

FAQ – How can I change the sandwich panel properties or add new sandwich panels to SandStat?

SandStat contains a module with which you can change existing sandwich panel characteristics or integrate a new element. This module is not included in the basic version and should be purchased separately.

General procedure



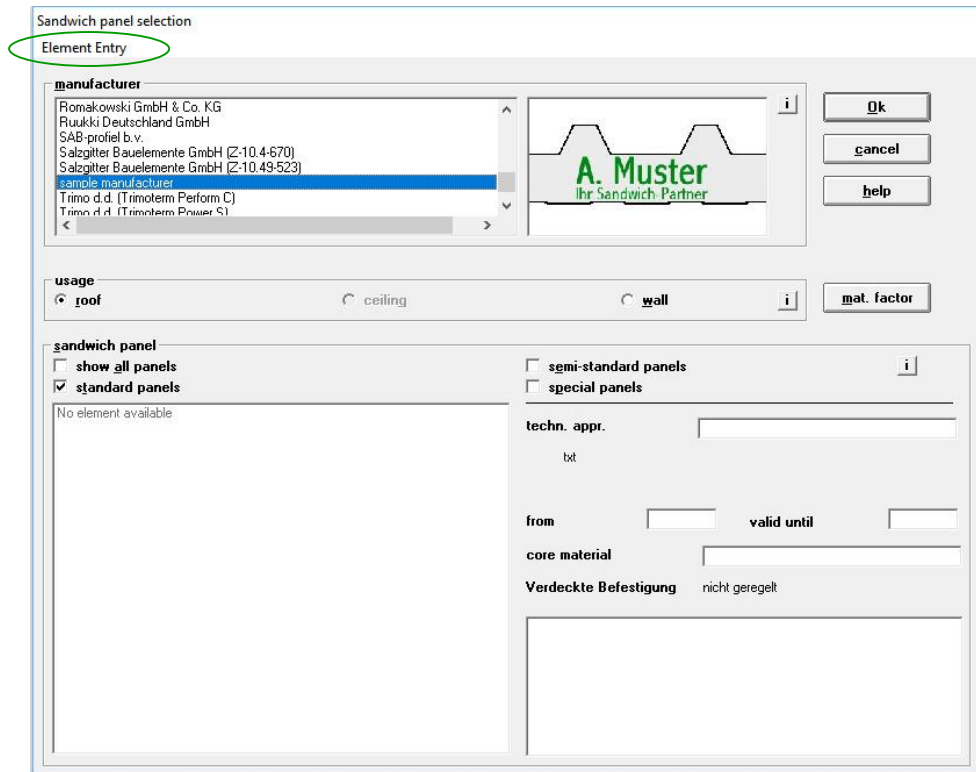
Definition of design procedure (depending on license)



