

Weight management

In NextGen there are multiple options to manage the weight of the equipment accurately.

Online version: <https://nextgen.sant-ambrogio.it/KB451147>

Latest update: 15 feb 2024

Managing the weight of the equipment is an important issue throughout the life of a project. NextGen takes care of automatically calculating the weight of each component, based on the volume occupied and the material used. Furthermore, the weight of the liquid in both test and design conditions is automatically calculated.

However, the software cannot know additional weights of components not modeled as pressure parts, such as:

- Internal lining
- Plates and filter material
- Motors and other components weighing on the structure

In order to manage these weights and take them into account when calculating the supports, there are various options. In this article we illustrate them, indicating when it is more appropriate to use one or the other.

Changing the weight of the component

The first point on which you can act is the "Weights" category in the component editing window:

Category	Parameter	Value	Unit	Lock	Help
Essentials	Net weight	2869	kg	Yes	No
General	Liquid weight	7069	kg	Yes	No
Design conditions	Additional dead (fixed) weight - absolute	0	kg	No	Yes
Geometry	Additional dead (fixed) weight - percentage	0	%	No	Yes
Liquid level	Consider additional dead weight in erection	<input checked="" type="checkbox"/>			
Ligaments	Consider additional dead weight in test	<input checked="" type="checkbox"/>			
External loads	Additional live (removable) weight - absolute	0	kg	No	Yes
Weight	Additional live (removable) weight - percentage	0	%	No	Yes
Reporting	Consider additional live weight in erection	<input type="checkbox"/>			
Reporting	Consider additional live weight in test	<input type="checkbox"/>			
	Point of application of the center of gravity of the component	Effective component location		No	Yes
	Internal volume	12.37002	m ³	Yes	No

All operations performed in this screen apply to the component being modified and are located in its center of gravity. The center of gravity of the component can be controlled via the "Point of application of the center of gravity of the component" option.

Weight management using this option is preferable when there is a uniform distribution of the additional weight on the component in question and this weight does not significantly impact the center of gravity of the component itself (and therefore of the entire equipment).

The net weight of the component is automatically calculated based on volume and material, as well as the

weight of the liquid. As usual, you can unlock the padlock icon and override these values.

There are then different inputs for the additional weights:

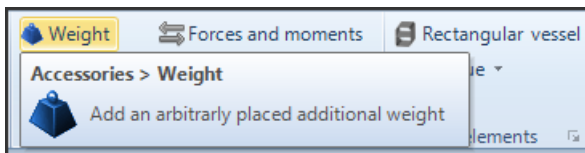
- Dead weight is a weight that is generally part of the component under all conditions, such as the weight of a part welded to the component. It can be defined in absolute value or percentage.
- Live weight is a removable weight, which is typically added to the appliance only under certain conditions or after testing. It can be defined in absolute value or percentage.

In all cases the additional weights are used in the "Load Combinations" set with the "Operating" type. By default, "Dead" weights are also considered for "Erection" and "Test" load combinations; on the contrary, "Live" weights are excluded from such combinations. However, it is the user's freedom to set the presence or absence of these additional weights in the various load conditions.

Note: For flanges, it is possible and recommended to enable bolt and nut weight estimation calculation

Use of the "Additional weight" component

In the ribbon bar there is the icon for inserting the "Additional weight" component:



The use of the "Additional weight" component is preferable in those cases where the mass being added is localized and has an impact on the positioning of the center of gravity of the structure.

The "Additional weight" is a secondary component, which must therefore be added to the model by first selecting a component to refer it to. It is not essential that in reality the weight is actually applied to this component, which is used only as a spatial reference.

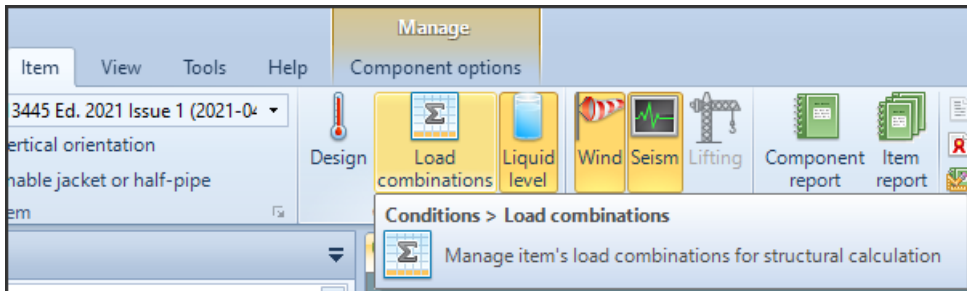
Additional weight "Additional weight #2"	
Essentials	General
General	Name / Position Additional weight #2
Position	Weight
External loads	Net weight [] kg
Weight	External loads
Reporting	Area exposed to wind [0] m ²
	Position
	Component position relative to: Parent component []
	X [0] mm
	Y [0] mm
	Z [0] mm

In the definition of the component it is possible to specify the name, weight value and its position in space, which can refer to the component above or to the reference line. It is also possible to set an area exposed to the wind, which will increase the overall surface area of the device and its wind resistance. As with the other components, it is then possible to further refine the definition in the "Weights" category.

