

Instructions for use naturvents-calc nv-calc

nv-calc is a program intended for designers to calculate natural ventilation in industrial facilities - power blocks, waste incineration plants, glass and metal works and similar hall-type facilities with high heat gains released to the volume. The thermal draught generated in the hall by the heat source is then a sufficient "engine" for ventilation, which is not significantly disturbed by gusts of wind.

Language

The program is available in 3 languages (Polish, German and English). Changing the language is done using the button in the upper right corner of the window. The language can be changed at any stage of using the program, especially for printing the calculation report.

The screenshot shows the web interface for the 'naturvents' program. At the top left is the 'naturvents' logo. In the top right corner, there is a language selection dropdown menu with a red border, currently set to 'English'. Below the logo, the text reads 'Program nv-calc' followed by 'for calculating natural ventilation in industry (glass and metal works, waste incineration plants, power units, etc.)'. The main content area features a 'Log in' section with a 'Username or e-mail' input field, a 'Password' input field, a 'Remember' checkbox, and a 'Log in' button. Below the login button are two smaller buttons: 'Register' and 'Remind password'.

Registration

When registering, you need to complete all the required fields. Then the User's account is activated by the administrator. Only after the account is activated, the User can log in with his/her data.

Register

| | |
|--|---|
| Username | First Name |
| <input type="text"/> | <input type="text"/> |
| E-mail | Last Name |
| <input type="text"/> | <input type="text"/> |
| Password | Company |
| <input type="text"/> | <input type="text"/> |
| Confirm password | Phone |
| <input type="text"/> | <input type="text"/> |
| Captcha | <input type="checkbox"/> I declare that I have read and agree to the terms of the license . |
| <input type="checkbox"/> I'm not a robot  | <input type="checkbox"/> I hereby give consent for my personal data to be processed in the collection of personal data "VENTOS". Look at the Personal Data Policy . |

[Sign up](#)

[Log In](#) [Remind password](#)

Log in and Remind password

When logging in, the User enters the login or e-mail and the password given during registration. If the User forgets the password, there is an option to change it. After selecting the "Password Reminder" option and entering the e-mail from the registration process, a confirmation code and a link allowing to change the password will be sent to the mailbox.

Calculations

After logging in, the user is on the main page of the program, where the program's license is displayed. In order to proceed to the calculations from the top menu, select the Projects tab.



Licence agreement

1. This licence agreement applies only to the SOFTWARE of the **nv-calc** (naturvents-calc) program.
2. The firm VENTOSYSTEM Bohdan Kontrymowicz (VentosystemBK) is the Owner of the program and the Company maintains the legal copyright to this program.
3. This program is dedicated to designers for calculation natural ventilation of workshops, specially industrial buildings with high thermal load. Any final reports produced with the assistance of this software may be included into the User's projects, but in its original form only. No changes, especially those that do not credit the origin of the software's ownership are allowed.
4. This licence empower the User for legal use of the program after registration and activate account by the Owner.
5. The login data to **nv-calc** (naturvents-calc) program in professional version can not be available to the third party (no registered) without Owners knowledge and agreement.
6. Legal liability restrictions apply. The contents of these restrictions are displayed on program's homepage and also on the report of the calculation printout.
7. VentosystemBK reserves the right to contact the User of the program in order to offer any additional or new information and obtain information on the use of the **nv-calc** program.

Formulas in this program are created to determine equilibrium between all thermal gains produced by industrial processes within a building as well as air flow exhausted by the ventilation system. Based on this principle, the program is not intended to calculate air exhaust used to prevent thermodynamic disasters such as fires or an explosion blast in the case of accidental discharge of flammable gases. This program requires the user to possess and apply engineering knowledge and to understand physical phenomena occurring in the natural ventilation of buildings. The results of the program's calculations will always correspond to the adopted criteria and the input data which have been entered, for which only

Add project [1]

As a first step before starting calculations, add a new project by entering data such as:

- Object (e. g. power plant)
- Client (e.g. Investor, General Contractor, etc.)
- Project Number

