



# NOVATOP SOLID

Technical documentation



NOVATOP 

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### CERTIFICATES, ATTESTS AND REPORTS

ETA-17/0004 NT SOLID, TaZÚS  
Declaration of Properties NT SOLID  
Certificate of constancy of performance NT SOLID, TaZÚS  
Record on fire resistance classification with jacketing NT SOLID, TaZÚS  
Record on fire resistance classification, SOLID 84 and 124, TaZÚS  
Steam diffusion NT SOLID 84 and 124 mm – a test certificate, CSI

Certificates, attests and reports can be downloaded on [www.novatop.system.cz](http://www.novatop.system.cz)

# NOVATOP SOLID

## WALLS – TECHNICAL DATA SHEET

### DESCRIPTION

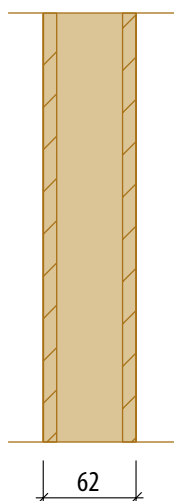
NOVATOP SOLID - is a large format multi-layer panel of the type of CLT (cross-laminated timber). Each layer consists of plates made of solid wood and fibre orientation of each layer is always at right angles to the adjacent layers. Slats in each layer are bonded in the longitudinal and transverse direction and the layers are glued together.

<b>Application</b>	For vertical construction walls
<b>Demands</b>	ETA – 17/0004
<b>Wood Species</b>	Local spruce
<b>Surface quality</b>	No-visual construction, visual living space. Sorting of quality according to internal regulations of AGROP NOVA a.s.
<b>Large format</b>	Max. 12000 x 2950 mm (Junctions: with overlap or overlapping strip.)
<b>Standard formats (mm)</b>	<b>Thickness:</b> 62, 84 (42/42), 124 (62/62) and other <b>Basic standard formats:</b> 6000 x 2500, 6000 x 2100, 5000 x 2500, 5000 x 2100 Other formats are based on these basic ones.
<b>Dimensional tolerances according to EN 13 353</b>	Tolerance of nominal width and length: $\pm 2$ mm Straightness of the sides: $\pm 1$ mm/m Rectangularity: $\pm 1$ mm/m
<b>Surface</b>	Sanded - K 50, 100
<b>Adhesive</b>	Melamine adhesive according to EN 301, PU according to EN 15425
<b>Formaldehyde emission class</b>	E1 according to EN 717-1 (max. 0.124 mg/m <sup>3</sup> )
<b>Moisture</b>	10% $\pm$ 3%
<b>Coefficient of shrinkage and swelling</b>	$\alpha$ (%/%) 0.002 - 0.012 %
<b>Density</b>	approximately 490 kg/m <sup>3</sup>
<b>Reaction to fire</b>	D-s2,d0 according to EN 13501-1
<b>Thermal conductivity (<math>\lambda</math>)</b>	0.13 W/mK according to EN ISO 10456
<b>Specific thermal capacity <math>c_p</math></b>	1600 J/kg.K according to EN ISO 10456
<b>Diffusion resistance (<math>\mu</math>)</b>	200/70 (dry/wet) according to EN ISO 10456
<b>Noise absorption</b>	250 - 500 Hz - 0,1 1000 - 2000 Hz - 0,3
<b>Airborne sound (dB)</b>	$R = 13 \times \log(m_a) + 14$ $m_a$ – surface weight kg/m <sup>2</sup>

## STANDARD THICKNESS

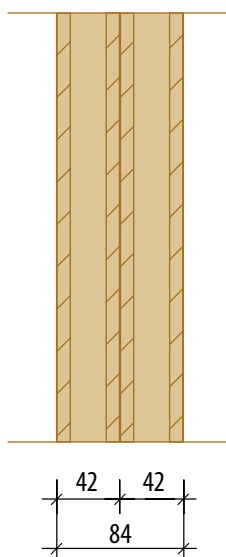
### 62 mm

9p - 44q - 9p



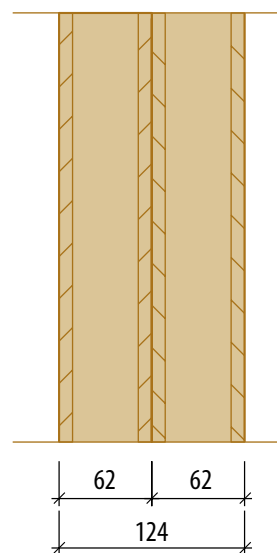
### 84 mm

2 x (9p - 24q - 9p)



### 124 mm

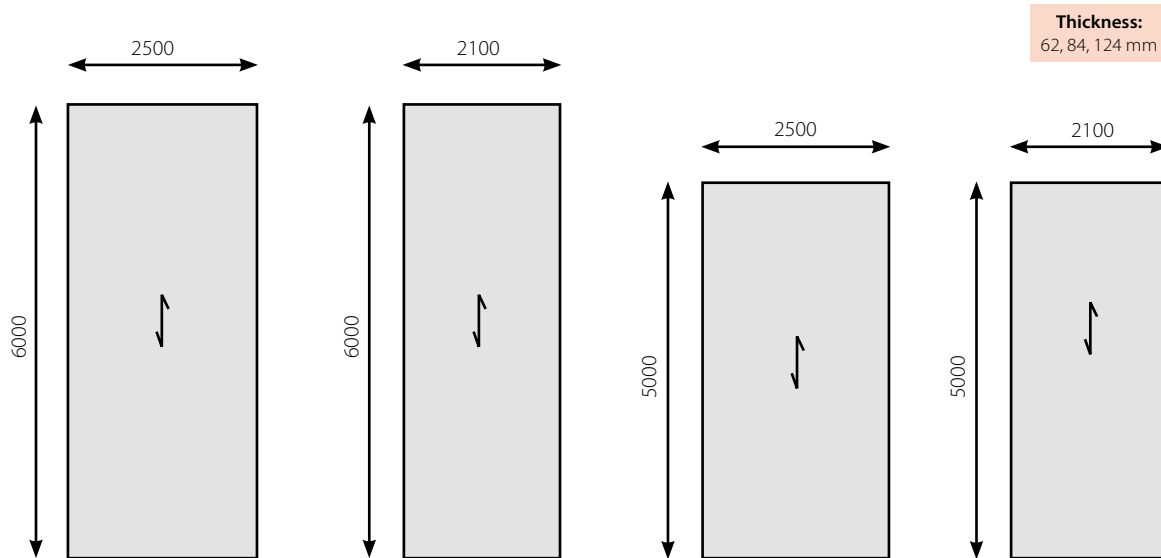
2 x (9p - 44q - 9p)



# NOVATOP SOLID WALLS – FORMATS

## BASIC FORMATS

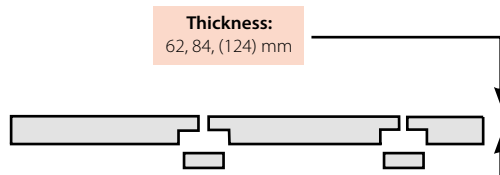
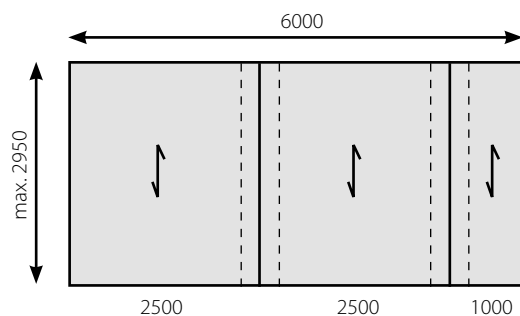
Basic formats which the panels consist of (mm). Other formats are based on these basic ones.