Selection of the sandwich panel to be calculated

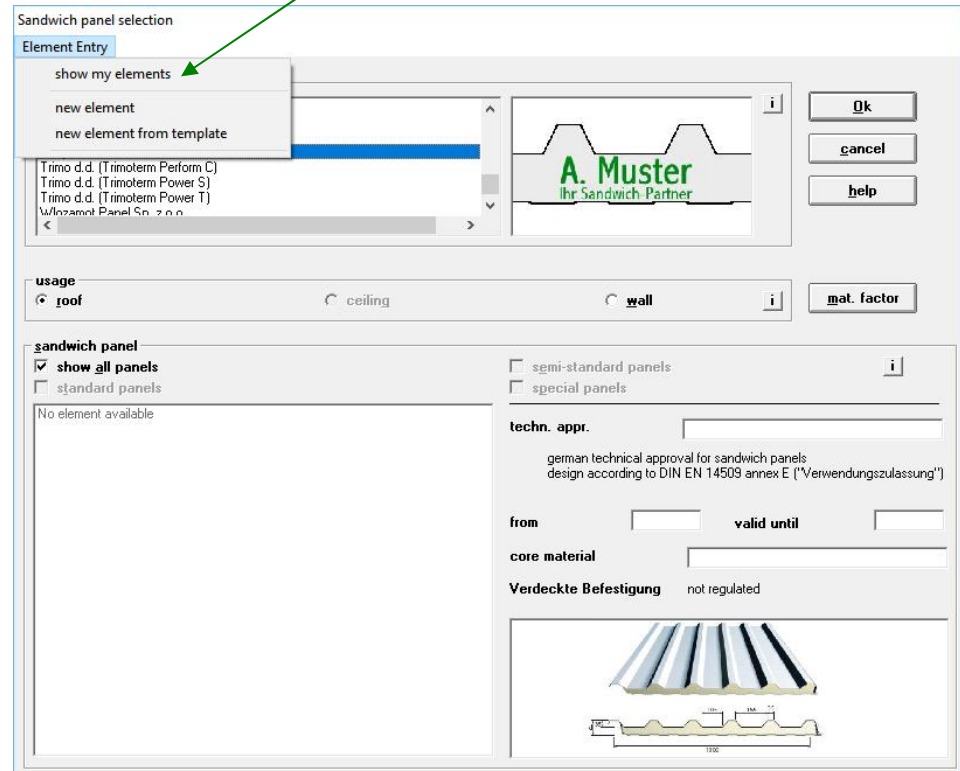
Explanatory notes

In the dialog "Sandwich panel selection" the menu item "Element Entry" is visible, if the module is purchased and activated:



1) Selecting a panel that has already been entered

The user-defined panels are stored in a separate database. The change between the databases takes place via the menu item "Show my elements".

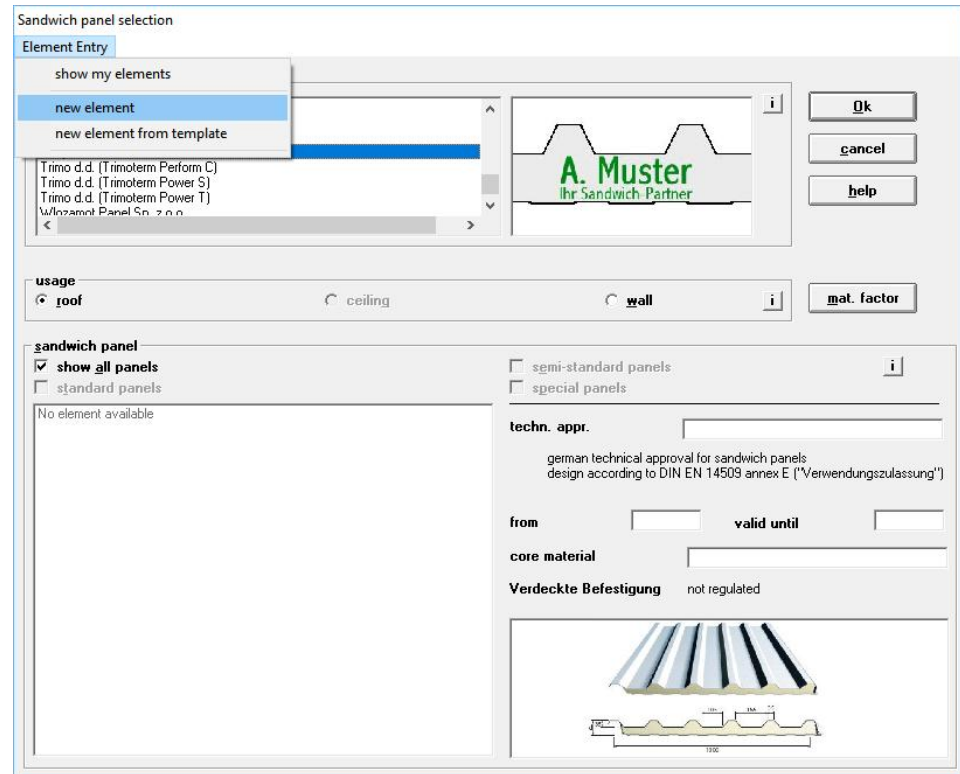


All panels that you have entered manually in the database are displayed.

To switch to the elements that have already been entered into the database by our site, deactivate the "Show my elements" option.