The screenshot shows the 'naturvents' software interface. At the top, there is a navigation bar with the logo, 'Projects', 'Help', and user information including 'Lizenz für: 2024-03-14 (links 49 Tage)', 'Ihr Konto erneuern', 'English', and 'Hello Karol!'. Below the navigation bar, there are three main input fields: '1. Project', '2. Venting zone', and '3. File name'. Each field has a dropdown menu and a green '+' button. A dark blue tooltip message is displayed over the '3. File name' field, stating: 'Before filling the Input Data, please fill the fields: 1. Project, 2. Venting Zone, 3. File name'. Below the input fields, there are sections for 'Report Nr', 'Date', 'Remarks', and 'Profile'. At the bottom, there is a section for '4. Input data' with a table and a '5. Openings of natural ventilation - intakes and outlets' section.

| Name | Designation | Value | Unit |
|-------------|-------------|-------|------|
| Room length | a | | [m] |

Add venting zone [2]

Next, add a venting zone for which calculation will be done. Each project can have multiple venting zones added. Adding the area entering data such as:

- Venting zone (e. g. boiler-house, machine-room)
- Calculations author

User always can edit entered information about project and venting zone.

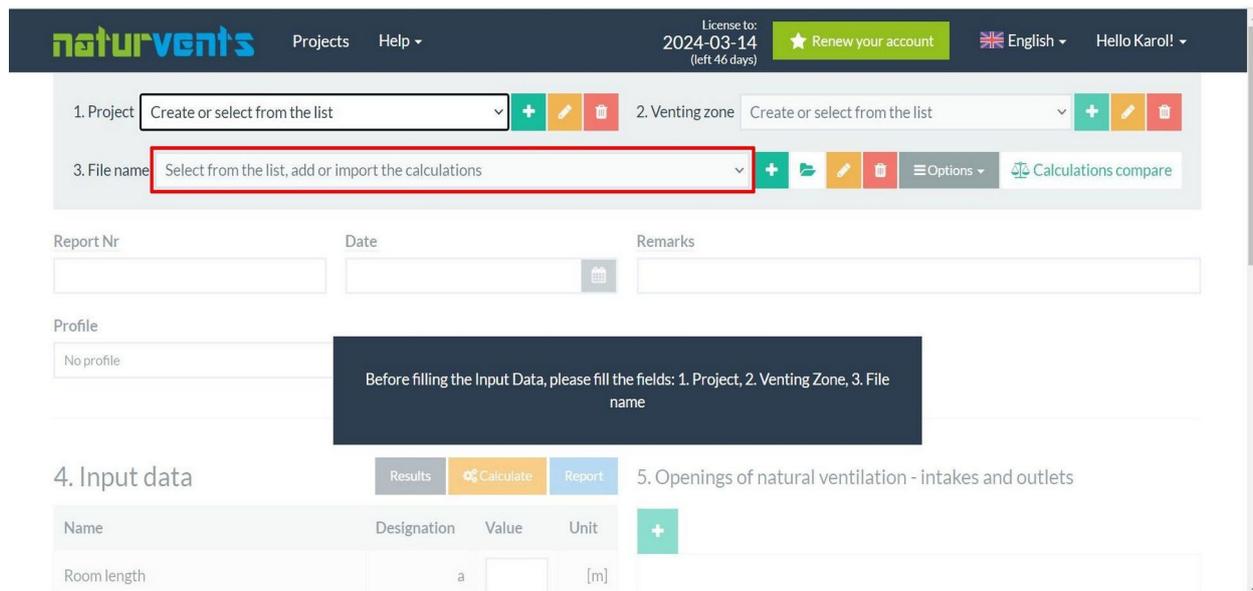
New calculation

To perform a new calculations, select from the list, or push the green button "+" add or import the data from your disc. Remember to save your data using the "Options" button as pressing the "+" will clear all data that's been filled:

- 4. Input data
- 5. Openings of natural ventilation – intakes and outlets
- 6. Devices of mechanical and hybrid ventilation.

