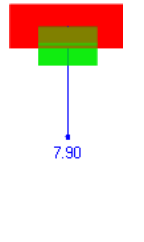
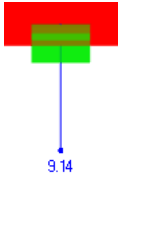
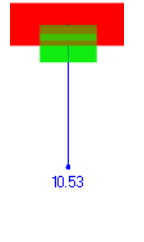
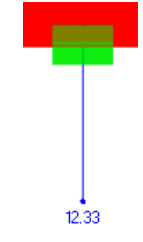
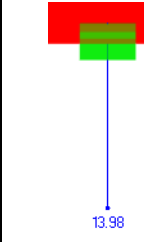
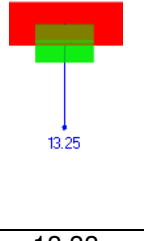
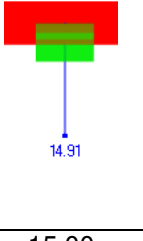
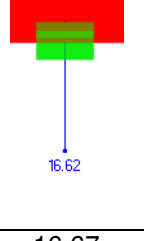
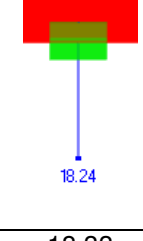
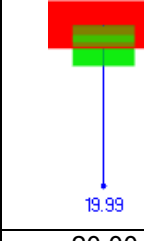
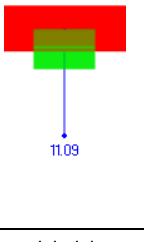
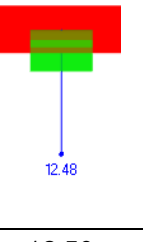
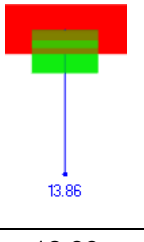
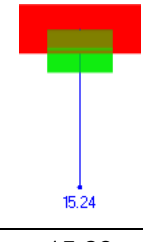
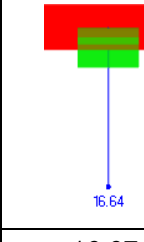
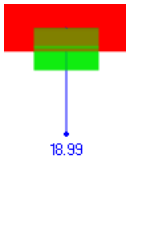
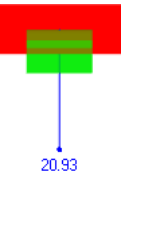
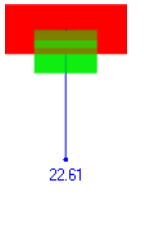
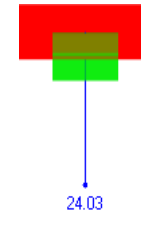
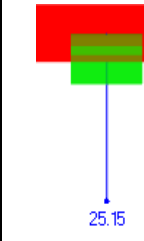


## 1. Carga máxima admissível do painel CRIPTOLAM F210

– Flecha máxima final (L/300)

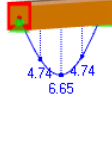
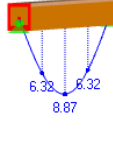
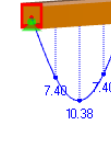
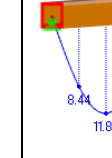
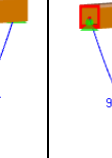
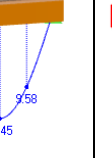
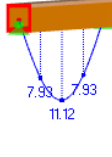
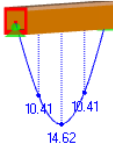
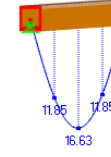
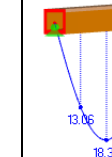
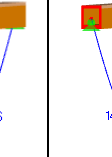
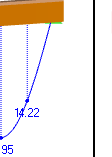
Vão [m]	4.0	4.5	5.0	5.5	6.0
<b>Carga max. [kg/m<sup>2</sup>] para além de: pp painel + Q = 200 kg/m<sup>2</sup></b>	<b>650</b>	<b>400</b>	<b>240</b>	<b>130</b>	<b>55</b>
<b>FLECHA INSTANTÂNEA   ELS - Combinação (P<sub>sd</sub> = G+Q)</b>					
Deformação [mm]	 7.90	 9.14	 10.53	 12.33	 13.98
Flecha max. (L/360) [mm]	11.11	12.50	13.89	15.28	16.67
<b>FLECHA FINAL   ELS - Combinação (P<sub>sd</sub> = 1.8G+1.24Q)</b>					
Deformação [mm]	 13.25	 14.91	 16.62	 18.24	 19.99
Flecha max. (L/300) [mm]	13.33	15.00	16.67	18.33	20.00

– Flecha máxima final (L/200)

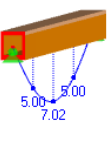
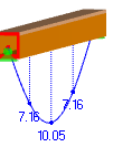
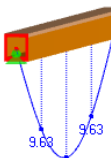
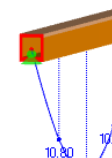
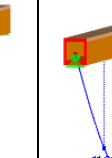
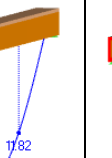
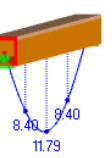
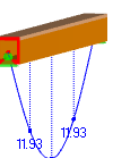
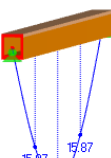
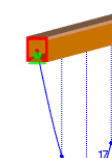
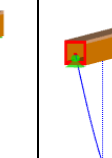
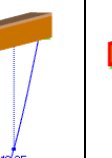
Vão [m]	4.0	4.5	5.0	5.5	6.0
<b>Carga max. [kg/m<sup>2</sup>] para além de: pp painel + Q = 200 kg/m<sup>2</sup></b>	<b>1000</b>	<b>640</b>	<b>400</b>	<b>235</b>	<b>120</b>
<b>FLECHA INSTANTÂNEA   ELS - Combinação (P<sub>sd</sub> = G+Q)</b>					
Deformação [mm]	 11.09	 12.48	 13.86	 15.24	 16.64
Flecha max. (L/360) [mm]	11.11	12.50	13.89	15.28	16.67
<b>FLECHA FINAL   ELS - Combinação (P<sub>sd</sub> = 1.8G+1.24Q)</b>					
Deformação [mm]	 18.99	 20.93	 22.61	 24.03	 25.15
Flecha max. (L/200) [mm]	20.00	22.50	25.00	27.50	30.00

