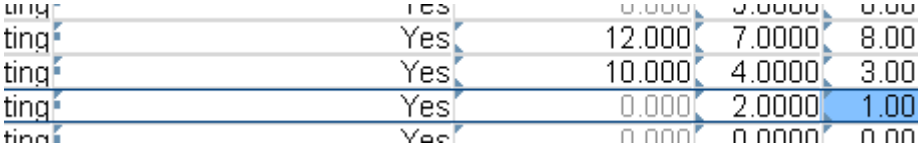
With respect to the cells of an input window, a distinction can be made between three methods of interaction;

1. Select, i.e. go to the underlying window or menu, with <Enter> or <double click left mouse button>.
2. Enter a free value or name, such as the vertical center of gravity for a weight item, or the name of the weight item. That value or this name can simply be typed on the keyboard.
3. Choose from a limited number of predefined values, such as the weight group. After such a choice a popup window comes up where the selection can be made. Making a choice from predefined types is simply also a way of data input, just like the entry of a name or a number, and is therefore also invoked by a convenient key on the keyboard, such as a letter or a number, but most conveniently with an easily accessible key such as <Spacebar> or <+> or <-> on the numeric keypad — or <F5>, which leaves no trace if accidentally used in cells which *do* accept textual input. Working with the mouse, the choice of such a predefined type is initiated by the <middle mouse button>. A third way to invoke the selection of predefined types is described in the bold text below.

In order to indicate which of these three actions apply in a particular cell, symbols are located on the side of the cell with the most free space, that is to say, on the left if the text in the cell is right aligned, and on the right if the text is placed left. Moreover, also combinations may be possible of the three actions, such as that at a loading condition its name can be changed by typing and, by pressing <Enter>, so that this loading condition can be accessed in order to enter tank fillings and weights.

These symbolic indications are as follows:

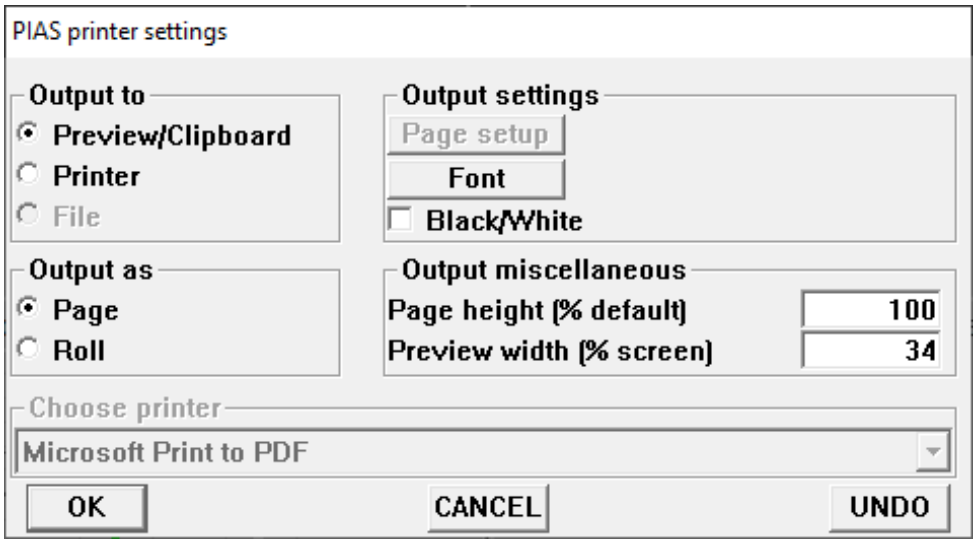
1. Select with <Enter>: a small triangle at the top of the cell.
2. To choose from predefined values: a rectangle in the middle of the cell. For completeness, this rectangle is not only a passive indication that this cell contains predefined types, but also an **active switch which will pop up the selection window when doubly clicked with the left mouse button**.
3. Typing text: a small triangle at the bottom of the cell.



Symbolic indications at the edges of the cell.

8.3 Preview of output to screen, and export of computation results

To get the LOCOPIAS output on screen, go to the menu bar of the [Main screen] and select [Setup]→[Print options] and then select 'Preview/clipboard'.



Print options.

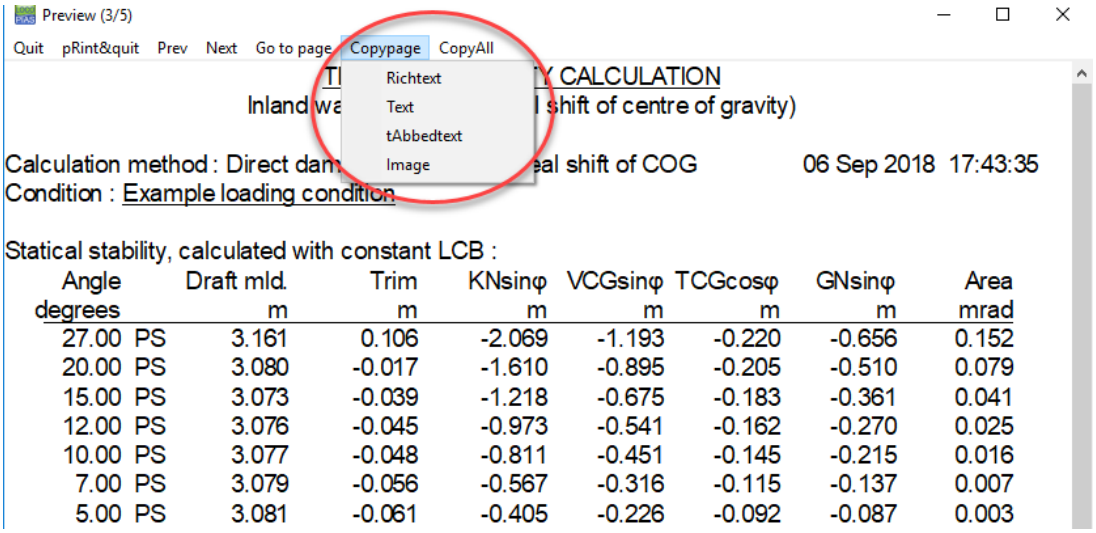
A preview on screen can be copied and pasted in external editing programs (e.g. Word or Paint) by means of the options [Copyall] and [Copypage]. With these functions you can paste all output or only the current page. The level of formatting of the text is determined by choosing Richtext, Text, Tabbedtext, or Image.

Richtext
Copy to clipboard in RTF, a format for word processing programs such as Microsoft Word.

Text
Copy to clipboard in a format for ASCII-based programs such as Notepad.

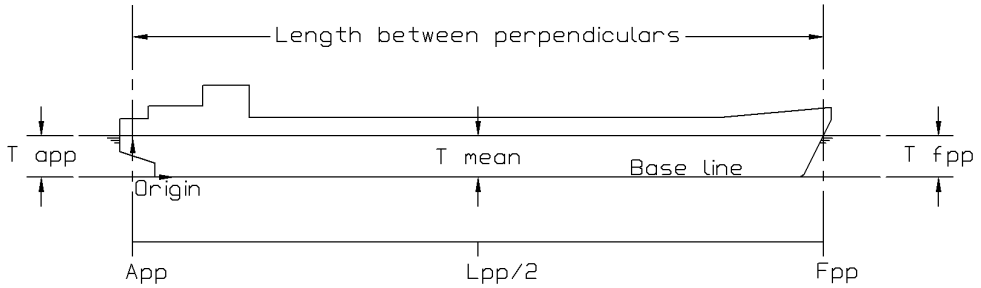
Tabbedtext
Copy to clipboard in a format suitable for spreadsheets such as Microsoft Excel.

