Wind and Snow Loads PLUS

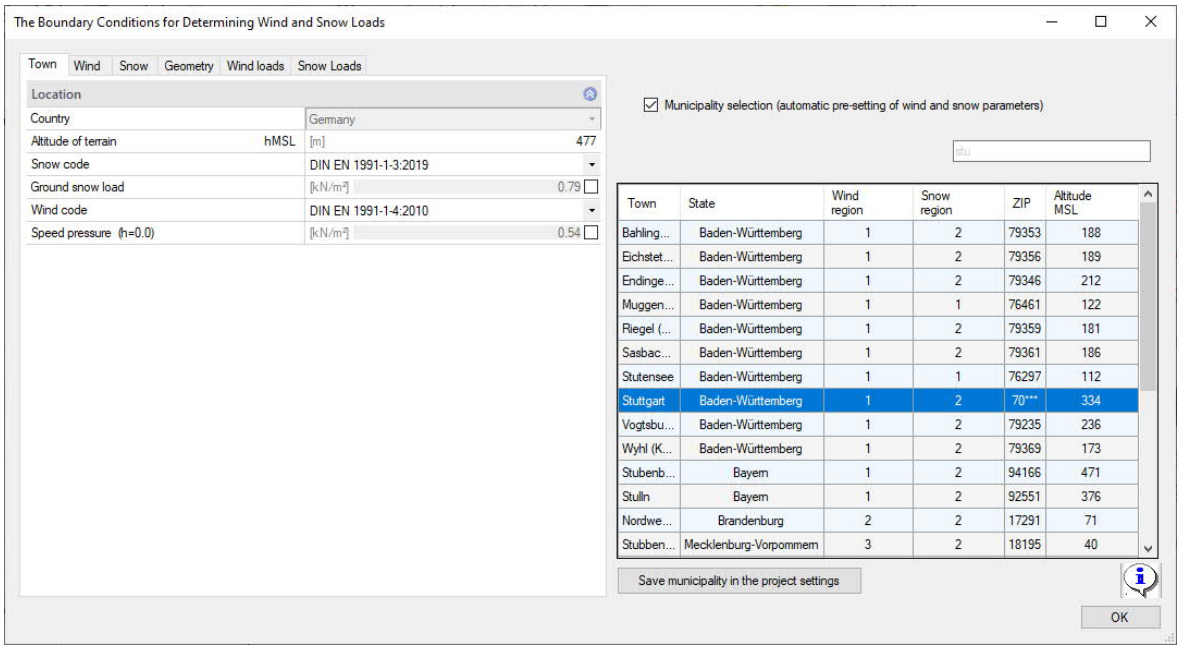
This documentation describes the wind and snow load dialog in our programs D7+, Dach+, FWH+, FWS+ and S7+.

Contents

Wind and snow loads dialog

In this dialog, the wind dynamic pressures or speed pressures and snow loads can be determined for the calculation.

Via the individual tabs (Town, Wind, Snow ...) you can call up the respective input sections.



For germany/austria/italy: The values can be set simply by selecting a municipality/town - wind and snow regions as well as the height above sea level are assigned to the individual municipalities.

If there are no suitable table values for the building, deactivate the municipality selection and enter the values yourself.

Note: *Current tables for germany with the assignment of communities to the wind and snow load regions can be found on the website of the "German Competence Center in Civil Engineering DIBT" (www.dibt.de, News section "Aktuelles").*

The lists of the individual countries are always legally binding, not the DIBt lists!

Therefore, if in doubt, always check the lists of countries for local peculiarities.

Standards

- EN 1991-1-3:2010-12, EN 1991-1-4:2010-12
- DIN EN 1991-1-3/NA:2010/2019, DIN EN 1991-1-4/NA:2010-12
- ÖNORM B 1991-1-3:2013/2018/2022, ÖNORM B 1991-1-4:2013/2019
- NA to BS EN 1991-1-3/A1:2015-12, NA to BS EN 1991-1-4/A1:2011-01
- UNI EN 1991-1-3/NTC:2018, UNI EN 1991-1-4/NTC:2018
- PN EN 1991-1-3:2010, PN EN 1991-1-4:2010

Municipality / Town

For germany/austria/italy: If you activate the option "Municipality selection", you can click on the federal state and the municipality from a selection list. The corresponding wind and snow zones as well as the height above sea level are then already defined/preassigned. If required, these values can be changed under the individual tabs.

Tip: *You can save the "Municipality selection" for this project as a default for new items ("Save municipality in the project settings" button). This is of course also possible in the FRILO Control Center under ▸ Projects ▸ Properties.*

Without “Municipality selection” you can enter/change the corresponding values yourself.