For each venting zone User can add many calculations entering information such as:

Report Number, Date, Remarks

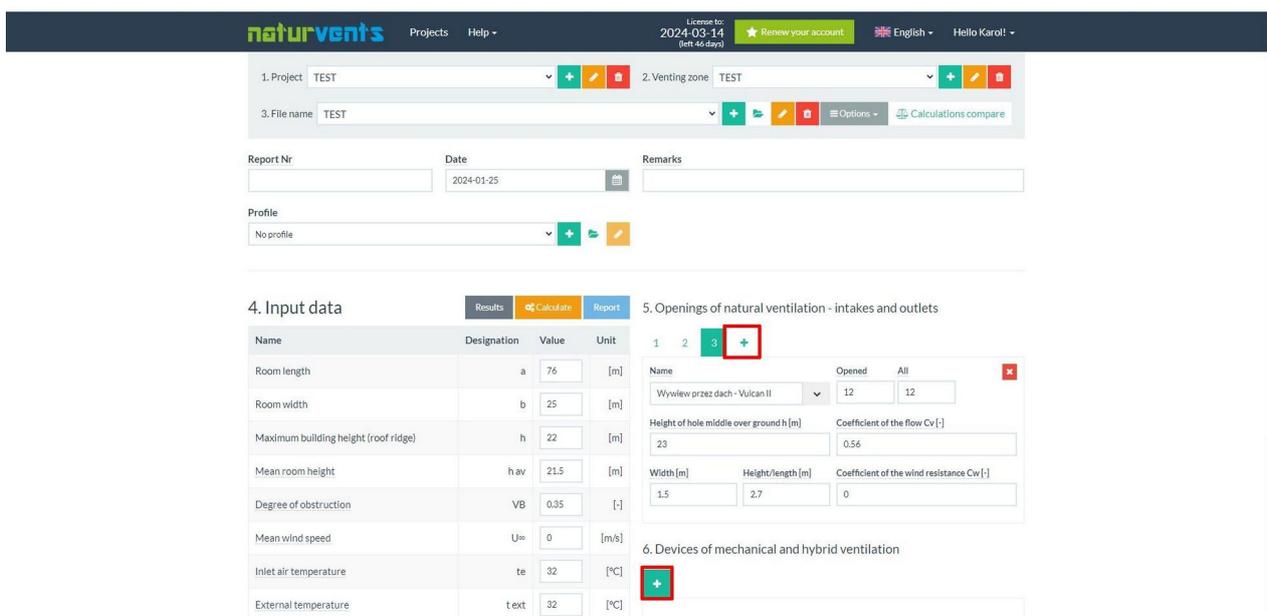


Data entry

The next step is to enter the object's input data, information about natural ventilation openings and mechanical or hybrid ventilation devices. Adding more openings is done using the plus symbol "+". There are balloons with prompts next to the data to be entered.

The names of devices recommended by VentosystemBK are available from the drop-down list. However, the program user can perform calculations for other devices outside this list by specifying the aerodynamic flow coefficient $Cv0$ characteristic of the device in addition to the inlet opening dimensions.

It is required to introduce at least two devices at two different heights.



Help

In the Help section, you will find the User's Manual and information about the equipment recommended by VentosystemBK. In addition, special calculation cases for selected types of objects are explained here.

The screenshot shows the top navigation bar of the naturvents software. The 'Help' menu is highlighted with a red box, showing options: 'Instructions for use', 'Special cases', and 'Devices dimensions'. Below the navigation bar, there are input fields for '1. Project', '2. Venting zone', and '3. File name'. A dark blue warning box in the center reads: 'Before filling the Input Data, please fill the fields: 1. Project, 2. Venting Zone, 3. File name'. Below this, there are tabs for 'Results', 'Calculate', and 'Report'. The 'Input data' section shows a table with columns: Name, Designation, Value, Unit. The first row is 'Room length' with designation 'a' and unit '[m]'.

Results

To get the calculation results, click the "Calculate" button, and then the "Results" tab will be displayed.