Image
Copy to clipboard in image format.



Preview on screen.

8.4 Definitions and units



Global definitions.

Units
Unless stated otherwise, all dimensions are in meters, volumes in m^3, weights in metric tons.

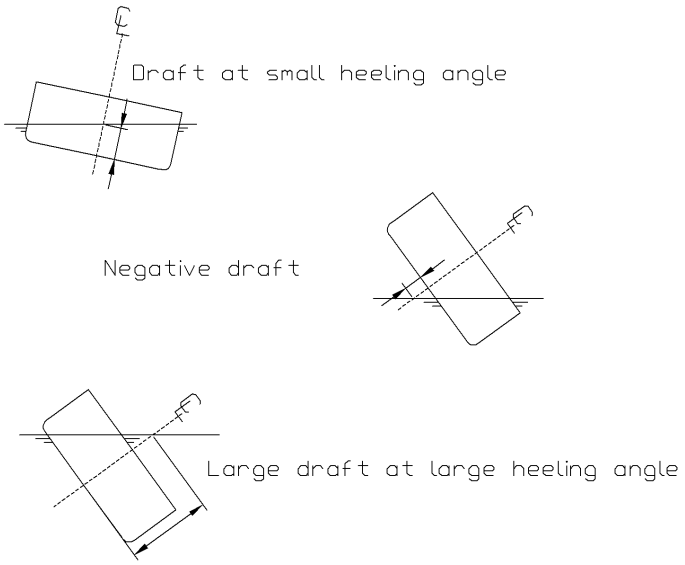
App
Aft perpendicular. All longitudinal distances are related to App. If App coincides with the rudderstock, then the part aft of App has negative longitudinal coordinates, that is not peculiar.

Fpp
Forward perpendicular. Position of Fpp is fixed as App + Lpp.

Lpp
Length between perpendiculars, Lpp is the distance between App and Fpp.

Baseline
All vertical distances relate to baseline, positive upwards.
CL
Centerline. All transverse distances relate to CL, with SB being positive and PS negative.
Draft
Distance between the baseline and the waterline, measured along the vessel's vertical axis.
Mean draft
Draft at Lpp/2
Draft aft
Draft at App
Draft fore
Draft at Fpp
Trim
Draft fore minus draft aft (according to ISO 7462).
Trim at the bow
Trim at the bow has a positive value
Trim at the stern
Trim at the stern has a negative value
Density
Specific weight. The weight per unit volume of a substance, in ton/m^3
Programs
LOCOPIAS Loading Computer Software and LOCOPIAS Tank Soundings are referred to as programs. They can be started independently.
Modules
Modules can be opened from the main screen of LOCOPIAS Loading Computer Software.

A consequence of the definition of draft is that at large heeling angles the draft may be quite large, as illustrated by the sketch below, so consequently the trim may also be large at greater angles.



Examples of drafts, according to its definitions.

8.5 LCG and weight distribution of weight items

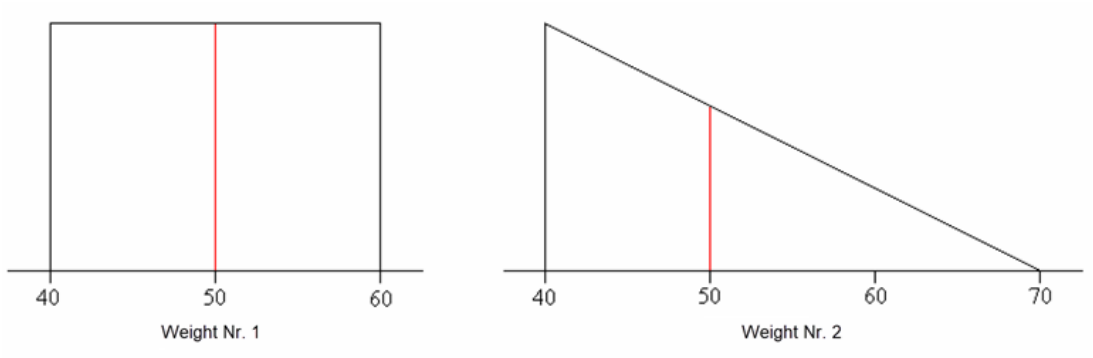
In cases where the LCG is not within the middle 1/3 of the distance between the fore and aft boundary, the line of weight distribution becomes negative at the boundaries. Sometimes this is correct (for example, in case of a crane where the center of gravity of the load is actually *outside* the boundaries of the crane), sometimes it is not

correct. Therefore this is checked at every longitudinal strength calculation and the user will get a message where appropriate.

Two examples of common weight distributions:

1. a weight item of 100 metric tons,
   - Center of gravity at 50 m
   - Boundaries at 40 and 60 m.
2. a weight item of 75 metric tons,
   - Center of gravity at 50 m
   - Boundaries at 40 and 70 m.

The corresponding weight distributions are shown in the figure below (nr. 1 on the left, nr. 2 on the right).

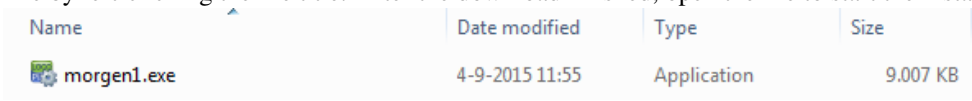


Examples of weight distributions.

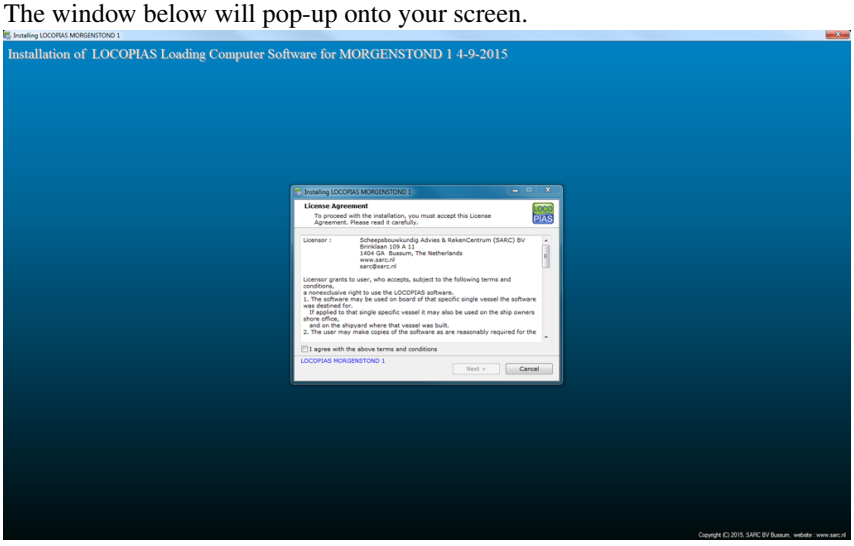
8.6 Installation of LOCOPIAS

Go to www.sarc.nl , click [Login]. Log in with your personal credentials.