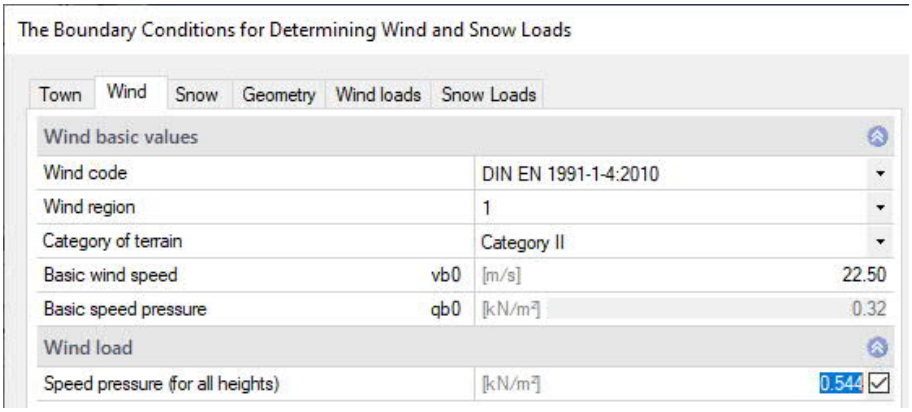
Altitude of terrain hMSL

Elevation above sea level (Mean Sea Level).

Wind

Wind region:

If the wind region was not defined via the municipality selection, it can be selected here.



Terrain category:

Indicates the terrain category (depending on the standard) - see also EN 1991-1-4, Tab. 4.1.

Additional mixed categories may be specified in national annexes:

- Category I:
  Lakes or areas with low vegetation and no obstacles.
- Mixed Category Coast:
  Sea, Coastal areas exposed to the open sea.
- Category II:
  Areas with low vegetation such as grass and individual obstacles (trees, buildings) at a distance of at least 20 times the height of the obstacle.
- Category III:
  Areas with uniform vegetation or building areas, or with individual objects spaced less than 20 times the obstacle height (e.g., villages, suburban building areas, wooded areas).
- Category IV:
  Areas in which at least 15% of the surface area is built up with buildings with an average height of more than 15 m.

Basic wind speed	The entry is only possible if the municipality selection is deactivated (see above).
Basic speed pressure	The display value qb0 results from the basic wind speed.

Slope H/Lu	Indicates the H/Lu value in the direction of flow. On isolated mountains, mountain ranges or rocks and embankments, different wind speeds result from the slope of the terrain. Here H denotes the height of the rise and Lu the length of the rise, see also EN 1991-1-4, A.3 (1).
Orography coefficient	Indicates the orography coefficient according to EN 1991-1-4, Figure A.2 for cliffs or changes in terrain or A.3 for crests and crests of hills, related to the effective length Le of the windward slope.
Topography coefficient	Display of the topography coefficient co according to EN 1991-1-4, 4.3.3. Where the topography (e.g. mountains, cliffs, etc.) increases the wind speed by more than 5%, the increase because of the topography coefficient co must be taken into account.
Speed pressure	The speed pressure at a height of 0.0 m is preassigned by the program according to the standard.

Snow

Climate region — The climate region is independent of the municipality selection. The regions displayed for selection are country/standard specific.

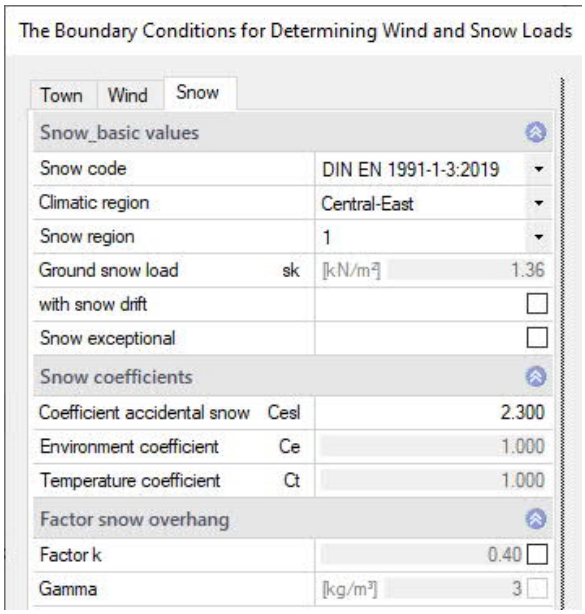


Fig.: Dialog in the Roof+ program

Snow region — If the snow region was not defined via the community selection, you can select it yourself here.