## THE PRINCIPLE OF EXECUTION OF THE WALL PANELS FROM THE BASIC FORMATS.

### Vertical direction of fibres.

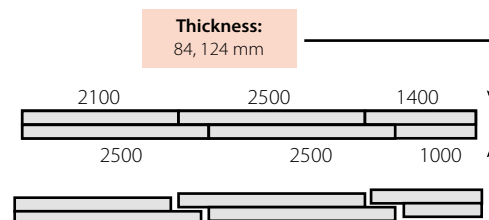
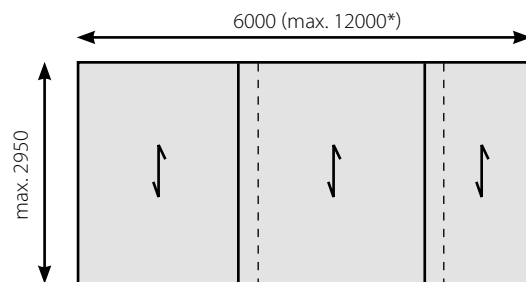
Junctions of panels: with an overlapping strip.



Delivery: individual pieces.

### Vertical direction of fibres.

Junctions of panels: with a longitudinal overlap 100–1250 mm

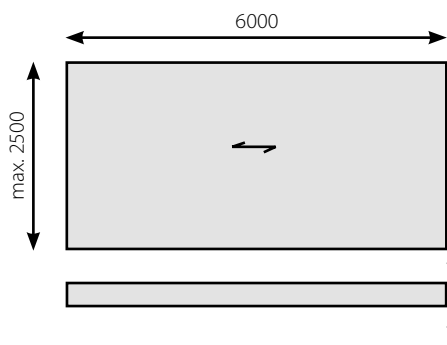


Delivery: assembled or individual pieces.

**\*Recommendation:** due to traffic restrictions and improved handling, we recommend maximum length of 8,500 mm.

## THE PRINCIPLE OF EXECUTION OF THE WALL PANELS FROM THE BASIC FORMATS.

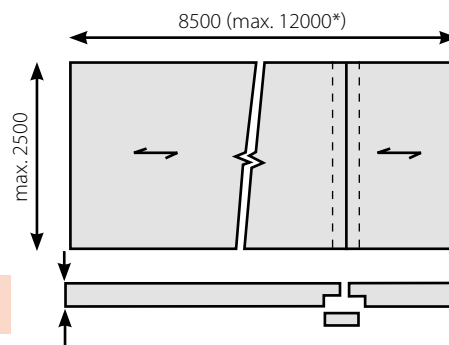
### Horizontal direction of fibres.



Delivery: assembled.

### Horizontal direction of fibres.

Junctions of panels: with an overlapping strip.



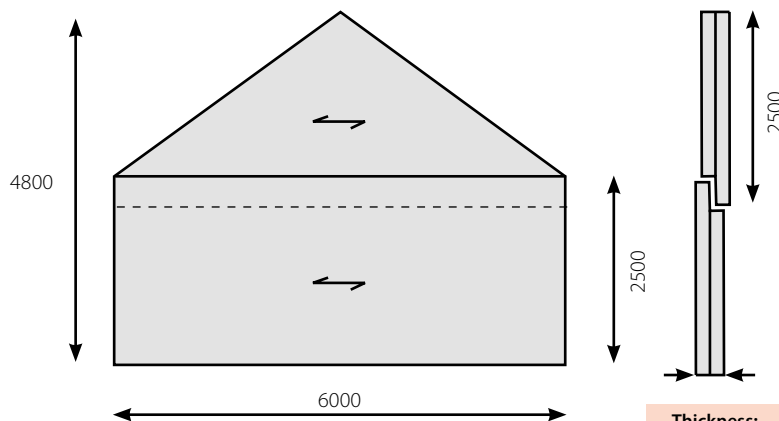
Delivery: individual pieces.

**\*Recommendation:** due to traffic restrictions and improved handling, we recommend maximum length of 8,500 mm.

## EXAMPLE OF EXECUTION OF A GABLE

### Horizontal direction of fibres.

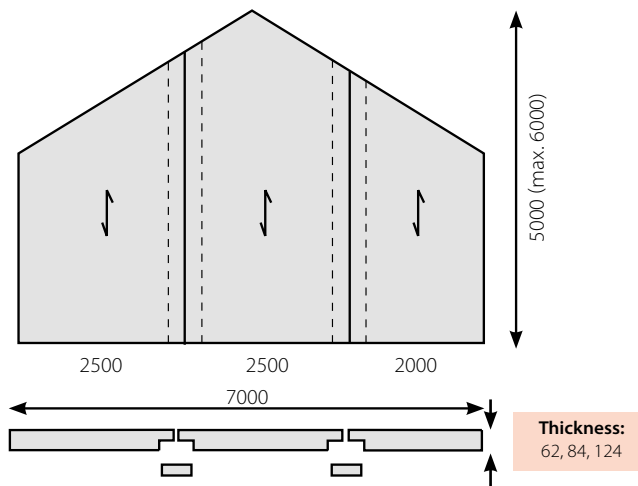
Junctions of panels:  
with an longitudinal overlap  
100-1250 mm



Delivery: individual pieces.

### Vertical direction of fibres.

Junctions of panels:  
with a overlapping strip.



Delivery: individual pieces.



# NOVATOP SOLID

## WALLS – MECHANICAL PROPERTIES

The cross-sectional values are based on the European technical approval ETA-12/0079 from 28th March, 2012 and are determined by the extended gamma procedure (according to SCHELLING) for four heights (h) of walls. The data is only for the first preliminary dimensioning and do not replace the static calculations.

### Cross-sectional values

Thickness of the panel		62 mm	84 mm	124 mm
Structure of the panel		9p - 44q - 9p	2 x (9p - 24q - 9p)	2 x (9p - 44q - 9p)
Area of the section		62000 mm <sup>2</sup>	84000 mm <sup>2</sup>	124000 mm <sup>2</sup>
(I)	Moment of inertia longitudinally	1,30E + 07 mm <sup>4</sup>	2,66E + 07 mm <sup>4</sup>	6,28E + 07 mm <sup>4</sup>
(I)	Moment of inertia – transversally	7,45E + 06 mm <sup>4</sup>	2,42E + 07 mm <sup>4</sup>	1,00E + 08 mm <sup>4</sup>
<b>Height of the wall h = 2,400 mm</b>				
(E <sub>eff</sub> )	Effective bending stiffness – longitudinally	1,37 E + 11 Nmm <sup>2</sup>	2, 77 E + 11 Nmm <sup>2</sup>	6,03 E + 11 Nmm <sup>2</sup>
(W <sub>eff</sub> )	Section modulus – longitudinally	3,82 E + 05 mm <sup>3</sup>	5,69 E + 05 mm <sup>3</sup>	8,39 E + 05 mm <sup>3</sup>
(E <sub>eff</sub> )	Effective bending stiffness – transversally	8,23 E + 10 Nmm <sup>2</sup>	2,53 E + 11 Nmm <sup>2</sup>	1,01 E + 12 Nmm <sup>2</sup>
(W <sub>eff</sub> )	Section modulus – transversally	3,23 E + 05 mm <sup>3</sup>	6,61 E + 05 mm <sup>3</sup>	1,65 E + 06 mm <sup>3</sup>
<b>Height of the wall h = 2,500 mm</b>				
(E <sub>eff</sub> )	Effective bending stiffness in flexure – longitudinally	1,38 E+11 Nmm <sup>2</sup>	2, 79 E + 11 Nmm <sup>2</sup>	6,10 E + 11 Nmm <sup>2</sup>
(W <sub>eff</sub> )	Section modulus – longitudinally	3,83 E+05 mm <sup>3</sup>	5,73 E + 05 mm <sup>3</sup>	8,48 E + 05 mm <sup>3</sup>
(E <sub>eff</sub> )	Effective bending stiffness in flexure – transversally	8,23 E+10 Nmm <sup>2</sup>	2,54 E + 11 Nmm <sup>2</sup>	1,02 E + 12 Nmm <sup>2</sup>
(W <sub>eff</sub> )	Section modulus – transversally	3,23 E + 05 mm <sup>3</sup>	6,66 E + 05 mm <sup>3</sup>	1,65 E + 06 mm <sup>3</sup>
<b>Height of the wall h = 2,700 mm</b>				
(E <sub>eff</sub> )	Effective bending stiffness in flexure – longitudinally	1,39 E + 11 Nmm <sup>2</sup>	2, 82 E + 11 Nmm <sup>2</sup>	6,21 E + 11 Nmm <sup>2</sup>
(W <sub>eff</sub> )	Section modulus – longitudinally	3,88 E + 05 mm <sup>3</sup>	5,79 E + 05 mm <sup>3</sup>	8,63 E + 05 mm <sup>3</sup>
<b>Height of the wall h = 2,900 mm</b>				
(E <sub>eff</sub> )	Effective stiffness in bending – longitudinally	1,41 E + 11 Nmm <sup>2</sup>	2, 84 E + 11 Nmm <sup>2</sup>	6,30 E + 11 Nmm <sup>2</sup>
(W <sub>eff</sub> )	Section modulus – longitudinally	3,91 E + 05 mm <sup>3</sup>	5,84 E + 05 mm <sup>3</sup>	8,76 E + 05 mm <sup>3</sup>

The basic width is 1,000 mm.