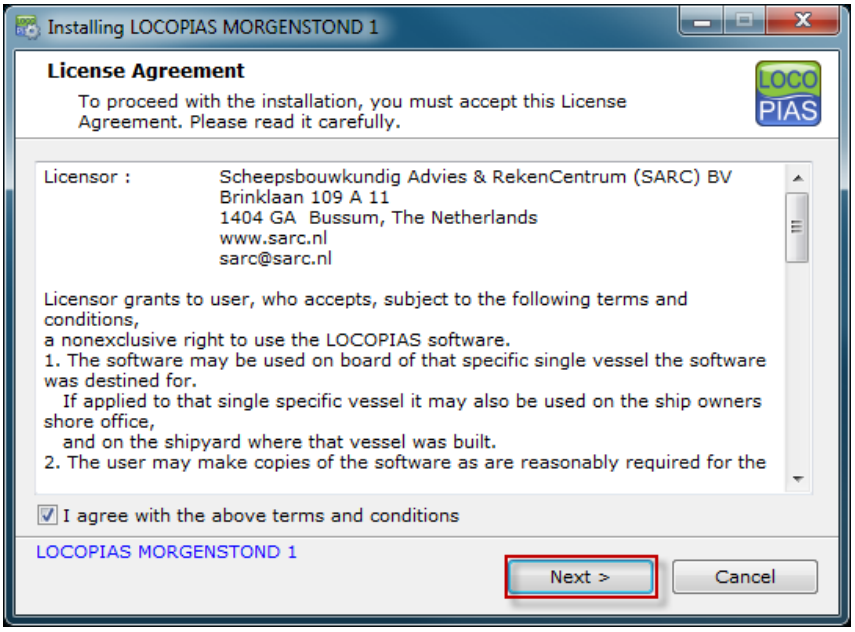
After logging in you will be shown a download page with a file, in this case 'morgen1.exe'. You can download this file by left-clicking the file title. After the download finished, open the file to start the installation.



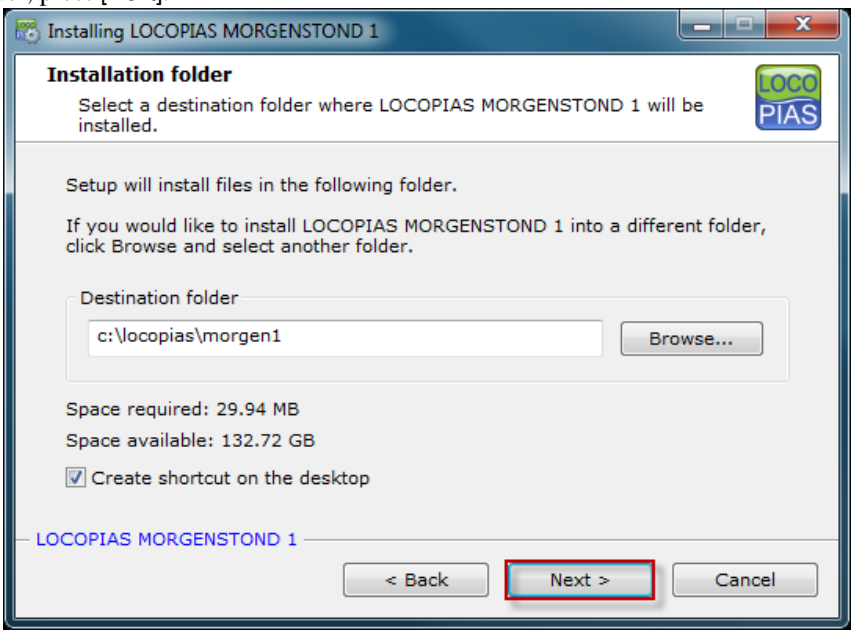
The window below will pop-up onto your screen.



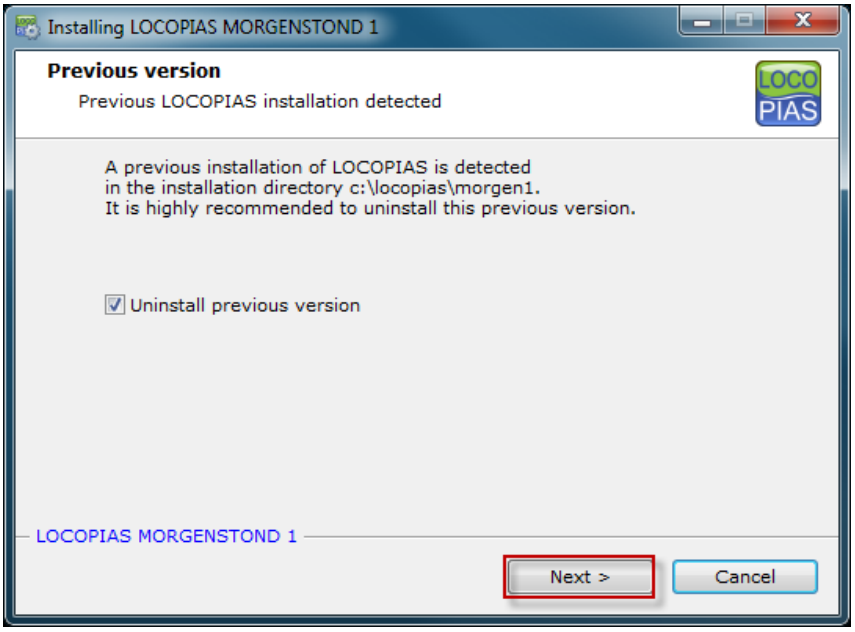
After reading the 'License Agreement', select 'I agree with the above terms and conditions', and, press [Next].



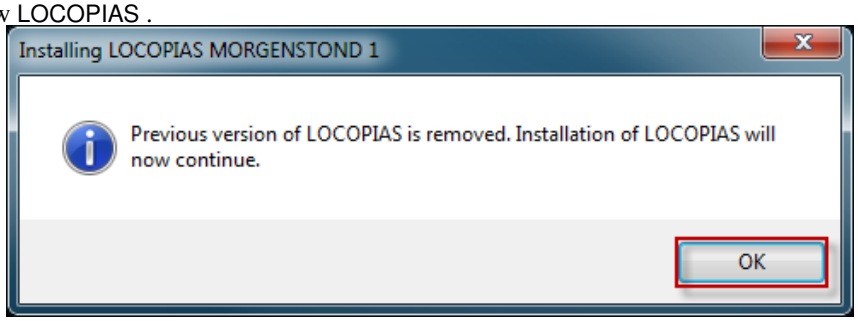
Select an installation folder, C:LOCOPIAS\ name-ship is pre-defined but not obligatory. After choosing the folder, press [Next].