Ground snow load sk — Display of ground snow load sk.

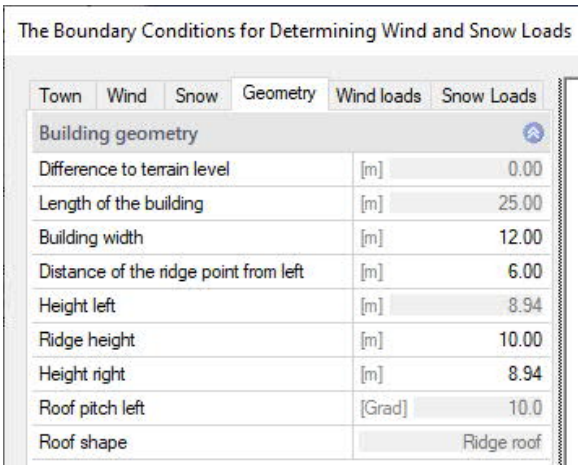
Environment coefficient — Specifies the coefficient that expresses the decrease or increase in snow load on the roof of an unheated building as a fraction of the characteristic snow load on the ground.
Windy = 0.8
Unobstructed areas that are flat on all sides or areas that are only slightly shielded by the terrain, as well as tall buildings or trees.
Common =1.0
Areas for which, due to the terrain, no significant snow removal by wind can take place, as well as other buildings or rooms.
Shielded =1.2
Areas where the structures are significantly lower than the surrounding terrain, or structures surrounded by tall trees or other tall buildings. See also EN 1991-1-3, 5.2 (7)

Temperature coefficient — This coefficient indicates the reduction in snow load on the roof, which occurs as a result of the heat flow through the roof and the resulting snowmelt.

Ground snow load — The ground snow load (regular snow load)can be adjusted manually here. In the case of a previously defined municipality, the data of the set municipality is discarded (municipality selection is deactivated).

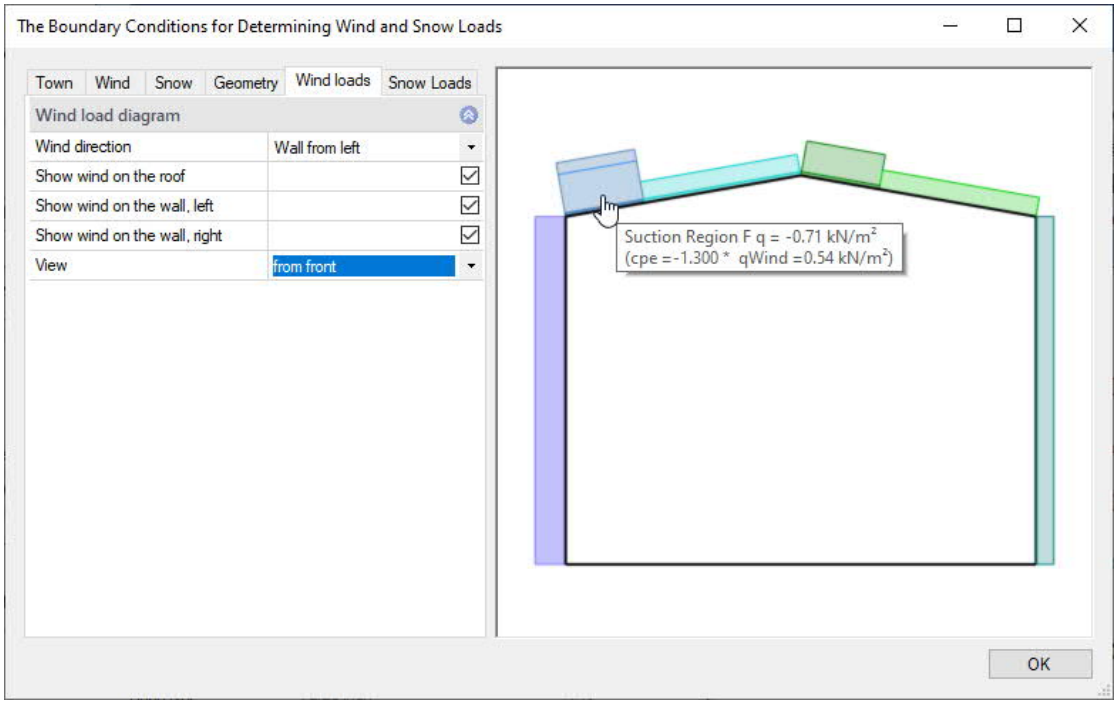
Geometry

Display and graphical representation of the geometry data.