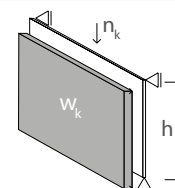
Structure of the panel

p – longitudinally: The surface layer runs in the direction of the range. The transverse layers may contain butted joints.

q – transversally: The surface layer is perpendicular to the direction of the range (both outer layers are not taken into account).

The transverse layers must not contain butted joints.

# NOVATOP SOLID WALLS – PRELIMINARY DIMENSIONING



Load | Modification coefficient  $k_{mod} = 0,8$

perma- nent load ( $g_p$ )	imposed load ( $n_k$ )	h = 2400 mm	h = 2500 mm	h = 2700mm	h = 2900 mm
10	10	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 84L / 62L	124L / 84L / 62L
	20	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 84L / 62L	124L / 84L / 62L
	30	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / 62L	124L / 84L / 62L
	40	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / --	124L / 84L / --
	50	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
20	10	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 84L / 62L	124L / 84L / 62L
	20	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / 62L	124L / 84L / 62L
	30	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / --	124L / 84L / --
	40	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	50	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
30	10	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / 62L	124L / 84L / 62L
	20	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / --	124L / 84L / --
	30	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	40	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	50	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / -- / --
40	10	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / --	124L / 84L / --
	20	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	30	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	40	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / -- / --
	50	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / -- / --	124L / -- / --
50	10	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / --	124L / 84L / --
	20	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	30	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	40	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / -- / --	124L / -- / --
	50	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / -- / --	124L / -- / --
60	10	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	20	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	30	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / -- / --
	40	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / -- / --	124L / -- / --
	50	124L / 124Q / -- / -- / -- / --	124L / 124Q / -- / -- / -- / --	124L / -- / --	-- / -- / --

The loads are characteristic loads.

The tables take into account the characteristic wind load ( $W_k = 0,5 \text{ kN/m}$ ).

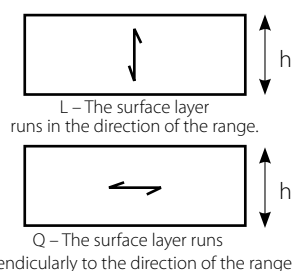
From a safety viewpoint, the dimensioning for wind loads was also carried out with  $k_{mod}$ .

The eccentricity of the bedding that is taken into account is:

10 mm for the panels NOVATOP Solid 62 mm

15 mm for the panels NOVATOP Solid 84 mm

40 mm for the panels NOVATOP Solid 124 mm

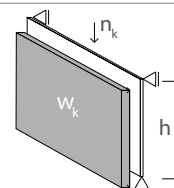


The tables are only for the first preliminary dimensioning and do not replace the static calculations.



# NOVATOP SOLID

## WALLS – PRELIMINARY DIMENSIONING



Load | Modification coefficient  $k_{mod} = 0,9$

perma- nent load ( $g_k$ )	imposed load ( $n_k$ )	h = 2400 mm	h = 2500 mm	h = 2700mm	h = 2900 mm
10	10	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 84L / 62L	124L / 84L / 62L
	20	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 84L / 62L	124L / 84L / 62L
	30	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 84L / 62L	124L / 84L / 62L
	40	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / 62L	124L / 84L / --
	50	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / --	124L / 84L / --
20	10	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 84L / 62L	124L / 84L / 62L
	20	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 84L / 62L	124L / 84L / 62L
	30	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / 62L	124L / 84L / --
	40	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / --	124L / 84L / --
	50	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
30	10	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 124Q / 84L / 84Q / 62L / 62Q	124L / 84L / 62L	124L / 84L / 62L
	20	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / 62L	124L / 84L / --
	30	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / --	124L / 84L / --
	40	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	50	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
40	10	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / 62L	124L / 84L / 62L
	20	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / --	124L / 84L / --
	30	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	40	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	50	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
50	10	124L / 124Q / 84L / 84Q / 62L / --	124L / 124Q / 84L / 84Q / 62L / --	124L / 84L / --	124L / 84L / --
	20	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	30	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	40	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	50	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / -- / --
60	10	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	20	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	30	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / 84L / --
	40	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / 84L / --	124L / -- / --
	50	124L / 124Q / 84L / 84Q / -- / --	124L / 124Q / 84L / 84Q / -- / --	124L / -- / --	124L / -- / --

The loads are characteristic loads.

The tables take into account the characteristic wind load ( $W_k = 0,5 \text{ kN/m}$ ).

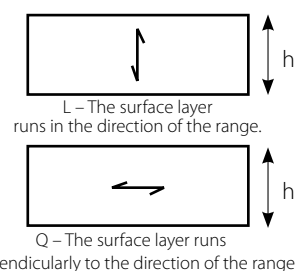
From a safety viewpoint, the dimensioning for wind loads was also carried out with  $k_{mod}$ .

The eccentricity of the bedding that is taken into account is:

10 mm for the panels NOVATOP Solid 62 mm

15 mm for the panels NOVATOP Solid 84 mm

40 mm for the panels NOVATOP Solid 124 mm



The tables are only for the first preliminary dimensioning and do not replace the static calculations.

# NOVATOP SOLID

## WALLS – PRELIMINARY DIMENSIONING

### Example of calculation according to ETA-12/0079

#### 1 General information

In the following document, the wall panel from laminated wood NOVATOP SOLID of the company AGROP NOVA a.s. shows a detailed calculation and performance of the assessment according to standards DIN EN 1995-1-1/NA A1 (2012-02) applicable to Germany (load externally and transversally to the wall direction, vertical direction of the surface layer fibres). Assessment of limit states of load capacity and applicability is carried out. Reference width for the calculation is 1.0 m.

#### 2 System and load

##### 2.1 Material:

Panel of laminated wood NOVATOP SOLID  $t = 84 \text{ mm}$   
(Composition: 9p – 24q – 2 x 9p – 24q – 9p; Surface layers C24)

Characteristic values:

Modulus of elasticity parallel to the fibre	$E_{0,\text{mean}} = 11.600 \text{ N/mm}^2$
Bending strength	$f_{m,k} = 24,0 \text{ N/mm}^2$
Compression strength parallel to the fibre	$f_{c,0,k} = 24,0 \text{ N/mm}^2$
Effective bending stiffness	$EI_{\text{eff}} = 2,82 \cdot 10^{11} \text{ Nmm}^2$
Creep coefficient	$k_{\text{def}} = 0,60$

##### 2.2 Load:

Operation class:

1

Permanent load:

$g_k = 2,00 \text{ kN/m}$   
Including the dead weight

Live load (with the wind):

$w_k = 1,50 \text{ kN/m}$ ; transversally to the wall axis

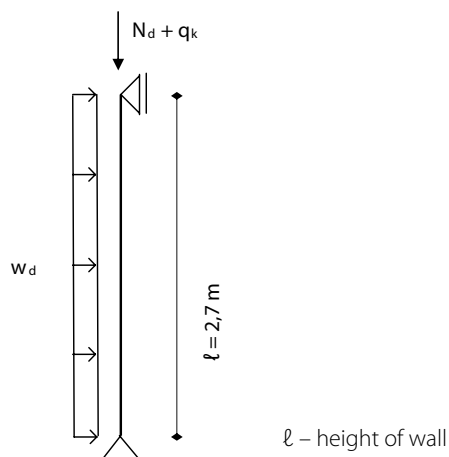
Imposed load:

$q_k = 30 \text{ kN}$ ; in the wall axis

Modification coefficient →

$k_{\text{mod}} = 0,80$

##### 2.3 Calculation of the internal forces:



$$N_d = 1,35 \cdot (0,084 \cdot 5,0 \cdot 2,7 + 20) + 1,5 \cdot 30 = 73,53 \text{ kN}$$

$$w_d = 1,5 \cdot 0,5 = 0,75 \text{ kN/m}$$

# NOVATOP SOLID

## WALLS – PRELIMINARY DIMENSIONING

The maximum normal force:

$$N_d = 73,53 \text{ kN}$$

The maximum moment (eccentricity  $N_d$ :  $e = 0,015\text{m}$ ):

$$M_d = \frac{w_d \cdot \ell^2}{8} + N_d \cdot e = \frac{0,75 \cdot 2,7^2}{8} = 73,53 \cdot 0,015 = 1,79 \text{ kNm}$$

The maximum transverse (shear) force:

$$V_d = \frac{w_d \cdot \ell}{2} = \frac{0,75 \cdot 2,7}{2} = 1,01 \text{ kNm}$$

### 3 Load capacity assessment - bend and compression assessment

$$z_d = \frac{h}{2} = 42 \text{ mm}$$

$$W = \frac{EI_{\text{eff}}}{E_{0, \text{mean}} \cdot z_s} = \frac{2,82 \cdot 10^{11}}{11600 \cdot 42} = 5,77 \cdot 10^5 \text{ mm}^3$$

$$i = \sqrt{\frac{EI_{\text{eff}}}{E_{0, \text{mean}} \cdot A_{\text{eff}}}} = \sqrt{\frac{2,82 \cdot 10^{11}}{11600 \cdot 9 \cdot 4 \cdot 1000}} = 25,99 \text{ mm}$$

$$\lambda_{\text{rel},y} = \frac{l_{\text{ef}}}{\pi \cdot i} \cdot \sqrt{\frac{f_{c,0,k}}{E_{0,0,05}}} = \frac{2700}{\pi \cdot 25,99} \cdot \sqrt{\frac{24}{\frac{5}{6} \cdot 11600}} = 1,648$$

$$\beta_c = 0,1 \text{ for CLT}$$

$$k_y = \frac{1}{2} \{1 + \beta_c \cdot (\lambda_{\text{rel},y} - 0,3) + \lambda_{\text{rel},y}^2\} = \frac{1}{2} \{1 + 0,1 \cdot (1,648 - 0,3) + 1,648^2\} = 1,925$$

$$k_{c,y} = \frac{1}{k_y + \sqrt{k_y^2 - \lambda_{\text{rel},y}^2}} = \frac{1}{1,925 + \sqrt{1,925^2 - 1,648^2}} = 0,342$$

$$\sigma_{c,0,d} = \frac{N_d}{A_{\text{ef}}} = \frac{73,53 \cdot 1000}{9 \cdot 4 \cdot 1000} = 2,04 \text{ N/mm}^2$$

$$\sigma_{m,d} = \frac{M_d}{W} = \frac{1,79 \cdot 10^6}{5,77 \cdot 10^5} = 3,1 \text{ N/mm}^2$$

$$f_{c,0,d} = \frac{f_{c,0,k} \cdot k_{\text{mod}}}{\gamma_m} = \frac{24 \cdot 0,8}{1,3} = 14,77 \text{ N/mm}^2$$

$$f_{m,d} = \frac{f_{m,k} \cdot k_{\text{mod}}}{\gamma_m} = \frac{24 \cdot 0,8}{1,3} = 14,77 \text{ N/mm}^2$$

Assessment:

$$\frac{\sigma_{c,0,d}}{k_{c,y} \cdot f_{c,0,d}} + \frac{\sigma_{m,d}}{f_{m,d}} = \frac{2,04}{0,342 \cdot 14,77} + \frac{3,1}{14,77} = 0,61 \leq 1,0$$

# NOVATOP SOLID

## CEILINGS AND ROOFS – TECHNICAL DATA SHEET

### DESCRIPTION

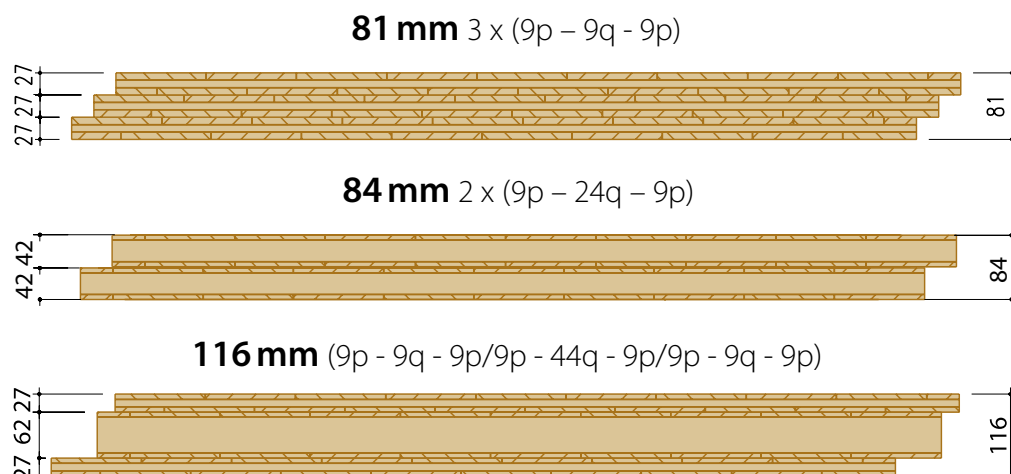
NOVATOP SOLID - is a large format multi-layer panel of the type of CLT (cross-laminated timber). Each layer consists of plates made of solid wood and fibre orientation of each layer is always at right angles to the adjacent layers. Slats in each layer are bonded in the longitudinal and transverse direction and the layers are glued together.

<b>Application</b>	For ceilings and roofs
<b>Demands</b>	ETA - 12/0079
<b>Wood Species</b>	Local spruce
<b>Surface quality</b>	No-visual construction, visual living space. Sorting of quality according to internal regulations of AGROP NOVA a.s.
<b>Large-area format</b>	Max 12000 x 2950 mm (Joining: a longitudinal overlap or a cover plate.)
<b>Standard formats (mm)</b>	<b>Thickness:</b> 81 (27/27/27), 84 (42/42), 116 (27/62/27) <b>Basic standard formats:</b> 6000 x 2500, 6000 x 2100, 5000 x 2500, 5000 x 2100 Other formats are based on these basic ones.
<b>Dimensional tolerances according to EN 13 353</b>	Tolerance of nominal width and length: $\pm 2$ mm Straightness of the sides: $\pm 1$ mm/m Rectangularity: $\pm 1$ mm/m
<b>Surface</b>	Sanded – K 50, 100
<b>Glueing</b>	D4 according to EN 204
<b>Adhesive</b>	Melamine adhesive according to EN 301, PU according to EN 15425
<b>Formaldehyde emission class</b>	E1 according to EN 717-1 (max. 0,124 mg/m <sup>3</sup> )
<b>Moisture</b>	10% $\pm$ 3%
<b>Coefficient of shrinkage and swelling</b>	$\alpha$ (%/%) 0.002 - 0.012 %
<b>Density</b>	approximately 490 kg/m <sup>3</sup>
<b>Reaction to fire</b>	D-s2,d0 according to EN 13501-1
<b>Thermal conductivity (<math>\lambda</math>)</b>	0.13 W/mK according to EN ISO 10456
<b>Specific thermal capacity <math>c_p</math></b>	1600 J/kg.K according to EN ISO 10456
<b>Diffusion resistance (<math>\mu</math>)</b>	200/70 (dry/wet) according to EN ISO 10456
<b>Noise absorption</b>	250 - 500 Hz - 0,1 1000 - 2000 Hz - 0,3
<b>Airborne sound (dB)</b>	$R = 13 \times \log(m_a) + 14$ $m_a$ – surface weight kg/m <sup>2</sup>

# NOVATOP SOLID

## CEILINGS AND ROOFS – TECHNICAL DATA SHEET

### STANDARD THICKNESS



### CROSS-SECTIONAL VALUES

The cross-sectional values are based on the European technical approval ETA-12/0079 from 28th March, 2012 and are determined by the extended gamma procedure (according to SCHELLING) for  $\ell/d = 20$ . When the ratio of the distance of the supports increases, the cross-sectional data increase as well. The data is only for the first preliminary dimensioning and do not replace the static calculations.