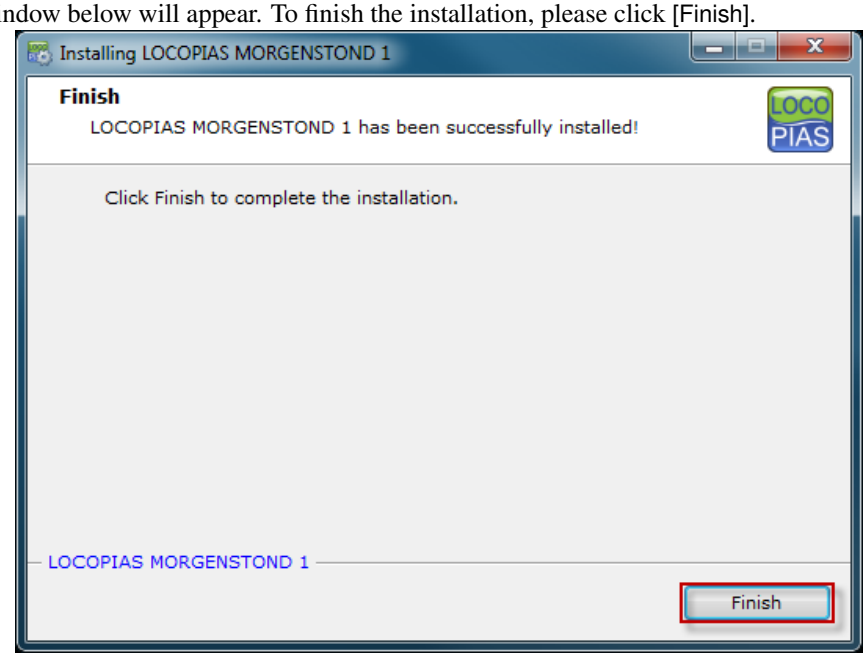
If an older version of LOCOPIAS is installed on this computer, the program automatically detects the previous LOCOPIAS and this will be uninstalled if you select the window next to 'Uninstall previous version'. After doing this, press [Next]. If you don't have an older version of LOCOPIAS , this window won't appear and you can skip to the next page.



A pop-up window will appear when the previous LOCOPIAS is removed. Press [OK] to continue installing the new LOCOPIAS .



LOCOPIAS now will be installed, this will take a few seconds, If the installment is completed, the pop-up window below will appear. To finish the installation, please click [Finish].



LOCOPIAS is now installed on your computer, to start LOCOPIAS please go to the folder you have selected to install LOCOPIAS or click on the shortcut which is on your desktop.

8.6.1 Installation command line parameters

The installation program *vesselname.exe* accepts the following command line parameters;

-s The LOCOPIAS installation is performed without user interaction.

-path= LOCOPIAS will be installed in the folder specified here. The specified installation path may not contain spaces.

Example: `username.exe -s -path=c:\custominstallpath`

Chapter 9

Formalities

LOCOPIAS has no protection against copying. Therefore, for any given vessel, LOCOPIAS may be distributed at the discretion of the owner, for example for office use or training. Although flexible, use of LOCOPIAS is not without restrictions, see section 9.2 on this page, License conditions. LOCOPIAS is produced by:

SARC BV
Landstraat 5
1404 JD Bussum
The Netherlands
Tel. +31 85 04 09 040
Web www.sarc.nl
Email sarc@sarc.nl

9.1 Downloads

New and updated versions of LOCOPIAS are distributed on a USB-stick or via the download section[1] of the SARC website www.sarc.nl. Access to LOCOPIAS installation files is granted after entering the username and matching password. Again, distribution of username and password is at the discretion of the owner.

9.2 License conditions

Licensor:

Scheepsbouwkundig Advies & RekenCentrum (SARC) BV
Landstraat 5
1404 JD Bussum, The Netherlands
Web www.sarc.nl , Email sarc@sarc.nl

Licensor grants to user who accepts, subject to the following terms and conditions, a nonexclusive right to use the LOCOPIAS software:

1. The software may be used on board of that specific single vessel the software was destined for. If applied to that single specific vessel it may also be used at the ship owner's shore office, and at the shipyard where that vessel was built.
2. For archival and security purposes the software may be copied in its entirety or partly, but only for use by the user.
3. User shall not modify, adjust, translate, counterfeit, decompile, demount, disassemble the software or make works that are based on it.
4. For the current system requirements for LOCOPIAS, please refer to the information on our website www.sarc.nl/system-requirements
5. Licensor is the owner of the software and documentation, and also owns its copyright. Only the license is purchased by the user.

[1] https://cloud.sarc.nl/

6. Subject to an attributable failing or a wonderful act, the user cannot hold SARC liable for any damage resulting from, or related to, the use of or not being able to use the software, and indemnifies the licensor against all claims of third parties due to such damage.
7. The liability of SARC for damages suffered by the customer, being the result of an attributable failing or wonderful act, is limited to the purchase price of the software license.
8. The restriction from the previous article does not apply in case of foul play or serious misconduct, in which case the liability is limited to €250,000.
9. To licensors best knowledge the software is correct. Licensor does not warrant the correctness of the software or any part of it however.
10. Updates of the software, if applicable, will in general only contain enhancements and extended functionality. However, licensor does not guarantee that functions of less importance will always remain to exist. Additionally, licensor does not guarantee that updates will always lead to exactly the same calculation results as the original software (for example, in an update a more exact calculation procedure might be applied).
11. Even if the software is initially approved by a regulatory body or a classification society, licensor does not guarantee that this approval will remain valid eternally, or that this approval is also applicable to updates of the software.
12. User is obliged to ensure that the terms and conditions of this agreement are also valid for subsequent owners.
13. This agreement shall be governed by, and interpreted in accordance with, the laws of the Netherlands. Disputes will be subjected to the judgment of a Dutch court.

Last modification date of these license conditions: January 30, 2018

9.3 Certificates

LOCOPIAS is accepted by all major classification societies and complies with Cat. B and C of ISO standard 16155. (Shipboard Loading Instruments). Just below, some of the type approval certificates of PIAS and LOCOPIAS of some major bodies have been included. Other societies may not issue type approval certificates at all, or SARC has not requested for such certificates. In that case classification societies have approval procedures for each ship-specific LOCOPIAS version. Note that no LOCOPIAS version has ever been denied approval by any of the classification societies SARC has come across, regardless whether or not that class had issued type approval certificates for LOCOPIAS or PIAS.

So, each ship-specific LOCOPIAS version requires in general an individual appraisal by a classification society or authority. The availability of a type approval certificate can assist in that procedure, but is not always required. And if a ship-specific certificate has been issued, the type approval certificate — and its expiry date — is not relevant anymore. After all, if updates of LOCOPIAS would be installed they would require a renewed ship-specific appraisal, but existing LOCOPIAS's are continuously covered by their ship-specific certificate.

Type approval PIAS by Germanischer Lloyd

For more than 15 years SARC had a type approval certificate for their PIAS ship design software. The last certificate expired at June 29, 2012 (see picture of certificate below). GL has stopped with delivering type approval certificates. When SARC asked GL for an official document with a confirmation of this new policy, we received below email. SARC considers this email as their confirmation.

From: Mendes, Olivier [mailto:olivier.mendes@gl-group.com]
Sent: Tuesday, September 18, 2012 9:45 AM
To: Sarc
Cc: Vareillas, Christophe
Subject: RE: Type approval certificate PIAS