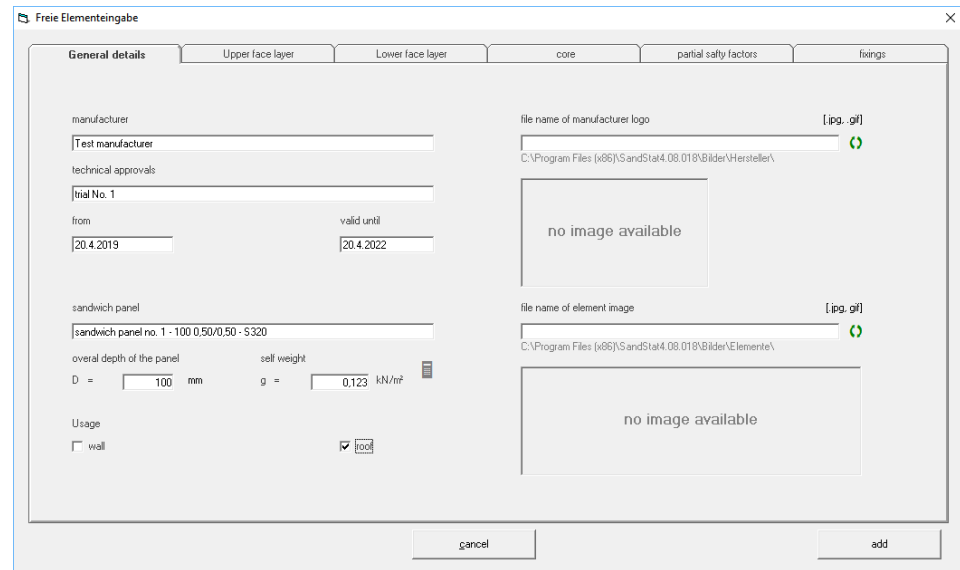
2) Creation of a new panel


Select the menu item „new element“ at „Element entry“:



In the following dialogue, the characteristic values of the new panel can be defined.

Index „General details“




| | | |
|--|---|--|
| • | manufacturer | designation of manufacturer |
| • | technical approval | Designation of the approval or the basis of the characteristic values (e.g. CE mark, Certification Document etc.) |
| • | from | validity from |
| • | valid until | validity until |
| • | sandwich panel | designation of sandwich panel |
| • | D | overall depth of the panel [mm] |
| • | g | self weight [kN/m ²] |
| • |  | Calculator symbol: automatic determination of the self weight, if the bulk densities of the face layers and the core as well as the face layer thicknesses have been defined on the other index cards. |
| • | wall / roof | Place of use: wall and/or roof. In the near future this module will also be extended with the application site ceiling and interior wall. |
| In the right area of the mask, manufacturer logos and element sketches can be defined. The corresponding files must be contained in the displayed directory. | | |

Index „Upper face layer“

The screenshot shows the 'Freie Elementeingabe' window with the 'Upper face layer' tab selected. It contains the following sections:

- Geometry:**
 - nominal thickness of face: $tN1 =$ [] mm
 - Zinkschichtdicke: $zinc1 =$ [] mm
 - cross-sectional area: $A1 =$ [] cm^2/m
 - moment of inertia: $I1 =$ [] cm^4/m
 - distance between centroids of: $d11 =$ [] $d12 =$ [] mm
- Wrinkling Stresses:**
 - in Feld: $w1f =$ [] N/mm^2
 - über der Stütze: $w1s =$ [] N/mm^2
 - in span T elevated: $w1s+ =$ [] N/mm^2
 - above support T elevated: $w1s+ =$ [] N/mm^2
 - reduction from [] fasteners / m with $k = ([] - n) / []$
- Material:**
 - name: []
 - modulus of elasticity: $E =$ [] N/mm^2
 - coefficient of thermal: $\alpha T =$ [] $1/^\circ$
 - yield strength: $R =$ [] N/mm^2
 - bulk density: $\rho_{vol} =$ [] kg/m^3
 - creeps

| Geometry | |
|---|--|
| • $tN1$ | Nominal sheet thickness (thickness including zinc coating) in mm |
| • $zinc1$ | Zinc layer thickness in mm (usually 0.04 mm) |
| •  | Tool for determining the cross-section values (nominal sheet thickness and zinc layer thickness must be defined beforehand; for explanation please refer to the following pages) |
| • $A1$ | Cross-sectional area (without zinc layer = netto cross-sectional area) in cm^2/m |

- I1 Moment of inertia (without zinc layer = netto moment of inertia) in cm^4/m

For lightly profiled faces:

According to EN 14509, the inherent rigidity of the surface course may be neglected for lightly profiled faces (both in the evaluation and in the design). In this case, the value for the moment of inertia is **$I = 0 \text{ cm}^4/\text{m}$** to be entered.