Thickness of the panel	81 mm	84 mm	116 mm
Structure of the panel	3 x (9p – 9q – 9p)	2 x (9p – 24q – 9p)	9p – 9q – 9p/ 9p – 44q – 9p/ 9p – 9q – 9p
Cross-sectional area	81000 mm <sup>2</sup>	84000 mm <sup>2</sup>	116000 mm <sup>2</sup>
Moment of inertia I Longitudinal	3,13E + 07 mm <sup>4</sup>	2,66E + 07 mm <sup>4</sup>	8,84E + 07 mm <sup>4</sup>
Moment of inertia I Transverse	1,41E + 07 mm <sup>4</sup>	2,42E + 07 mm <sup>4</sup>	4,52E + 07 mm <sup>4</sup>
<b><math>\ell/d = 20</math></b>			
Effective bending stiffness – longitudinally (eff. $EI_p$ )	3,17 E + 11 Nmm <sup>2</sup>	2,55 E + 11 Nmm <sup>2</sup>	8,33 E + 11 Nmm <sup>2</sup>
Section modulus – longitudinally (eff. $W_p$ )	6,74 E + 05 mm <sup>3</sup>	5,24 E + 05 mm <sup>3</sup>	1,21 E + 06 mm <sup>3</sup>
Effective bending stiffness – transversally (eff. $EI_q$ )	1,35 E + 11 Nmm <sup>2</sup>	2,35 E + 11 Nmm <sup>2</sup>	4,70 E + 11 Nmm <sup>2</sup>
Section modulus – transversally (eff. $W_q$ )	3,69 E + 05 mm <sup>3</sup>	6,14 E + 05 mm <sup>3</sup>	8,27 E + 05 mm <sup>3</sup>

The basic width is 1,000 mm.

Structure of the panel:

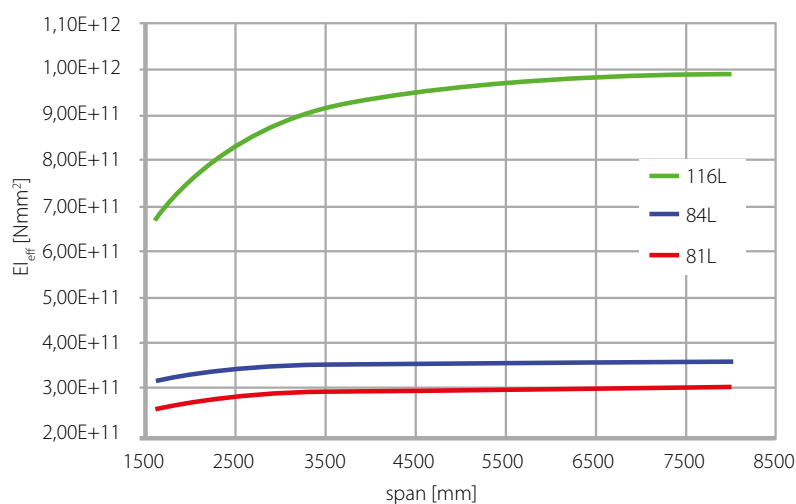
p – longitudinally: The surface layer runs in the direction of the range. The transverse layers may contain butted joints.

q – transversally: The surface layer is perpendicular to the direction of the range (both outer layers are not taken into account). The transverse layers must not contain butted joints.

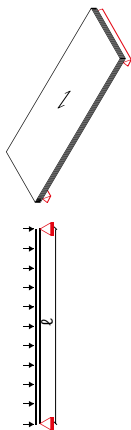
# NOVATOP SOLID CEILINGS AND ROOFS – MECHANICAL PROPERTIES

Effective bending stiffness ( $EI_{\text{eff}}$ ) depending on the span ( $\ell_{\text{ef}}$ )

span	$EI_{\text{eff}}$ [Nmm <sup>2</sup> ]		
[mm]	81L	84L	116L
1620	3,17E+11	2,54E+11	6,72E+11
1750	3,22E+11	2,60E+11	7,05E+11
2000	3,30E+11	2,68E+11	7,58E+11
2250	3,36E+11	2,75E+11	8,00E+11
2500	3,40E+11	2,79E+11	8,33E+11
2750	3,43E+11	2,83E+11	8,59E+11
3000	3,46E+11	2,85E+11	8,80E+11
3250	3,48E+11	2,88E+11	8,97E+11
3500	3,49E+11	2,89E+11	9,11E+11
3750	3,51E+11	2,91E+11	9,23E+11
4000	3,52E+11	2,92E+11	9,33E+11
4250	3,53E+11	2,93E+11	9,41E+11
4500	3,53E+11	2,94E+11	9,48E+11
4750	3,54E+11	2,94E+11	9,54E+11
5000	3,54E+11	2,95E+11	9,60E+11
5250	3,55E+11	2,95E+11	9,64E+11
5500	3,55E+11	2,96E+11	9,68E+11
5750	3,56E+11	2,96E+11	9,72E+11
6000	3,56E+11	2,97E+11	9,75E+11
6250	3,56E+11	2,97E+11	9,78E+11
6500	3,56E+11	2,97E+11	9,80E+11
6750	3,57E+11	2,98E+11	9,82E+11
7000	3,57E+11	2,98E+11	9,84E+11
7250	3,57E+11	2,98E+11	9,86E+11
7500	3,57E+11	2,98E+11	9,88E+11
7750	3,57E+11	2,98E+11	9,89E+11
8000	3,57E+11	2,98E+11	9,91E+11



# NOVATOP SOLID – FOR CEILINGS AND ROOFS PRELIMINARY DIMENSIONING



Requirements: instant deflection  $w_{\text{Inst}} \leq l/300$

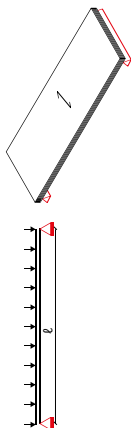
perma- nent load( $g_k$ )	live load ( $n_k$ )	$l$									
		1620	1750	2000	2250	2500	2750	3000	3250	3500	3750
1,0	1,5	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L
	2,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L	
	3,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L		
	4,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	116L	116L	116L	116L			
	5,0	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L					
1,5	1,5	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L	
	2,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L		
	3,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L			
	4,0	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L				
	5,0	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L					
2,0	1,5	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L		
	2,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L		
	3,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	116L	116L	116L	116L			
	4,0	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L				
	5,0	81L/84L/116L	81L/84L/116L	116L	116L	116L					
2,5	1,5	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L		
	2,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L			
	3,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	116L	116L	116L				
	4,0	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L				
	5,0	81L/84L/116L	81L/84L/116L	116L	116L	116L					
3,0	1,5	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L			
	2,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	116L	116L	116L	116L			
	3,0	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L				
	4,0	81L/84L/116L	81L/84L/116L	116L	116L	116L	116L				
	5,0	81L/84L/116L	81L/84L/116L	116L	116L	116L					

The tables are only for the first preliminary dimensioning and do not replace the static calculations.