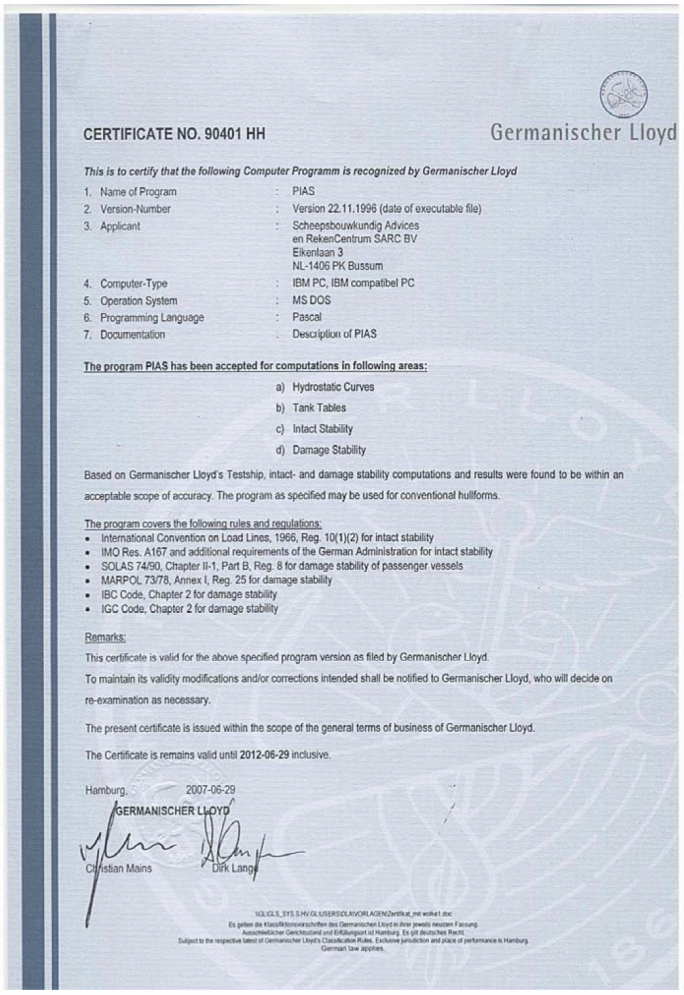
Dear Sir,

As mentioned per email already we do not deliver any type approval certificate. If you would like to receive an official document stating it please be informed that this will be charged 400 euros. Please confirm whether you accept our offer.

Best regards,

Germanischer Lloyd SE
Ship Service Delivery Hamburg
Dept. MPV & Container Vessel

Dipl.-Ing. Naval Architect
Plan Approval
Brooktorkai 18
20457 Hamburg / Germany



CERTIFICATE NO. 90401 HH

Germanischer Lloyd

This is to certify that the following Computer Programm is recognized by Germanischer Lloyd

1. Name of Program : PIAS
2. Version-Number : Version 22.11.1996 (date of executable file)
3. Applicant : Scheepsbouwkundig Advices en RekenCentrum SARC BV, Eikenlaan 3, NL-1406 PK Bussum
4. Computer-Type : IBM PC, IBM compatibel PC
5. Operation System : MS DOS
6. Programming Language : Pascal
7. Documentation : Description of PIAS

The program PIAS has been accepted for computations in following areas:

a) Hydrostatic Curves
b) Tank Tables
c) Intact Stability
d) Damage Stability

Based on Germanischer Lloyd's Testship, intact- and damage stability computations and results were found to be within an acceptable scope of accuracy. The program as specified may be used for conventional hullforms.

The program covers the following rules and regulations:

- International Convention on Load Lines, 1966, Reg. 10(1)(2) for intact stability
- IMO Res. A167 and additional requirements of the German Administration for intact stability
- SOLAS 74/90, Chapter II-1, Part B, Reg. 8 for damage stability of passenger vessels
- MARPOL 73/78, Annex I, Reg. 25 for damage stability
- IBC Code, Chapter 2 for damage stability
- IGC Code, Chapter 2 for damage stability

Remarks:

This certificate is valid for the above specified program version as filed by Germanischer Lloyd.

To maintain its validity modifications and/or corrections intended shall be notified to Germanischer Lloyd, who will decide on re-examination as necessary.

The present certificate is issued within the scope of the general terms of business of Germanischer Lloyd.

The Certificate is remains valid until **2012-06-29** inclusive.

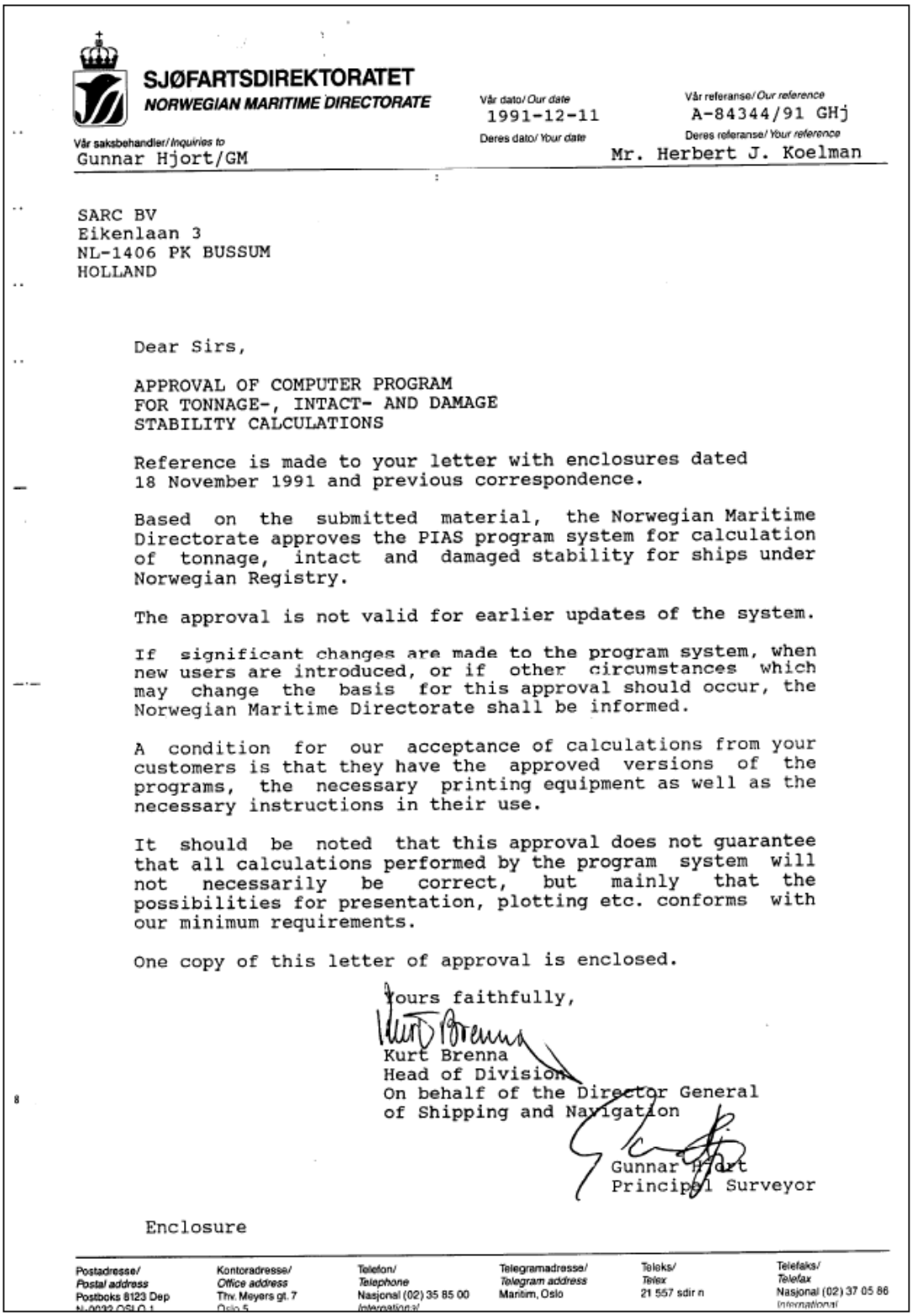
Hamburg, 2007-06-29

GERMANISCHER LLOYD

Christian Mains Dirk Lange

Es gelten die Klassifikationsvorschriften des Germanischen Lloyd in ihrer jeweils neusten Fassung.
Ausschließlicher Gerichtsstand und Erfüllungsort ist Hamburg. Es gilt deutsches Recht.
Subject to the respective latest of Germanischer Lloyd's Classification Rules. Exclusive jurisdiction and place of performance is Hamburg. German law applies.