The screenshot shows the software interface after the calculation. The 'Calculate' button is highlighted with a red arrow. The 'Results' tab is active, showing a table of calculation results. The table has columns: Name, Designation, Value, Unit. The results are as follows:

| Name | Designation | Value | Unit |
|--|-------------------|--------|---------------------|
| Surface area of shop | A | 1 900 | [m ²] |
| Volume of shop | VR | 40 850 | [m ³] |
| Net volume of shop | VRN | 26 553 | [m ³] |
| Total thermal flow | Q _g | 4 000 | [kW] |
| Specific internal heat of net shop volume | Q _I | 151 | [W/m ³] |
| Temperature under top | t _{out} | 64.3 | [°C] |
| Difference between the exhaust and inlet temperature | Δt _{out} | 32.3 | [K] |
| Air displacement (per hour) | LW | 14.22 | [1/h] |
| Height of the neutral zone from ground | NZ | 12.57 | [m] |
| Pressure difference under roof | pt | 9 | [Pa] |

Below the table, there are sections for '5. Openings of natural ventilation - intakes and outlets' and '6. Devices of mechanical and hybrid ventilation'. The '5. Openings...' section shows a table with columns: Name, Opened, All. The first row is 'Wywiew przez dach - Vulcan II' with 'Opened' value 12 and 'All' value 12. Below this, there are input fields for 'Height of hole middle over ground h [m]' (23), 'Coefficient of the flow C_v [-]' (0.56), 'Width [m]' (1.5), 'Height/length [m]' (2.7), and 'Coefficient of the wind resistance C_w [-]' (0).

Report

The end result of the calculation is a report containing all input data and results. It gives the results for each hole and device. At the end of the report is a schematic drawing of the building, along with an illustrative diagram of the pressure difference. The report can be displayed in Polish, English or German regardless of the language in which you work in the program. It is possible to download the report in pdf format.

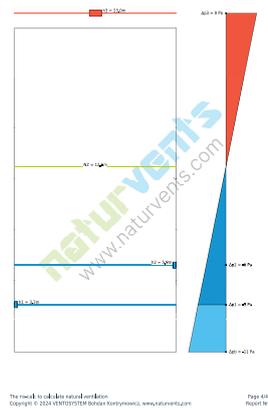
| Test | |
|---------------------|------------|
| Project number | 1001 |
| Object | 1001 |
| Working name | 1001 |
| Project | 1001 |
| Calculation number | 232401-01 |
| Temperature profile | No profile |

| Input data | |
|----------------------------|---------------------------------|
| Room height | h = 3.20 [m] |
| Room width | b = 2.50 [m] |
| Minimum indoor temperature | t _{min} = 23.0 [°C] |
| Minimum design | t _{min} = 23.0 [°C] |
| Design air temperature | t _{air} = 20.0 [°C] |
| Minimum design | t _{min} = 20.0 [°C] |
| Indoor air temperature | t _{in} = 20.0 [°C] |
| Outdoor air temperature | t _{out} = 10.0 [°C] |
| Temperature difference | t _d = 10.0 [°C] |
| Design air velocity | v _{air} = 0.5 [m/s] |
| Design air density | ρ _{air} = 1.20 [kg/m³] |
| Design air mass flow | Q _{air} = 0.25 [kg/s] |
| Design air volume flow | V _{air} = 0.80 [m³/s] |

| Calculation results | |
|------------------------|----------------------------------|
| Design air velocity | v _{air} = 0.50 [m/s] |
| Design air density | ρ _{air} = 1.20 [kg/m³] |
| Design air mass flow | Q _{air} = 0.25 [kg/s] |
| Design air volume flow | V _{air} = 0.80 [m³/s] |
| Design air temperature | t _{air} = 20.0 [°C] |
| Design air pressure | p _{air} = 1013.25 [hPa] |
| Design air mass | m _{air} = 0.30 [kg] |
| Design air volume | V _{air} = 0.80 [m³] |
| Design air weight | G _{air} = 0.36 [N] |
| Design air mass flow | Q _{air} = 0.25 [kg/s] |
| Design air volume flow | V _{air} = 0.80 [m³/s] |
| Design air mass | m _{air} = 0.30 [kg] |
| Design air volume | V _{air} = 0.80 [m³] |
| Design air weight | G _{air} = 0.36 [N] |