Display wind loads / snowloads

Wind and snow load values can be viewed by moving the mouse pointer over each graphic area.



The respective areas are displayed in the graphic representation via various options/selection lists.

Standard-specific notes

In the national standards/annexes, values/snow load regions partially deviating from EN 1991-1 are applied.

EN 1991-1

Snow loads as per EN 1991-1-3:2010-12

The regular snow load is determined in dependence of the altitude in the respective snow zone.

In the associated software applications, the roof snow load s_i can be calculated with the help of the regular snow load (Ground snow load) s_k as follows:

Roof snow load $s_i = \mu_i \cdot s_k$

Snow load on the eaves $S_e = k \cdot \frac{s_i^2}{\gamma}$

Wind loads as per EN 1991-1-4:2010-12

The velocity pressure is calculated with consideration to the topographical border conditions.

The velocity pressure q is determined for the maximum building height z in accordance with EN 1991-1-4, 4.

In the associated software applications, the wind load w_e can be calculated with the help of the velocity pressure q as follows:

Wind load $w_e = c_{pe} \cdot q$

with the aerodynamic coefficients c_{pe} as per EN 1991-1-4, 7.2

DIN EN 1991-1/NA

Snow loads as per DIN EN 1991-1-3/NA:2010-12

DIN EN uses its own division of snow load zones together with its own formula for the calculation of the regular (ground) snow load sk.

Roof snow load $s_i = \mu_i \cdot s_k$, Attention! DIN EN uses partly a different μ_i!

Snow load on the eaves $S_e = k \cdot \frac{s_i^2}{\gamma}$ with k=0.4 or k=0 if snow guards are fitted

Wind loads as per DIN EN 1991-1-4/NA:2010-12

The velocity pressure is determined in accordance with DIN EN 1991-1-4/NA, 4.2 or Annex NA.A and depends on the topographic border conditions.

The directional factor and the season coefficient are included with a value of 1.0 as defined by DIN EN 1991-1-4/NA, 4.2.

The velocity pressure q is determined for the maximum building height z.

In the associated software applications, the wind load w_e can be calculated with the help of the velocity pressure q as follows:

Wind load $w_e = c_{pe} \cdot q$

with the aerodynamic coefficients c_{pe} as per DIN EN 1991-1-4/NA, 7

ÖNORM B 1991-1

Snow loads as per ÖNORM B 1991-1-3

DIN EN uses its own division of snow load zones together with its own formula for the calculation of the regular (ground) snow load sk.

In the associated software applications, the roof snow load s_i can be calculated with the help of the regular snow load (Ground snow load) s_k as follows:

Roof snow load $s_i = \mu_i \cdot s_k$, Attention! ÖNORM uses it own μ_i!

Snow load on the eaves $S_e = 0{,}5 \cdot s_i$

Wind loads as per ÖNORM B 1991-1-4

The velocity pressure is determined in accordance with ÖNORM B 191-1-4, 4.2 and depends on the topographic border conditions.

The directional factor and the season coefficient are included with a value of 1.0 as defined by ÖNORM B 1991-1-4, 4.2.2.

The velocity pressure q is determined for the maximum building height z in accordance with ÖNORM B 1991-1-4, 4.2.

In the associated software applications, the wind load w_e can be calculated with the help of the velocity pressure q as follows:

Wind load $w_e = c_{pe} \cdot q$

with the aerodynamic coefficients c_{pe} as per ÖNORM B 1991-1-4, 4.6.

NA to BS EN 1991-1

Snow loads as per NA to BS EN 1991-1-3

NA to BS EN 1991-1-3 uses its own division of snow load zones (Figure NA.1) together with its own formula for the calculation of the soil snow load sk.

In the associated software applications, the roof snow load s_i can be calculated with the help of the regular snow load s_k as follows:

Roof snow load $s_i = \mu_i \cdot s_k$, Attention! NA to BS EN uses its own μ_i!

Snow load on the eaves $S_e = \frac{s_i^2}{\gamma}$

Wind loads as per NA to BS EN 1991-1-4

The velocity pressure is determined in accordance with NA to BS EN 1991-1-4, NA 2.17 and depends on the topographic border conditions.

The United Kingdom uses its own wind zones and the coefficients depend on the distance to the sea shore or the border of the town or village.

The velocity pressure q is determined for the maximum building height z in accordance with NA to BS EN 1991-1-4, NA.2.17.

In the associated software applications, the wind load w_e can be calculated with the help of the velocity pressure q as follows:

Wind load $w_e = c_{pe} \cdot q$

with the aerodynamic coefficients c_{pe} as per NA to BS EN 1991-1-4, NA.2.29.