Certificate Germanischer Lloyd.



SJØFARTSDIREKTORATET
NORWEGIAN MARITIME DIRECTORATE

Vår dato/ Our date: 1991-12-11
Vår referanse/ Our reference: A-84344/91 GHj
Deres dato/ Your date:
Deres referanse/ Your reference: Mr. Herbert J. Koelman
Vår saksbehandler/ Inquiries to: Gunnar Hjort/GM

SARC BV
Eikenlaan 3
NL-1406 PK BUSSUM
HOLLAND

Dear Sirs,

APPROVAL OF COMPUTER PROGRAM
FOR TONNAGE-, INTACT- AND DAMAGE
STABILITY CALCULATIONS

Reference is made to your letter with enclosures dated 18 November 1991 and previous correspondence.

Based on the submitted material, the Norwegian Maritime Directorate approves the PIAS program system for calculation of tonnage, intact and damaged stability for ships under Norwegian Registry.

The approval is not valid for earlier updates of the system.

If significant changes are made to the program system, when new users are introduced, or if other circumstances which may change the basis for this approval should occur, the Norwegian Maritime Directorate shall be informed.

A condition for our acceptance of calculations from your customers is that they have the approved versions of the programs, the necessary printing equipment as well as the necessary instructions in their use.

It should be noted that this approval does not guarantee that all calculations performed by the program system will not necessarily be correct, but mainly that the possibilities for presentation, plotting etc. conforms with our minimum requirements.

One copy of this letter of approval is enclosed.

Yours faithfully,

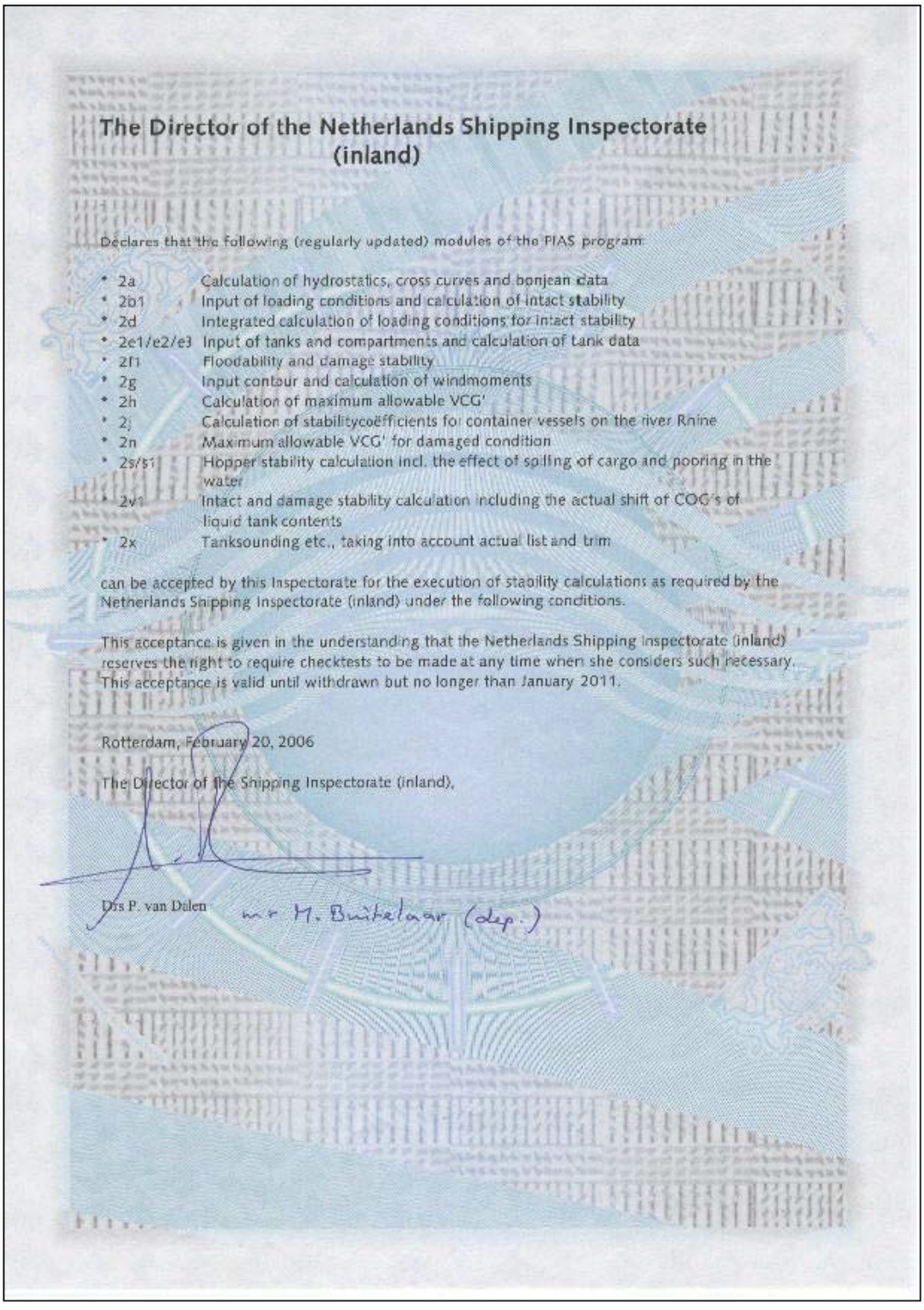
Kurt Brenna
Head of Division
On behalf of the Director General
of Shipping and Navigation

Gunnar Hjort
Principal Surveyor

Enclosure

Postadresse/ Postal address: Postboks 8123 Dep
Kontoradresse/ Office address: Thv. Meyers gt. 7
Telefon/ Telephone: Nasjonal (02) 35 85 00
Telegramadresse/ Telegram address: Maritim, Oslo
Teleks/ Telex: 21 557 sdir n
Telefaks/ Telefax: Nasjonal (02) 37 05 86

Certificate Norwegian Maritime Directorate.



The Director of the Netherlands Shipping Inspectorate (inland)

Declares that the following (regularly updated) modules of the PIAS program

* 2a	Calculation of hydrostatics, cross curves and bonjean data
* 2b1	Input of loading conditions and calculation of intact stability
* 2d	Integrated calculation of loading conditions for intact stability
* 2e1/e2/e3	Input of tanks and compartments and calculation of tank data
* 2f1	Floodability and damage stability
* 2g	Input contour and calculation of windmoments
* 2h	Calculation of maximum allowable VCG'
* 2j	Calculation of stabilitycoëfficients for container vessels on the river Rhine
* 2n	Maximum allowable VCG' for damaged condition
* 2s/s1	Hopper stability calculation incl. the effect of spilling of cargo and pooring in the water
* 2v1	Intact and damage stability calculation including the actual shift of COG's of liquid tank contents
* 2x	Tanksounding etc., taking into account actual list and trim

can be accepted by this Inspectorate for the execution of stability calculations as required by the Netherlands Shipping Inspectorate (inland) under the following conditions.