| Openings of natural ventilation - intakes and outlets | |
|---|----------------------------------|
| 1. Complete shop front - Threshold | |
| Design air mass flow | Q _{air} = 0.25 [kg/s] |
| Design air volume flow | V _{air} = 0.80 [m³/s] |
| Design air temperature | t _{air} = 20.0 [°C] |
| Design air pressure | p _{air} = 1013.25 [hPa] |
| Design air mass | m _{air} = 0.30 [kg] |
| Design air volume | V _{air} = 0.80 [m³] |
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| Design air volume | V _{air} = 0.80 [m³] |
| Design air weight | G _{air} = 0.36 [N] |

Disclaimer: The user is responsible for the design assumptions and data (especially the design air mass flow) used in the program. The user is responsible for the design assumptions and data (especially the design air mass flow) used in the program. The user is responsible for the design assumptions and data (especially the design air mass flow) used in the program. The user is responsible for the design assumptions and data (especially the design air mass flow) used in the program.



Save and Save as

Each new calculation can be saved using the "Save" or "Save As" option. The "Save As" function creates new calculations. While "Save" overwrites the current calculation. Pressing the "Calculate" button also overwrites the last calculation.

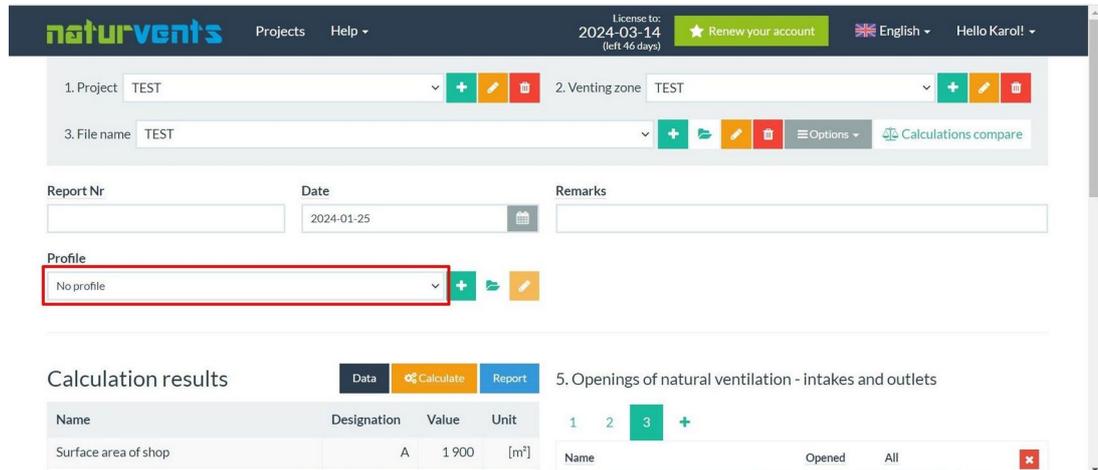
Delete calculations

Calculations that are no longer needed can be deleted using the "Delete calculation" button.

Temperature profile

For calculations, you can use the available temperature profiles. Currently, profiles are available for the boiler plant of a power block and a glass factory.

NOTES: These are temperature profiles measured at specific facilities. The object for which you are doing your calculations is probably different. That's why we suggest not using any profile at the beginning of your calculations.