Excerpt from EN 14509:

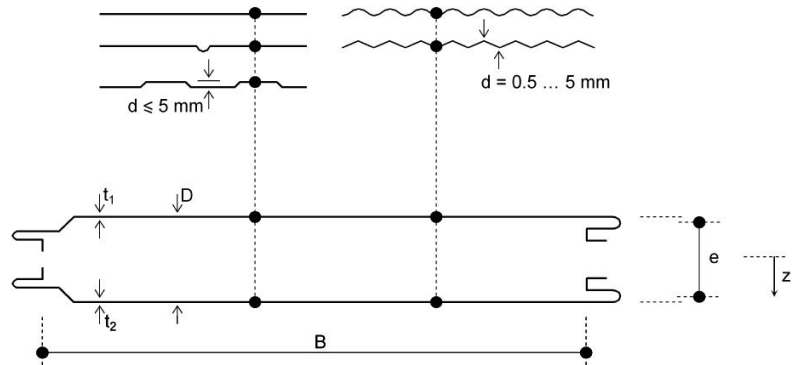


Figure E.1 a) – Panel cross-section, flat, lightly profiled or microprofile face

For profiled faces:

Excerpt from EN 14509:

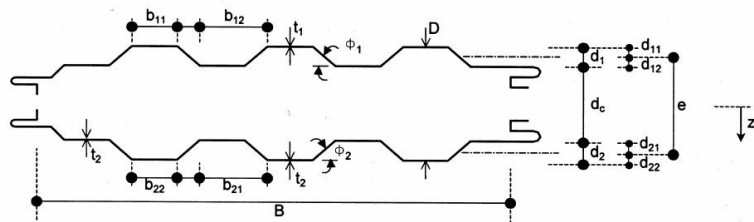



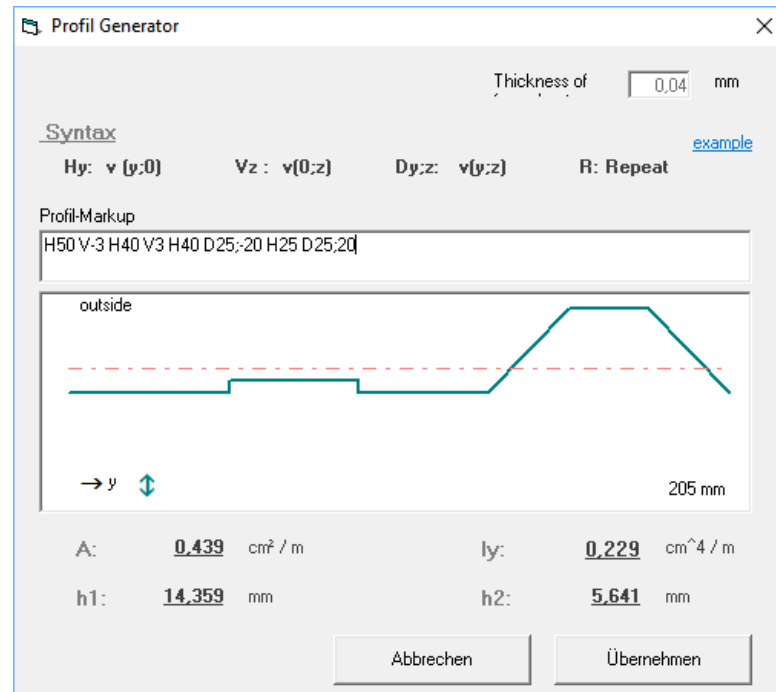
Figure E.1 b) – Panel cross-section, profiled face and material properties of a sandwich panel