This acceptance is given in the understanding that the Netherlands Shipping Inspectorate (inland) reserves the right to require checktests to be made at any time when she considers such necessary. This acceptance is valid until withdrawn but no longer than January 2011.

Rotterdam, February 20, 2006

The Director of the Shipping Inspectorate (inland),

Drs P. van Dalen mr M. Buitelaar (dep.)

Certificate Netherlands Shipping Inspection.

Certificate of Approval

Certificate No: CLI/21/305
Issue Date: 08/01/2021
Expiry Date: 07/01/2024

This certificate is issued to: SARC BV

Brinklaan 109 A 11
1404 GA Bussum
The Netherlands

Program Name: LOCOPIAS

Program ID/Version Number: 08/01/2021

Minimum Hardware Specification: A PC with Windows XP or later versions
- 1 GB Internal Memory
- Sufficient memory to install LOCOPIAS
- A USB port or CD reader for installation
- Mouse / keyboard / printer / colour monitor (min res 1024 x 768)

Operating System: Windows

Strength Design Appraisal Document: SOUTSO/HULL/29471665

Stability Design Appraisal Document: MTSO/STAB/17/0700, UK&ITSO/SLT/41674852

User's Operations Manual ID: CLI/21/305

This is to certify that the above Strength and Intact (Type 1) & Damage (Type 2 & 3) Stability calculation program has been examined in accordance with the relevant Classification Rules and the requirements of Statutory Regulations and is approved for the functions stated on the Supplement attached hereto.

Conditions of Certification:

Approval of test conditions will be required together with an installation test for each specific ship.

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 loss of performance or functionality has not been demonstrated to Lloyd's Register EMEA.

Lloyd's Register
Patty Apostolopoulou
UK&I Technical Support Office
Lloyd's Register EMEA

Patty Apostolopoulou
Surveyor to Lloyd's Register EMEA
A Subsidiary Of Lloyd's Register Group Limited

Certificate Lloyd's Register (2021-2024) 1/2.

Program Name : LOCOPIAS

Program Version : 08/01/2021

	INTACT	DAMAGED
Strength Features:	* Indicates Not Applicable	
Shear Forces and Bending Moments	Yes	N/A *
Multiple Shear Forces and Bending Moments	No	N/A *
Bulkhead Shear Force Correction Factors, Ship Rules	No	N/A *
Bulkhead Shear Force Correction Factors, CSR Up To June 2015	No	N/A *
Bulkhead Shear Force Correction Factors, CSR From July 2015	No	N/A *
Cargo Torque	No	N/A *
Multiple Cargo Torque	No	N/A *
Longitudinal Strength In Flooded Hold Conditions	No	N/A *
Local Double Bottom Strength	No	N/A *
Stability Features:		
IACS URL5 Compliant for the approved stability features only	Type 1	Type 2 & 3
Program Type:		
Hydrostatic data- Pre-programmed Even Keel, Trimmed or 3D Hullform	3D	3D
Cross curve data- Pre-programmed Even Keel, Trimmed or 3D Hullform	3D	3D
Tank capacity data- Even keel, Trimmed, 3D hullform or 3DI (3D ignoring trim)	3D	3D
Downflooding Data- Even keel angles, Trimmed: angles or 3D points	3D	3D
Intact Stability:		
A749(18) General Criteria check (A167 para. 3.1.2)	Yes	N/A *
A749(18) Timber Criteria check (A206 para. 4.1.3)	No	N/A *
Automatic Timber Cargo Water Absorption Calculation	No	N/A *
A749(18) Weather Criteria (A562 para. 3.2.2.)	Yes	N/A *
Windage Data- Single Table, Variable Table or Direct Area Calculation	D	N/A *
Icing - Deadweight item or density on Surface area	None	N/A *
Inland Waterways (ADN) Intact Stability, Type C Tank Ships, Tank Width > 0.7B	Yes	N/A *
Free Surfaces:		
Pre-defined Maximum values (at zero heel, Even keel or Trimmed)	None	None
Pre-defined Calibrated data (at zero heel, Even keel or Trimmed)	E	None
Directly calculated from tank geometry, taking heel into account	No	No
Directly calculated from tank geometry taking heel and trim into account	Yes	Yes
GZ Curve:		
Program calculates ship's overall TCG	Yes	N/A *
GZ curve calculations included for any initial heel angle (using GM or GZ)	YesGZ	No
GZ corrected for constant FSM/GGo for all heel angles	Yes	No
GZ corrected for FSM/GGo varying with heel (from pre-defined tables)	No	No
GZ directly calculated from 3D hull/tank geometry and floating position	Yes	Yes
Reference displacement - Intact, Intact minus Outflow, full Variable	N/A *	I
Intermediate Stages assessed (number of stages)	N/A *	5
Limiting GM/KG Curve:		
Single parameter, pre-programmed (ie. limit versus draught)	Yes	Yes
Two parameter, pre-programmed (ie. see DAD for parameters)	Yes	Yes
Multiple parameter, pre-programmed (ie. see DAD for parameters)	No	Yes
Combined limit curve option (only where no separate curves exist)	No	N/A *
Grain Stability:		
Pre-programmed trimmed/partly filled data	Yes	N/A *
Pre-programmed trimmed/untrimmed/partly filled data	No	N/A *
Grain stability individual criteria check	Yes	N/A *
Pre-programmed allowable heeling moment check	No	N/A *
GZ curve with heeling moment plot shown	Yes	N/A *

Certificate Lloyd's Register (2021-2024) 2/2.

Certificate of Approval

Certificate No: CLI/18/266
Issue Date: 27/06/2017
Expiry Date: 08/01/2021

This certificate is issued to: SARC BV

Brinklaan 109 A 11
1404 GA Bussum
The Netherlands

Program Name: LOCOPIAS
Program ID/Version Number: 19/12/2017
Minimum Hardware Specification: A PC with windows XP or later versions
- 1GB Internal Memory
- Sufficient memory to install LOCOPIAS
- A USB port or CD reader for installation
- Mouse/Keyboard/printer/colour monitor (min res 1024 x 768)

Operating System: Windows

Strength Design Appraisal Document: SOUTSO/HULL/29471665

Stability Design Appraisal Document: MTSO/STAB/17/0700

User's Operations Manual ID: CLI/18/266

This is to certify that the above Strength and Intact (Type 1) & Damage (Type 2 & 3) Stability calculation program has been examined in accordance with the relevant Classification Rules and the requirements of Statutory Regulations and is approved for the functions stated on the Supplement attached hereto.

Conditions of Certification:

Approval of test conditions will be required together with an installation test for each specific ship.

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 loss of performance or functionality has not been demonstrated to Lloyd's Register

Lloyd's Register Group Limited, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this clause as 'Lloyd's Register'. Lloyd's Register assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.

Colin Clifford-Smith
Southampton Technical Support Office
Lloyd's Register EMEA

C. Clifford-Smith
Surveyor to Lloyd's Register EMEA
A Subsidiary Of Lloyd's Register Group Limited

Certificate Lloyd's Register (2021-2024) 1/2.