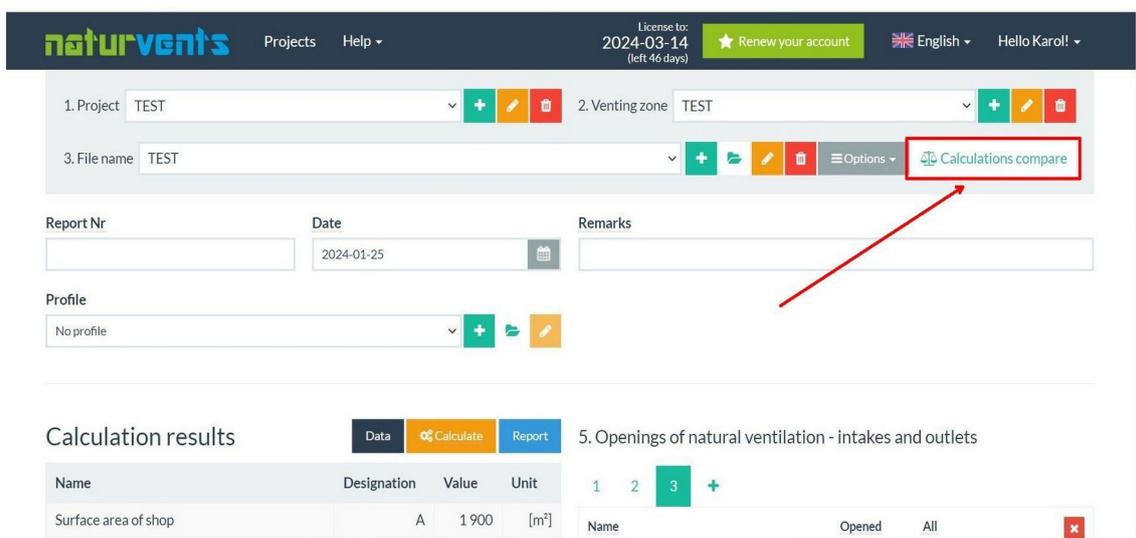


The screenshot shows the naturvents software interface. At the top, there is a navigation bar with the logo, 'Projects', 'Help', a license expiration date of '2024-03-14 (left 46 days)', a 'Renew your account' button, language settings ('English'), and a user greeting ('Hello Karol!'). Below the navigation bar, there are three input fields: '1. Project' (TEST), '2. Venting zone' (TEST), and '3. File name' (TEST). Each field has a dropdown arrow and a set of action icons (add, edit, delete). To the right of the 'File name' field is a 'Calculations compare' button. Below these fields are three input fields: 'Report Nr', 'Date' (2024-01-25), and 'Remarks'. Underneath is a 'Profile' dropdown menu with 'No profile' selected, which is highlighted with a red rectangular box. At the bottom, there is a 'Calculation results' section with tabs for 'Data', 'Calculate', and 'Report'. A table shows the results for '5. Openings of natural ventilation - intakes and outlets' with columns for Name, Designation, Value, and Unit. The table contains one row: 'Surface area of shop' with Designation 'A', Value '1 900', and Unit '[m²]'. There are also some additional controls and a 'Calculations compare' button in this section.

It is, of course, possible to use any of the ready-made profiles or to create a profile yourself, especially if there is an object available that is identical or similar in its shape and distribution of heat sources to the designed object. In such a situation, we recommend consulting with the owner of the **nv-calc** program

Calculations compare

For convenient and easy comparisons between different calculations in the same venting zones, click the "Calculations compare" button. This function allows you easily compare 6 calculations. To compare you can also add openings of natural ventilation or devices of mechanical and hybrid ventilation.