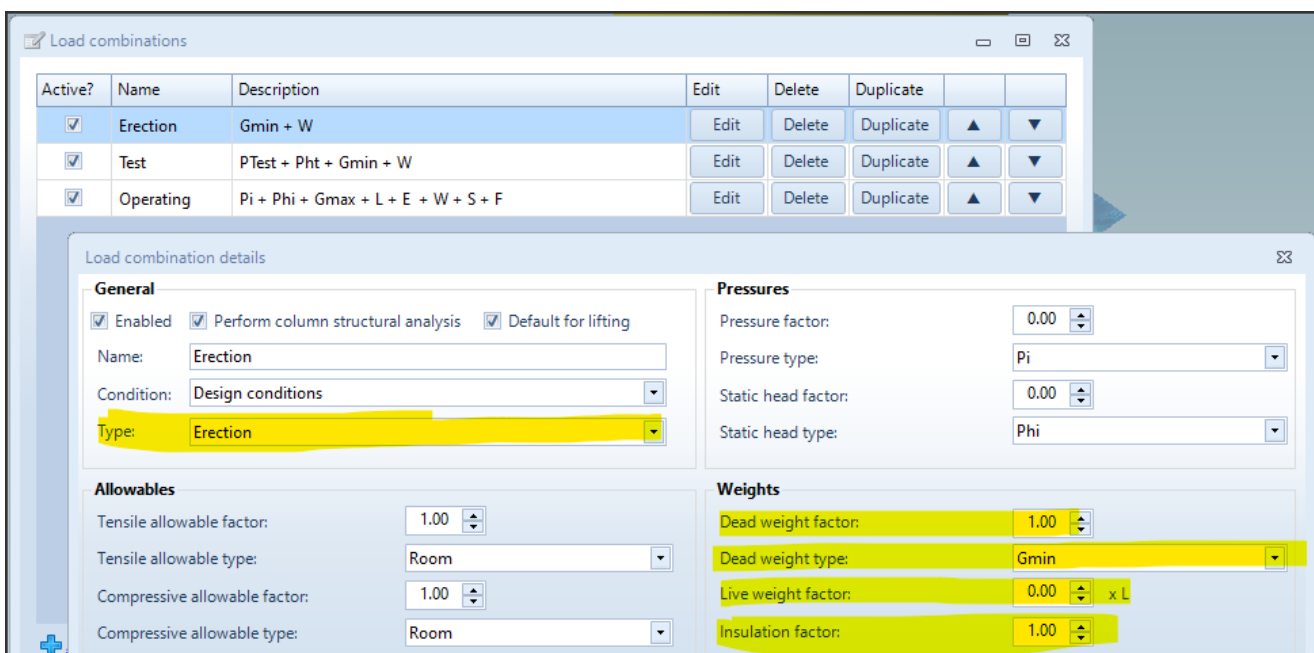
Adjustment of the coefficients relating to the weights

Up to this point we have seen how it is possible to set the absolute value of a weight weighing on the device support. Often, however, the calculation value that this weight will have is influenced by coefficients that modify it even significantly.

The filter through which all the weight transfer operations towards the support pass are the load combinations:

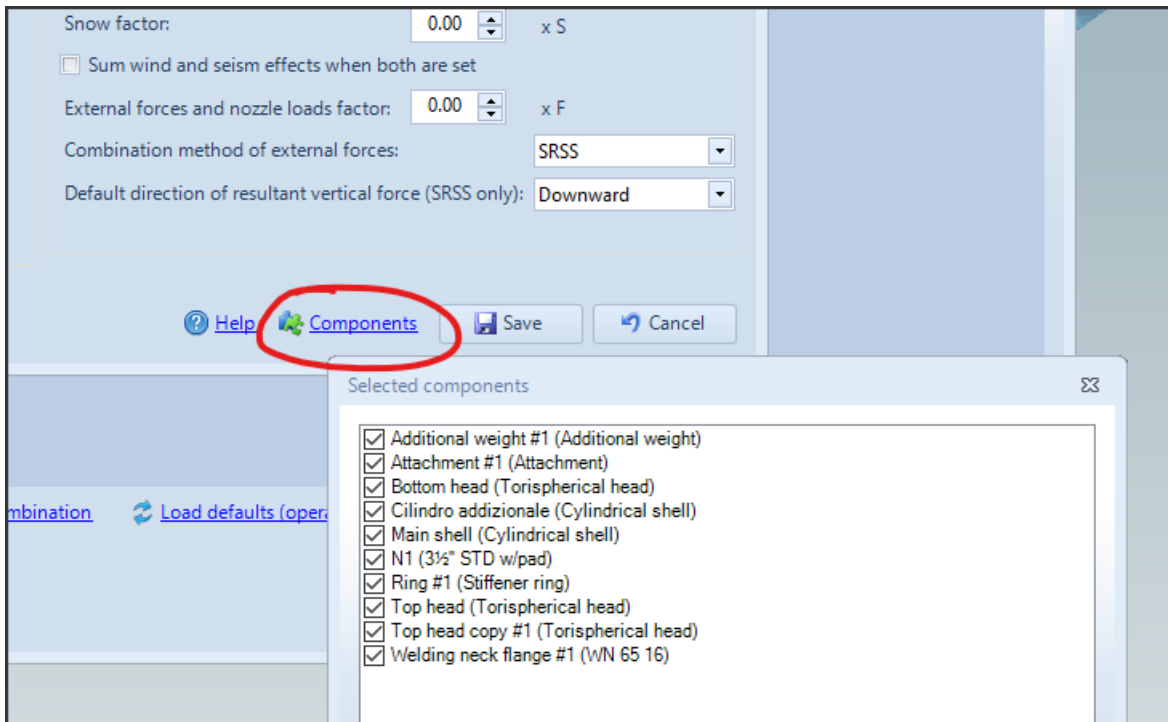


The [management of load combinations](#) is outside the scope of this article, but it is possible to focus on some key points that impact weight:



- The type of combination (Erection, Test, Operating) influences the presence or absence of the additional weights defined in the "Weights" category of the components
- "Dead weight factor" and "Live weight factor" multiply the respective "Dead" and "Live" weights
- The type of "Dead weight" to be considered varies the weight, e.g. by considering corrosion or not
- "Insulation factor" multiplies the insulation weight, defined in the item properties

Finally, from the same window, it is possible to define which components to consider for the current load combination:



In this way it is possible to completely exclude a component, be it a component under pressure or an additional weight, if this is not to be taken into account in the calculation for a specific load condition.

Calculation report

In the calculation report there is a "Weights summary" section: in this section, the report details both the input values set by the user and their transformation through the load conditions. For each condition, the parameters that impact the weight, the presence of the components and the center of gravity are summarized.

Weights											
Components											
Nr	Component										
1	Additional weight #1										
2	Cilindro addizionale										
3	Bottom head										
4	Main shell										
5	Top head										
6	Top head copy #1										
7	Attachment #1										
8	N1										
9	Welding neck flange #1										
10	Ring #1										
Weight of components (kg)											
Nr	Dead			Dead additional			Live			Liquid	
	Net	Corroded	Bolts	Value	Erection	Test	Value	Erection	Test	Operating	Test
1	100	100	0	0	*	*	0			0	0
2	2469	1729	0	0	*	*	0			0	78540
3	236	173	0	0	*	*	0			424	530
4	2869	2091	0	0	*	*	0			7069	12370
5	236	173	0	0	*	*	0			0	530
6	236	173	0	0	*	*	0			0	530
7	8	8	0	0	*	*	0			0	0
8	5	3	0	0	*	*	0			1	1
9	3	3	0	0	*	*	0			0	0
10	41	41	0	0	*	*	0			0	0
Total	6203	4494	0	0			0			7494	92501
Liquid description: Oil - Liquid density: 800.00 kg/m ³											
Total volume: 92.50057 m ³											
Definitions											
<i>Dead-net: uncorroded weight of component excluding eventual bolts and additional dead weight</i>											
<i>Dead-corroded: corroded weight of component excluding eventual bolts and additional dead weight</i>											
<i>Bolts: weight of bolts (when applicable)</i>											
<i>Dead additional: additional dead weight on component</i>											
<i>Live: additional live weight on component</i>											
<i>Liquid-operating: weight of liquid contained in component in operating conditions (depending on liquid level)</i>											
<i>Liquid-test: weight of liquid contained in component in hydrostatic test conditions</i>											
<i>Insulation: weight of insulation on component, when present</i>											

Weights for load combination : Erection						
Load combination type : Erection; Dead weight factor : 1; Live weight factor : 0; Dead weight type : Gmin						
Nr	Dead	Bolts	Dead additional	Live	Liquid	Total
1	100 kg	0 kg	0 kg	0 kg	0 kg	100 kg
2	2 469 kg	0 kg	0 kg	0 kg	0 kg	2 469 kg
3	236 kg	0 kg	0 kg	0 kg	0 kg	236 kg
4	2 869 kg	0 kg	0 kg	0 kg	0 kg	2 869 kg
5	236 kg	0 kg	0 kg	0 kg	0 kg	236 kg
6	236 kg	0 kg	0 kg	0 kg	0 kg	236 kg
7	8 kg	0 kg	0 kg	0 kg	0 kg	8 kg
8	5 kg	0 kg	0 kg	0 kg	0 kg	5 kg
9	3 kg	0 kg	0 kg	0 kg	0 kg	3 kg
10	41 kg	0 kg	0 kg	0 kg	0 kg	41 kg
Total	6 103 kg	0 kg	0 kg	0 kg	0 kg	6 103 kg
Crossed out components have been excluded from the load combination by the user						
Center of gravity: Cx=0 mm, Cy=-4.00 mm, Cz=3 941.47 mm						

Through a careful analysis of this section of the calculation report it is possible to understand the origin

of each load weighing on the supports, its entity and its transformation.