L – longitudinally, Q – transversally



# NOVATOP SOLID – FOR CEILINGS AND ROOFS PRELIMINARY DIMENSIONING



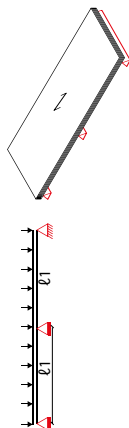
Requirements: instant deflection  $w_{inst} \leq l/300$

perma- nent load( $g_k$ )	live load ( $n_k$ )	$l$									
		1620	1750	2000	2250	2500	2750	3000	3250	3500	3750
1,0	1,5	81L / 84L / 116L	81L / 84L / 116L	81L / 84L / 116L	84L / 116L	84L / 116L	116L	116L			
	2,0	81L / 84L / 116L	81L / 84L / 116L	84L / 116L	84L / 116L	116L	116L				
	3,0	81L / 84L / 116L	81L / 84L / 116L	84L / 116L	116L	116L					
	4,0	81L / 84L / 116L	84L / 116L	84L / 116L	116L						
	5,0	84L / 116L	84L / 116L	116L	116L						
1,5	1,5	81L / 84L / 116L	81L / 84L / 116L	84L / 116L	84L / 116L	116L	116L				
	2,0	81L / 84L / 116L	81L / 84L / 116L	84L / 116L	84L / 116L	116L	116L				
	3,0	81L / 84L / 116L	84L / 116L	84L / 116L	116L	116L					
	4,0	84L / 116L	84L / 116L	116L	116L						
	5,0	84L / 116L	84L / 116L	116L	116L						
2,0	1,5	81L / 84L / 116L	81L / 84L / 116L	84L / 116L	84L / 116L	116L	116L				
	2,0	81L / 84L / 116L	81L / 84L / 116L	84L / 116L	116L	116L					
	3,0	81L / 84L / 116L	84L / 116L	84L / 116L	116L						
	4,0	84L / 116L	84L / 116L	116L	116L						
	5,0	84L / 116L	84L / 116L	116L							
2,5	1,5	81L / 84L / 116L	81L / 84L / 116L	84L / 116L	116L	116L					
	2,0	81L / 84L / 116L	84L / 116L	84L / 116L	116L	116L					
	3,0	84L / 116L	84L / 116L	116L	116L						
	4,0	84L / 116L	84L / 116L	116L	116L						
	5,0	84L / 116L	84L / 116L	116L							
3,0	1,5	81L / 84L / 116L	84L / 116L	84L / 116L	116L	116L					
	2,0	81L / 84L / 116L	84L / 116L	84L / 116L	116L	116L					
	3,0	84L / 116L	84L / 116L	116L	116L						
	4,0	84L / 116L	84L / 116L	116L	116L						
		84L / 116L	116L	116L							

The tables are only for the first preliminary dimensioning and do not replace the static calculations.

L – longitudinally, Q – transversally

# NOVATOP SOLID – FOR CEILINGS AND ROOFS PRELIMINARY DIMENSIONING



Requirements: instant deflection  $w_{inst} \leq \ell/300$

perma- nent load(g <sub>k</sub> )	live load (n <sub>k</sub> )	(Σ1 = Σ1)														
		1620	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000
1,0	1,5	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	116L	116L	116L	116L	116L	116L
	2,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	116L	116L	116L	116L	116L	116L
	3,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	116L	116L	116L	116L	116L			
	4,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	116L	116L	116L	116L	116L				
	5,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L					
1,5	1,5	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	116L	116L	116L	116L	116L	116L
	2,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L	116L		
	3,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L					
	4,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L						
	5,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	116L	116L	116L	116L						
2,0	1,5	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L	116L		
	2,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L	116L			
	3,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	116L	116L	116L	116L					
	4,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L					
	5,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L						
2,5	1,5	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L			
	2,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L	116L			
	3,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L					
	4,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L					
	5,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L						
3,0	1,5	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L			
	2,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L	116L			
	3,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L					
	4,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L					
	5,0	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/84L/116L	81L/116L	116L	116L	116L	116L						

The tables are only for the first preliminary dimensioning and do not replace the static calculations.

L – longitudinally, Q – transversally

**Fire safety of buildings in the Czech Republic with manufacturing and non-manufacturing facilities is subject to the requirements of design standards ČSN 73 08xx and Ministry of Interior Decree No. 246/2001 Coll. and Ministry of Interior Decree No. 23/2008 Coll. in the wording of later regulations that make these requirements mandatory. The basic document that takes into account all requirements of the currently valid regulations and sets the fire safety of the building is the fire safety layout of the building. This is a document that raises requirements for fire resistance of building structures, escape routes, distances, technical equipment, fire safety equipment and equipment for fire fighting actions.**

### Fire resistance

As for fire safety of buildings, fire resistance of building structures is the basic term.

Fire resistance is the time during which these structures can withstand temperatures resulting from the fire without violating their functions and during which the fire safety of the building is ensured, it means that in case of fire, loss of life and personal injury or loss of property are prevented from. This required time is given by the requirements of the design standards of ČSN 73 08xx and generally depends directly on the design system of the building, the highest calculated fire load of the fire section and the height of the assessed building. These determining parameters of the building are collectively referred to as the degree of fire safety (hereinafter referred to as DFS). Fire resistance of the structures is determined by classification based on the results of tests in accordance with relevant European test standards. Classification of fire resistance is expressed by individual limit states, so-called criteria, which are referred to as, for example R, E, I, W and the time in minutes (t) during which the structures being assessed meet the characteristic properties.

– **R (t) – load capacity of the structure** – the ability of the structural element to withstand fire exposure for a certain period of time at a specified mechanical load without any loss of structural stability

– **E (t) – structural integrity** – the ability of an element with separating function to resist the action of fire from one side only without the spread of fire to the unexposed side due to penetration of flames or hot gases. This criterion ensures that no ignition of an unexposed surface or any material lying near it occurs.

– **I (t) – thermal insulation of the structure** – the ability of a structural element to resist the action of fire from one side only without the spread of fire due to substantial heat transfer from the exposed side to the unexposed one. The element creates a thermal barrier capable of protecting persons in its vicinity.

– **W (t) – heat flow density or radiation from the surface of the structure** – the ability of a structural element to withstand exposure to fire in order to reduce the probability of spread of fire due to penetration of the significant radiant heat through the element to the adjacent materials. The element protects persons in its vicinity. If the element meets

criterion I, it is assessed as complying with criterion W for the same period.

The company AGROP NOVA a.s currently markets walls, ceilings and roofs with a declared fire resistance verified according to the applicable European test standards

– ČSN EN 1365-1 Fire resistance tests of load-bearing elements – Part 1: Walls

– ČSN EN 1365-2 Fire resistance tests of load-bearing elements – Part 2: Roofs and ceilings

All the structures supplied are classified in accordance with:

– ČSN EN 13501-2+A1 Fire classification of construction products and building elements

– Part 2: Classification according to the results of fire resistance tests except for air conditioning equipment

Requirements for meeting the criteria for fire resistance and the requirement for the type of structure in accordance with the required incorporation of the structure into the building are based on the fire safety design standards for the above-mentioned structures.

### Type of structure

Types of structure generally depend on the heat released from parts of the elements during a fire, the influence on stability and load capacity of structural parts and class of reaction to fire of individual components

which the structure being assessed consists of. We distinguish the following types of structure: DP1, DP2, DP3. In terms of fire safety, the most strictly assessed type is DP1.

### Fire danger area

In terms of location of the building on the building land, the term fire danger area, which arises around the burning building, is very important. In this area, there is a danger of fire transfer by heat radiation or by falling parts of the structures of the burning building. The width of this area is determined by gap distances (distance from the fire open area to the border where the risk of fire transfer ends) from the fire open areas (window, wall or roof that does not have the required fire resistance) of fire sections of the burning building.

Therefore, determination of the fire danger area around the building being assessed fully depends on determination of the fire openness of individual perimeter structures in accordance with the design standards of the series of ČSN 73 08xx.

Fire danger area should not, according to the design standards, extend beyond the border of the building land, except public areas and according to Article 25 of Decree no. 501/2006 Coll., mutual distances of buildings must meet the requirements for fire protection.