- d11 distance between centroid of outer face layer to outer surface of face layer in mm
- d12 distance between centroid of outer face layer to inner surface of face layer in mm

| Wrinkling stresses -> charakteristic value in [N/mm ²] | |
|---|--|
| • S _{w1f} | in span |
| • S _{w1s} | at support |
| • S _{w1f+} | in span with a temperature of face layer above 20°C |
| • S _{w1s+} | at support with a temperatur of face layer above 20°C |
| reduction | Reduction of wrinkling stresses as a function of the number of fasteners (usually with flat or lightly profiled faces) |
| Material | |
| • name | designation of material |
| • E | E-modulus of outer face layer (steel: 210 000 N/mm ²) |
| • a _T | coefficient of thermal expansion of outer face layer (steel: 0,000012 1/°) |
| • f _t | charakteristic yield strength of outer face layer in N/mm ² |
| • rho _M | bulk density of outer face layer (steel: 8000 kg/m ³) |
| •  | The cross-sectional values are adapted to changes in the nominal sheet thickness. |
| • creeps | The outer surface layer consists of a material which can creep (e.g. GRP surface layers). Further information is required (modulus of elasticity long-term, yield strength long-term etc.). |

Tool for determining the cross-section values

The cross-section values of the surface layer can be calculated in the following tool:



Starting from the left, the face layer "expired" and the alignment (top/bottom; right; diagonal) as well as the distance are defined.

Using the example above:

| | |
|---------|---------------------------------------|
| H50 | Horizontally right 50 mm |
| V-3 | Vertically top 3 mm |
| H40 | Horizontally right 40 mm |
| V3 | Vertically down 3 mm |
| H50 | Horizontally right 50 mm |
| D25;-20 | Diagonally 25 mm right and 20 mm top |
| H25 | Horizontally right 25 mm |
| D25;20 | Diagonally 25 mm right and 20 mm down |

The letter "R" repeats the entered geometry to a width of 1000 mm.

Index „Lower face layer“

è Analogous to index „Upper face layer“

Index „core“



| Core material | |
|------------------------------|--|
| • name | designation of core material |
| • Material | Selection field for the classification of the core material. Possible selections are: EPS, MW, PIR, PUR and others ("sonstige"). |
| Charakteristic values | |
| • G _c | shear modulus of core material [N/mm ²] |
| • G _{c,T+} | shear modulus of core material at elevated temperature [N/mm ²] |
| • rhoC | bulk density of core [kg/m ³] |
| • f _{Cv} | shear strength of core material [N/mm ²] |
| • f _{Cv,L} | shear strength of core material at long term loads (self weight and/or snow) [N/mm ²] |
| • f _{Cv,T+} | shear strength of core material at elevated temperature [N/mm ²] |
| • f _{Cc} | compression strength of core material [N/mm ²] |
| • f _{Ct} | tensile strength of core material [N/mm ²] |
| • phi2k | creep coefficient of core material for snow loads (2.000 h); if necessary according to EN 14509, E.7.6 |
| • phi100k | creep coefficient of core material for self weight (100.000 h); if necessary according to EN 14509, E.7.6 |
| • k | parameter of support reaction capacity k (if necessary according to nach EN 14509, E.4.3.2) |

Index „partial safety factors“

The screenshot shows the 'Freie Elementeingabe' window with the 'partial safety factors' tab selected. It contains three main sections:

- Material safety factors:** A table with columns for 'ULS' and 'SLS'. Rows include:
 - yielding of a metal face (upper/lower face layer): ULS 1.1, SLS 1
 - wrinkling of a metal face in the span (upper/lower face layer): ULS 1.25, SLS 1.1
 - wrinkling of a metal face at an intermediate support (upper/lower face layer): ULS 1.25, SLS 1.1
 - shear of the core: ULS 1.5, SLS 1.1
 - shear failure of a profiled face: ULS 1.1, SLS 1
 - crushing of the core: ULS 1.4, SLS 1.1
 - support reaction capacity of a profiled face: ULS 1.1, SLS 1
- Load factors:** A dropdown menu set to 'EN 14509, Tab. E.8'. A table with columns for 'ULS' and 'SLS'. Rows include:
 - Permanent actions: ULS 1.35, SLS 1
 - Variable actions: ULS 1.5, SLS 1
 - Temperature actions: ULS 1.5, SLS 1
 - Creep effects: ULS 1, SLS 1
- Combination coefficients:** A dropdown menu set to 'EN 14509, Tab. E.6'. A table with columns for 'Snow', 'Wind', 'Temperature', and 'Live load'. Rows include:
 - Ψ_0 : Snow 0.6, Wind 0.6, Temperature 0.6, Live load 1^a, 0
 - Ψ_1 : Snow 0.75, 1^b; Wind 0.75, 1^b; Temperature 1; Live load 0
 - Ψ_2 : Snow 0, Wind 0, Temperature 0, 0^a, 0

The partial safety factors can be defined here:

è Material safety factors

The material safety factors according to EN 14509, Tab. E.9 are given as default settings. If necessary, these factors must be adjusted according to the specifications or test results and the national regulations.

è Load factors

At this point the load factors can be predefined. This is a default setting which can still be changed in the course of the design of the element in the "Overall control" mask.

è Combination coefficients

At this point the combination coefficients can be predefined. This is a default setting which can still be changed in the course of the design of the element in the "Overall control" mask.

Index „fixings“

The sandwich panels entered in this module all have the possibility to be fixed directly to the substructure. The corresponding boundary conditions (yield strength, covering layer thickness, sandwich thickness etc.) are taken into account in the mask for selecting the connection with the substructure.

In the Index "fixings" you can now define hidden fixings - here using an example:

Freie Elementeingabe

General details | Upper face layer | Lower face layer | core | partial safety factors | **fixings**

hidden fastening: plat 100x50x3 - S>=0 + x

variation

plat 100x50x3 | S>=16 | LSP | interpolation | el: 500 mm | delta: 0 mm

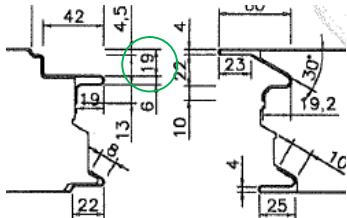
washer Ø: 16 mm | fastener Ø: 0 mm | head of fastener Ø: 12 mm

characteristic

| | | | | |
|----|------------------------|------------|---------------|-----|
| 1. | number of fasteners: 2 | eR: 40 mm | NRVI: 2.5 kN | + x |
| 2. | number of fasteners: 2 | eR: 500 mm | NRVI: 3.80 kN | + x |

cancel | add

A new type of hidden fixings is created by selecting "+" at the top. This is followed by the definition of this type:

| | |
|-----------------------------|---|
| • variation | designation of type of hidden fixing |
| • LSP | with load spreader plate? |
| • Interpolation | In the case of a cantilever arm with a length between the end support and the intermediate support, NRvk may be interpolated. Please refer to the "eR" explanations in the table below. |
| • el | At what distance is the intermediate support [mm] |
| • delta | Reduction of the sandwich thickness due to the hidden fixing (usually approx. 20 mm). Example:  |
| • washer-diameter | Which wahser diameter is possible? Here as an example: from 16 to 100 mm Note: 0 and 100 mm are only to be regarded as placeholders for fictitious sizes - there is therefore no restriction for the range 0 to 100 mm. |
| • fastener-diameter | Which fastener diameter is possible? Here as an example: from 0 to 7 mm Note: 0 and 100 mm are only to be regarded as placeholders for fictitious sizes - there is therefore no restriction for the range 0 to 100 mm. |
| • diameter head of fastener | Which diameter of head of fastener is possible? Here as an example: only 12 mm Note: 0 and 100 mm are only to be regarded as placeholders for fictitious sizes - there is therefore no restriction for the range 0 to 100 mm. |

| characteristic | | |
|----------------|---------------------|--|
| • | number of fasteners | number of fasteners |
| • | eR | <p>edge distance in [mm]</p> <p>A distinction must be made here between an end support and an intermediate support ($eR \geq eI$).</p> <p>Using the example:</p> <ul style="list-style-type: none"> - eR = 40 mm -> this is an end support (with a distance of 40 mm) - eR = 500 mm -> this is the intermediate support <p>If the "Interpolation" option is activated and we have a cantilever arm, the resistance value of the concealed attachment between eR and eI is interpolated.</p> |
| • | NRVk | Characteristic value of the hidden fixing in [kN]. |

Referenc:

All data and boundary conditions must correspond to those of the tests (e.g. according to FprEN 14509-2). The national regulations must be observed if necessary. For Germany, for example, these values are to be regulated within the tests of an German Technical Approval/German Technical Type Approval.