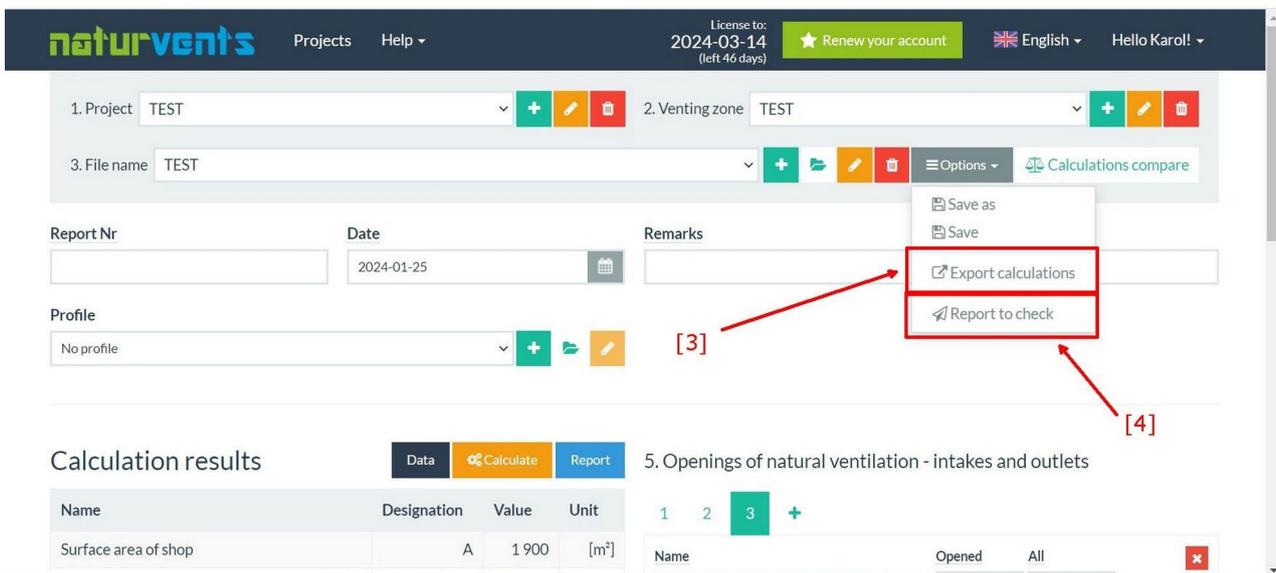
This screenshot is similar to the one above, showing the naturvents software interface. The 'Calculations compare' button is highlighted with a red rectangular box, and a red arrow points from this box towards the bottom right of the interface. The rest of the interface, including the navigation bar, input fields, and calculation results table, is identical to the previous screenshot.

Import calculations and Export calculations [3]

This function allows you to save a file of currently open calculations on the computer (export calculations) and to reload calculations from the computer (import calculations). Imported calculations are saved in the currently open ventilation area. It is possible to import calculations from the current and previous versions of the program. Exported files are compatible only with the current version of the program.

If your own profile was used for the calculation of the exported file (saved on your own computer), it is encoded in this file, but it will not load automatically. In this case, click on the "Load Profile" button and select the same saved calculation file.

It is good practice to export the finished final design results and archive them on your own computer, as they may be deleted from the system after a year (with prior email notice). In that case, the eventual need to return to that project years later will come down to loading all the data without having to re-enter it into the system.



The screenshot shows the naturvents software interface. At the top, there is a navigation bar with the logo, 'Projects', 'Help', a license expiration date of '2024-03-14 (left 46 days)', a 'Renew your account' button, language settings ('English'), and a user greeting ('Hello Karol!'). Below the navigation bar, there are input fields for '1. Project TEST', '2. Venting zone TEST', and '3. File name TEST'. A dropdown menu is open, showing options: 'Save as', 'Save', 'Export calculations', and 'Report to check'. A red box highlights the 'Export calculations' and 'Report to check' options, with a red arrow pointing to the 'Export calculations' option labeled '[3]' and another red arrow pointing to the 'Report to check' option labeled '[4]'. Below the dropdown menu, there are fields for 'Report Nr', 'Date' (2024-01-25), and 'Remarks'. A 'Profile' dropdown is set to 'No profile'. At the bottom, there is a 'Calculation results' section with tabs for 'Data', 'Calculate', and 'Report'. A table shows calculation results for 'Surface area of shop' with a value of 1900 [m²]. To the right of the table, there is a section titled '5. Openings of natural ventilation - intakes and outlets' with a table that has columns for 'Name', 'Opened', and 'All'.

Submit for verification [4].

Using this function automatically sends the current calculations to the administrator. The correctness of the calculation will be checked by the administrator and he will contact the User submitting the calculation.