### External walls of the structure

In accordance with the design standards, there is a requirement for fire resistance of external walls; with external walls providing stability of the building it is 15 to 180 minutes, and with external walls not providing stability of the building it is 15 to 90 minutes.

# NOVATOP SOLID

## FIRE RESISTANCE

The generally required type of structure is DP3, except for external walls on the underground floor, fire stopping structures of protected escape routes, fire strips and fire sections with a high DFS (over IV), and individual requirements of design standards where the required type of structure is DP1.

### Fire resistance of external walls is assessed as follows:

#### 1) From the inside according to the fire scenario

– standardized curves temperature/time

- REW (t) – with walls providing stability of the building
- EW (t) – with walls not providing stability of the building

at the same time, there is attached the directional orientation of stress of the wall element by fire

- from the inside (i→o), at the same time, fire closeness or openness of surfaces is assessed
- from the outside (o→i), as for walls located in a fire danger area or walls forming a fire strip

#### 2) From the outside according to the fire scenario

- external fire action curve
- REI (t) with walls providing stability of the building
- EI (t) with walls not providing stability of the building

at the same time, there is attached the directional orientation of stress of the wall element by fire (i→o)

### Wall structures inside the building

In accordance with the design standards, there is a requirement for fire resistance of external walls of 15 to 180 minutes.

The generally required type of structure is DP3, except for walls on the underground floor, fire stopping walls between buildings, fire stopping structures of protected escape routes, fire sections with a high DFS (over IV), and individual requirements of design standards where the required type of structure is DP1.

Fire resistance of wall structures inside the building is assessed as follows:

- **REI (t)** – with walls with fire-stopping function (fire walls) if they provide stability of the building
- **EI (t)** – with walls (partitions) if they do not provide stability of the building

Exceptionally:

- **EW (t)** – with walls with fire-stopping function if it is proved that the heat shared with these walls does not endanger escaping persons and does not spread fire.

### Ceiling and roof structures

In accordance with the design standards, there is a requirement for fire resistance of ceiling and roof structures; 15 to 180 minutes with both fire and non-fire ceilings, and 15 to 90 minutes with roof bearing structures.

The generally required type of structure is DP3, except for ceilings on the underground floor, fire stopping structures of protected escape routes, fire strips in roof structures and fire sections with a high DFS (over IV), and individual requirements of design standards where the required type of structure is DP1.

Fire resistance of ceilings and roofs is assessed as follows:

- **REI (t)** – ceilings of roofs with fire-stopping function and ceilings serving as roofs over the last utility floor if there is fire load over these structures
- **RE (t)** – ceilings inside a fire section and ceilings serving as roofs over the last utility floor if there is not fire load over these structures

## TECHNICAL INFORMATION ABOUT TEST SAMPLES

Test Certificate no. FIRES-FR-098-10-AUNS  
Test regulation: ČSN EN 1365-1

### SAMPLE 1

Dimension of the wall: 3000 x 3000 mm  
Inferred load: 20 kN/m  
Side exposed to fire: from the exterior  
Total thickness of the wall: 202 mm

#### Composition of the wall from the exterior:

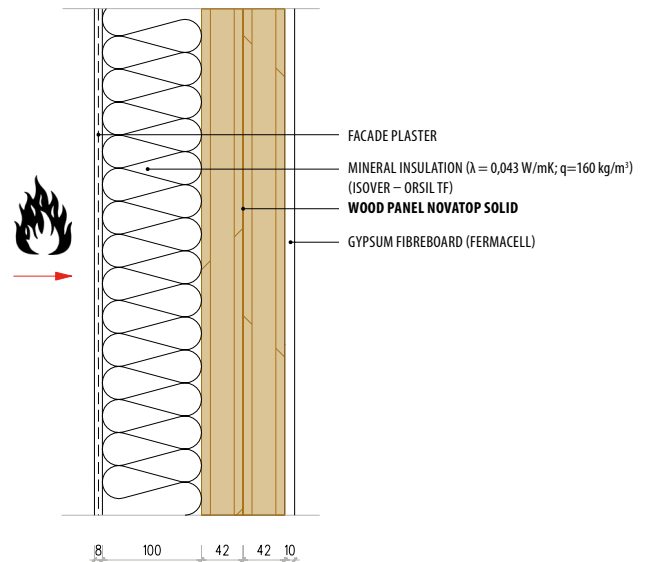
Plaster, thickness of 8 mm  
Mineral insulation, thickness of 100 mm NOVATOP SOLID,  
thickness of 84 mm (2 x 42 mm)  
Gypsum fibreboard, thickness of 10 mm (FERMACELL)

#### Results of the test:

Without breaking the criterion of load capacity, integrity and insulation up to the 125th minute

#### Classification:

**REI/REW 120 DP3 (i←o)**



Test Certificate no. FIRES-FR-098-10-AUNS  
Test regulation: ČSN EN 1365-1

### SAMPLE 2

Dimension of the wall: 3000 x 3000 mm  
Inferred load: 20 kN/m  
Side exposed to fire: symmetric structure  
Total thickness of the wall: 104 mm

#### Composition of the wall:

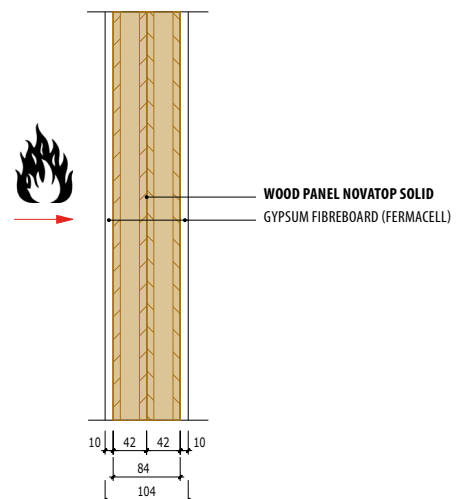
Gypsum fibreboard, thickness of 10 mm (FERMACELL)  
NOVATOP SOLID, thickness of 84 mm (2 x 42 mm)  
Gypsum fibreboard, thickness of 10 mm (FERMACELL)

#### Results of the test:

Without breaking the criterion of load capacity, integrity and insulation up to the 61st minute.

#### Classification:

**REI/REW 60 DP3 (i←o)**



# NOVATOP SOLID

## PROCESSING, LABELLING AND PACKING

### PROCESSING

NOVATOP SOLID panels are processed from lamellas of massive solid wood (SWP). The lamellas in each layer are glued both in the longitudinal and the transverse direction and the layers are glued together. The thickness of the layers can differ and determines the final thickness of the panel. The quality of sanding corresponds to the grain size of 100 (the possibility of coarser sanding is made to order). The moisture content at dispatch is  $10\% \pm 3\%$ .

All the processing is performed on the basis of the agreed production documentation on CNC machines that operate according to CAD data. The panels are most often supplied as fully processed with no further need of processing on the construction site.

**Warning:** Wood properties of this product are maintained, so it responds to changes in temperature and humidity by shrinking or, possibly, by swelling. Improper storage and use in extreme conditions (extreme temperatures and humidity) can cause cracking and deformations.

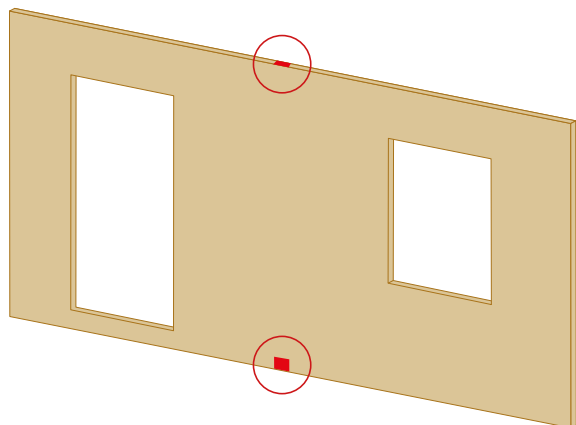
**Recommendation:** In large formats, the panels have a relatively high dead weight and, therefore, we recommend their final processing in the production.