3) Finish creating a new panel

To complete the entry, select the "Add" button.

The screenshot shows the 'Element Entry' dialog box for a sandwich panel. The title bar reads 'Element Entry - sandwich panel no. 1 - 100 0,50/0,50 - S320'. The dialog has several tabs: 'General details', 'Upper face layer', 'Lower face layer', 'core', 'partial safety factors', and 'fixings'. The 'General details' tab is active. It contains the following fields and controls:

- manufacturer:** A text input field containing 'sample manufacturer'.
- technical approvals:** A text input field containing 'test no 1'.
- from:** A date input field containing '01.01.2111'.
- valid until:** A date input field containing '01.01.2111'.
- sandwich panel:** A text input field containing 'sandwich panel no. 1 - 100 0,50/0,50 - S320'.
- overall depth of the panel:** A text input field containing '100' followed by 'mm'.
- self weight:** A text input field containing '0,123' followed by 'kN/m²'.
- Usage:** Two checkboxes: 'wall' (checked) and 'roof' (unchecked).
- file name of manufacturer logo:** A text input field with a file browser icon, containing the path 'C:\Program Files (x86)\SandStat4.00.019\Bilder\Hersteller\'.
- file name of element image:** A text input field with a file browser icon, containing the path 'C:\Program Files (x86)\SandStat4.00.019\Bilder\Elemente\'.

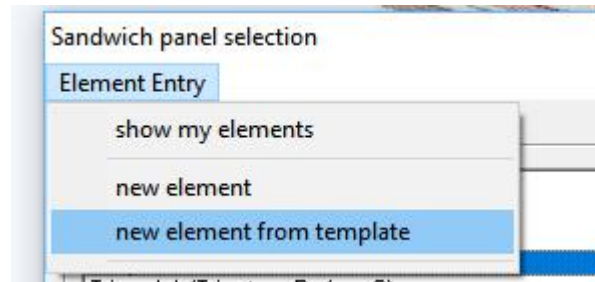
At the bottom of the dialog, there are four buttons: 'cancel', 'delete', 'edit', and 'add'.

The mask is closed by selecting the "Cancel" button.

Please note that the newly entered panel may not yet be listed in the sandwich panel selection dialogue. Please select the option "Show my elements" first.

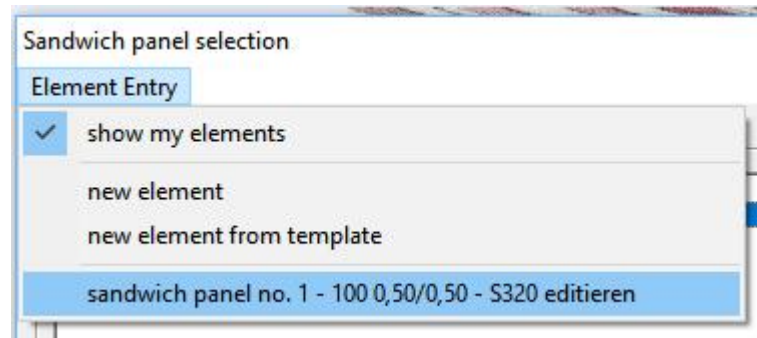
4) Creating a new sandwich panel from a template

It is also possible to modify an existing element. To do this, please mark the corresponding element in the element selection and select the option "New element from template".



5) Changes to an entered sandwich panel

You can also change the sandwich panels that you have entered. Please select the corresponding panel in the element selection and select the option "Element name - editieren".



Sandwich panels that are already contained in the SandStat database cannot be edited.