Program Name : LOCOPIAS
Program Version : 19/12/2017

	INTACT	DAMAGED
Strength Features:	* Indicates Not Applicable	
Shear Forces and Bending Moments	Yes	N/A *
Multiple Shear Forces and Bending Moments	No	N/A *
Bulkhead Shear Force Correction Factors, Ship Rules	No	N/A *
Bulkhead Shear Force Correction Factors, CSR Up To June 2015	No	N/A *
Bulkhead Shear Force Correction Factors, CSR From July 2015	No	N/A *
Cargo Torque	No	N/A *
Multiple Cargo Torque	No	N/A *
Longitudinal Strength In Flooded Hold Conditions	No	N/A *
Local Double Bottom Strength	No	N/A *
Stability Features:		
IACS URL5 Compliant for the approved stability features only	Type 1	Type 2 & 3
Program Type:		
Hydrostatic data- Pre-programmed Even Keel, Trimmed or 3D Hullform	3D	3D
Cross curve data- Pre-programmed Even Keel, Trimmed or 3D Hullform	3D	3D
Tank capacity data- Even keel, Trimmed, 3D hullform or 3DI (3D ignoring trim)	3D	3D
Downflooding Data- Even keel angles, Trimmed: angles or 3D points	3D	3D
Intact Stability:		
A749(18) General Criteria check (A167 para. 3.1.2)	Yes	N/A *
A749(18) Timber Criteria check (A206 para. 4.1.3)	No	N/A *
Automatic Timber Cargo Water Absorption Calculation	No	N/A *
A749(18) Weather Criteria (A562 para. 3.2.2.)	Yes	N/A *
Windage Data- Single Table, Variable Table or Direct Area Calculation	D	N/A *
Icing - Deadweight item or density on Surface area	None	N/A *
Inland Waterways (ADN) Intact Stability, Type C Tank Ships, Tank Width > 0.7B	Yes	N/A *
Free Surfaces:		
Pre-defined Maximum values (at zero heel, Even keel or Trimmed)	None	None
Pre-defined Calibrated data (at zero heel, Even keel or Trimmed)	E	None
Directly calculated from tank geometry, taking heel into account	No	No
Directly calculated from tank geometry taking heel and trim into account	Yes	Yes
GZ Curve:		
Program calculates ship's overall TCG	Yes	N/A *
GZ curve calculations included for any initial heel angle (using GM or GZ)	YesGZ	No
GZ corrected for constant FSM/GGo for all heel angles	Yes	No
GZ corrected for FSM/GGo varying with heel (from pre-defined tables)	No	No
GZ directly calculated from 3D hull/tank geometry and floating position	Yes	Yes
Reference displacement - Intact, Intact minus Outflow, full Variable	N/A *	I
Intermediate Stages assessed (number of stages)	N/A *	5
Limiting GM/KG Curve:		
Single parameter, pre-programmed (ie. limit versus draught)	Yes	Yes
Two parameter, pre-programmed (ie. see DAD for parameters)	Yes	Yes
Multiple parameter, pre-programmed (ie. see DAD for parameters)	No	Yes
Combined limit curve option (only where no separate curves exist)	No	N/A *
Grain Stability:		
Pre-programmed trimmed/partly filled data	Yes	N/A *
Pre-programmed trimmed/untrimmed/partly filled data	No	N/A *
Grain stability individual criteria check	Yes	N/A *
Pre-programmed allowable heeling moment check	No	N/A *
GZ curve with heeling moment plot shown	Yes	N/A *

Certificate Lloyd's Register (2021-2024) 2/2.

Lloyd's Register

Certificate of Approval

Certificate No: CLI/11/209
Issue Date: 31/07/2012
Expiry Date: 30/07/2017

This certificate is issued to: SARC BV

Brinklaan 109-I
1404 GA Bussum
The Netherlands

Program Name: LOCOPIAS
Program ID/Version Number: 26/07/2012

Minimum Hardware Specification: Windows XP/ VISTA compatible PC.
CRT or TFT color monitor with minimum resolution of 800x600 pixels.
200Mb free hard disk space.

Operating System: Windows

User's Operations Manual ID: CLI/11/209

This is to certify that the above Strength and Intact & Damage (Type 3) Stability calculation program has been examined in accordance with the relevant Classification Rules and the requirements of Statutory Regulations and is approved for the functions stated on the Supplement attached hereto.

Conditions of Certification:

Approval of test conditions will be required together with an installation test for each specific ship.

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 loss of performance or functionality has not been demonstrated to Lloyd's Register EMEA.

Lloyd's Register, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this clause as the 'Lloyd's Register Group'. The Lloyd's Register Group assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register Group entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.

B. Parkinson
Surveyor to Lloyd's Register EMEA
A Member of the Lloyd's Register Group

Certificate Lloyd's Register (2012-2017 1/2.

Program Name : LOCOPIAS

Program Version : 26/07/2012

	INTACT	DAMAGED
Strength Features:		
Shear Forces and Bending Moments	Yes	--/--
Multiple Shear Forces and Bending Moments		--/--
Bulkhead Shear Force Correction Factors		--/--
Cargo Torque		--/--
Multiple Cargo Torque		--/--
Longitudinal Strength In Flooded Hold Conditions		--/--
Local Double Bottom Strength		--/--
Stability Features:		
Program Type:		
Hydrostatic data- Pre-programmed Even Keel,Trimmed or 3D Hullform	3D	3D
Cross curve data- Pre-programmed Even Keel,Trimmed or 3D Hullform	3D	3D
Tank capacity data- Even keel,Trimmed,3D hullform or 3DI (3D ignnoring trim)	E	3D
Downflooding Data- Even keel angles, Trimmed:angles or 3D points	3D	3D
Intact Stability:		
A749(18) General Criteria check (A167 para. 3.1.2)	Yes	--/--
A749(18) Timber Criteria check (A206 para. 4.1.3)	No	--/--
Automatic Timber Cargo Water Absorbtion Calculation	No	--/--
A749(18) Weather Criteria (A562 para. 3.2.2.)	Yes	--/--
Windage Data- Single Table, Variable Table or Direct Area Calcultation	D	--/--
Icing - Deadweight item or density on Surface area		--/--
Free Surfaces:		
Pre-defined Maximum values (at zero heel, Even keel or Trimmed)		
Pre-defined Calibrated data (at zero heel, Even keel or Trimmed)		
Directly calculated from tank geometry, taking heel into account	No	
Directly calculated from tank geometry taking heel and trim into account	No	Yes
GZ Curve:		
Program calculates ship's overall TCG	Yes	--/--
GZ curve calculations included for any initial heel angle (using GM or GZ)	YesGZ	
GZ corrected for constant FSM/GGo for all heel angles	Yes	
GZ corrected for FSM/GGo varying with heel (from pre-defined tables)	No	
GZ directly calculated from 3D hull/tank geometry and floating position	No	Yes
Reference displacement - Intact, Intact minus Outflow, full Variable	--/--	I
Intermediate Stages assessed (number of stages)	--/--	5
Limiting GM/KG Curve:		
Single parameter, pre-programmed (ie. limit versus draught)	No	
Two parameter, pre-programmed (ie. see DAD for paramters)	Yes	
Multiple parameter, pre-programmed (ie. see DAD for paramters)	No	
Combined limit curve option (only where no separate curves exist)	No	--/--
Grain Stability:		
Pre-programmed trimmed/partly filled data	Yes	--/--
Pre-programmed trimmed/untrimmed/partly filled data	No	--/--
Grain stability individual criteria check	Yes	--/--
Pre-programmed allowable heeling moment check	No	--/--
GZ curve with heeling moment plot shown	Yes	--/--

Certificate Lloyd's Register (2012-2017) 2/2.

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