### LABELLING AND PACKING



Each panel is fitted with an identification label with a description. The labels are placed at the top edge and at the bottom of each panel. With the external walls, the inside of the panel bears a bottom label; with the internal walls, the bottom label is placed in the viewing direction of the wall that is entered in the drawing.

Following the final quality inspection, the panels are packed, wrapped in PE foil (protection against changes in humidity, contamination and partially against mechanical damage) and tightened on all sides with a tape. Each package is fitted with an identification label with a description.



Placement of labels on the panel



Label on the package

Package Nr.		
<hr/>		
Client: _____		
Object: _____		
Address: _____		
Description: _____		
Position Nr.: _____		
_____		
_____		
_____		
_____		
_____		
_____		
_____		
Pcs.:	Date:	
Weight:	Proportion:	Control:
<small>Manufacturer: AGROP NOVA a.s., Pletenský Dvůrek 99, Pletň, Czech Republic, www.novatosystem.com</small>		

Label on the panel

Positions No.:		
<hr/>		
Client:	Date:	
Object:	Control:	
Product:		
Description:		
Adhesive:		
Quality:		
<small>ADRESA VÝROBY: AGROP NOVA a.s., Pletenský Dvůrek 99, Pletň, Czech Republic, www.novatosystem.com</small>		

## STORAGE

The panels must be stored in an enclosed, dry space and positioned horizontally. After the removal of the protective casing, they must be carefully covered, preferably with a different sheet material.

The panels must be protected from adverse weather conditions, even on the construction site, and stored there for only the necessary time. It is essential to avoid exposing of the panels to rain and flowing water. For the protection against water, dirt and excessive solar radiation, we recommend using tarps.

**Warning:** Improper storage may result in damage, for which the producer assumes no liability.

## TRANSPORT

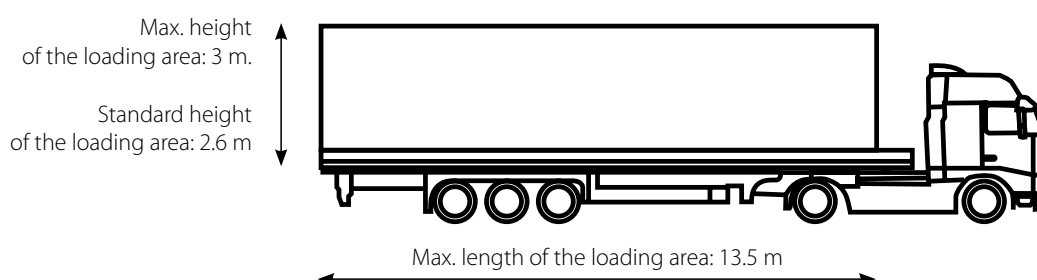
As a standard, the panels are transported in lorries (covered semi-trailers), possibly in containers. For the lorries, it is necessary to ensure entry in and exit from the construction site.

**Warning:** The panels must be at all times protected against adverse weather conditions. During longer transport under adverse climatic conditions, a change in the moisture of the panels may occur; that is why we recommend acclimatisation before processing it (gradual drying, gradual changes of temperature).

### Maximum parameter of the load: 50 m<sup>3</sup>/24 t

At present, only horizontal loading of packages is possible. The transport of NOVATOP components is possible with different types of trucks and depends on the dimensions of the packages, ways of unloading and transport accessibility to the building site. It is necessary to ensure entry and exit of these vehicles onto the site. According to the particular conditions, when the cargo is smaller, a surcharge will be imposed due to inefficient utilization of the transport capacity.

package width	length packet	way of landing	transportation facilities	supplementary charge
≤ 2,1 m	max. 6 m	electric crane	trailer with a standard-size sheet	
		lift truck	trailer with a standard-size sheet	
max. 2,4 m	max. 12 m	electric crane	trailer with a sheet with a possibility of removing the support in the upper part	
		lift truck	trailer with a sheet with the possibility of displacement of the central pillars	
max. 2,5 m	max. 6,5 m	electric crane	uncovered trailer	✓
		lift truck	trailer with a sheet with the possibility of displacement of the central pillars	
max. 2,48 m	max. 12 m	electric crane	uncovered trailer	✓
		lift truck	trailer with a sheet with the possibility of displacement of the central pillars	
2,5–3 m	max. 12 m	electric crane	uncovered trailer	✓
		lift truck	uncovered trailer	✓





# NOVATOP SOLID

## MANIPULATION, ASSEMBLY

### MANIPULATION

Due to the high weights of the panels, cranes and special vehicles (forklift trucks) are suitable for manipulation. It is always necessary to define in advance the maximum lifting load and range. During manipulation, it is necessary to ensure protection of the packaging material, surfaces and edges of the panels to avoid damage.

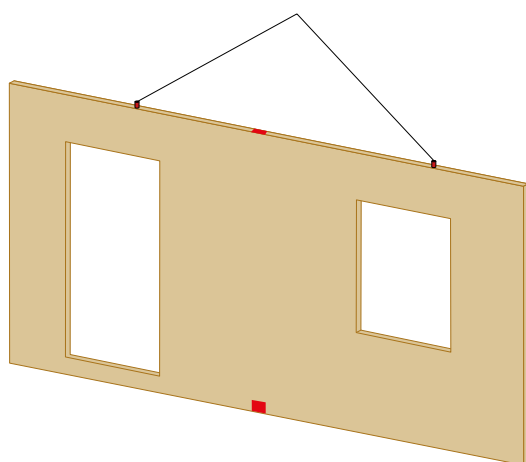
When handling NOVATOP SOLID panels, there are used suspension screws (price list item 011.001) and suspension metal shackles (price list item 011.002), which can be ordered from the manufacturer.

When screwing the screws, it is necessary to take into account the centre of gravity of each panel. The maximum load of the suspension screws screwed into the depth of 145 mm is given by their load capacity. When screwing perpendicularly to the fibres, one screw has load capacity of 850 kg, and, when screwing longitudinally to the fibres, one screw has load capacity of 260 kg. The number of screws per panel is determined by the load capacity of individual screws, usually two screws per one manipulated panel are used.

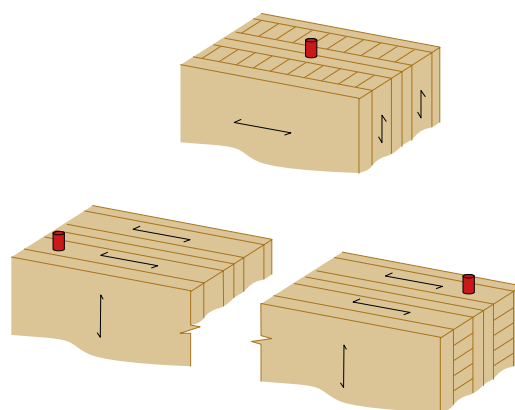
Crane straps, chains and thimbles must be provided by the customer.

**Warning:** The panels must be at all times protected against adverse weather conditions.

Recommended manipulation



Recommended placement of the screw in the direction of fibers



### ASSEMBLY

The custom-made panels (in exact formats, with selected processing of joints, with openings for windows and doors and with other individual adjustments) are forwarded directly to the assembly point. Individual panels are fitted by means of a crane. You can build directly from the truck, without further intermediate warehouse manipulation. The panels are connected with wood screws and the connection with other structures is carried out using various kinds of building hardware. We recommend determining the exact position with the help of tightening ratchets. For more information, see "Instructions for assembly".

**Warning:** The panels must be at all times protected against adverse weather conditions.

The recommended relative humidity of the environment in which NOVATOP panels are installed is 55% at 20°C. Wood cracks may occur due to low air humidity.

**Warning:** Wood properties of this product are maintained, so they respond to changes in temperature and humidity by shrinking or, possibly, by swelling. Improper storage and use in extreme conditions (extreme temperatures and humidity) can cause cracking and distortions.

The producer assumes no liability for the damage of the product due to improper storage, processing, unsuitable use or nonobservance of work procedures during the assembly.



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[novato-system.com](http://novato-system.com)

Manufacturer certificates:



The technical documentation and the certificates  
 can be downloaded at [www.novato-system.com](http://www.novato-system.com)