## 2. Carga máxima admissível do painel ISOLAM R230

– Flecha máxima final (L/300)

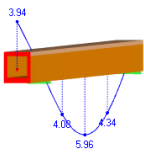
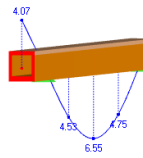
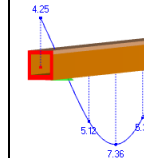
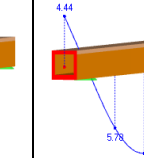
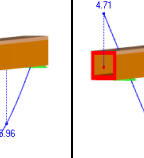
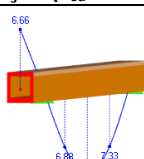
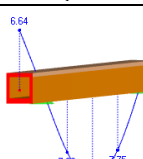
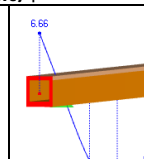
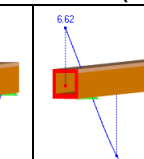
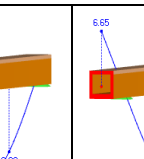
Vão [m]	4.0	4.5	5.0	5.5	6.0	6.5
<b>Carga max. [kg/m<sup>2</sup>] para além de: pp painel + Q = 40 kg/m<sup>2</sup> + Q<sub>neve</sub> = 110 kg/m<sup>2</sup></b>	<b>650</b>	<b>550</b>	<b>375</b>	<b>250</b>	<b>160</b>	<b>95</b>
<b>FLECHA INSTANTÂNEA   ELS - Combinação (P<sub>sd</sub> = G+Q)</b>						
Deformação [mm]						
Flecha max. (L/360) [mm]	11.11	12.50	13.89	15.28	16.67	18.06
<b>FLECHA FINAL   ELS - Combinação (P<sub>sd</sub> = 1.8G + 0.94Q + 1.16Q<sub>neve</sub>)</b>						
Deformação [mm]						
Flecha max. (L/300) [mm]	13.33	15.00	16.67	18.33	20.00	21.67

– Flecha máxima final (L/200)

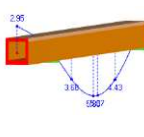
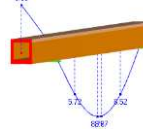
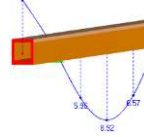
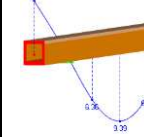
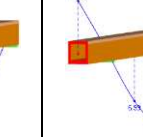
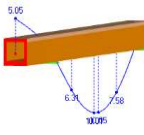
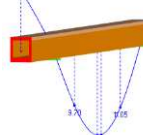
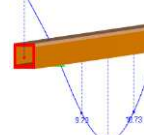
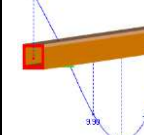
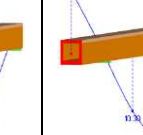
Vão [m]	4.0	4.5	5.0	5.5	6.0	6.5
<b>Carga max. [kg/m<sup>2</sup>] para além de: pp painel + Q = 40 kg/m<sup>2</sup> + Q<sub>neve</sub> = 110 kg/m<sup>2</sup></b>	<b>*700</b>	<b>*650</b>	<b>*550</b>	<b>375</b>	<b>245</b>	<b>150</b>
<b>FLECHA INSTANTÂNEA   ELS - Combinação (P<sub>sd</sub> = G+Q)</b>						
Deformação [mm]						
Flecha max. (L/360) [mm]	11.11	12.50	13.89	15.28	16.67	18.06
<b>FLECHA FINAL   ELS - Combinação (P<sub>sd</sub> = 1.8G + 0.94Q + 1.16Q<sub>neve</sub>)</b>						
Deformação [mm]						
Flecha max. (L/200) [mm]	20.00	22.20	25.00	27.50	30.00	32.50

\* Limitação imposta pelo Estado Limite Último à Flexão

- Flecha máxima final (L/300) com 1 metro de consola livre

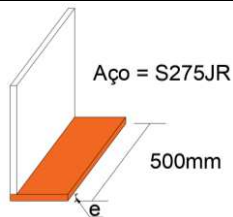
Vão [m]	4.0	4.5	5.0	5.5	6.0
<b>Carga max. [kg/m<sup>2</sup>] para além de: pp painel + Q = 40 kg/m<sup>2</sup> + Q<sub>neve</sub> = 110 kg/m<sup>2</sup></b>	<b>650</b>	<b>435</b>	<b>305</b>	<b>145</b>	<b>75</b>
<b>FLECHA INSTANTÂNEA   ELS - Combinação (P<sub>sd</sub> = G+Q)   Flecha max. na consola (L/200 = 1000/200 = 5mm)</b>					
Deformação [mm]					
Flecha max. (L/360) [mm]	11.11	12.50	13.89	15.28	16.67
<b>FLECHA FINAL   ELS - Combinação (P<sub>sd</sub> = 1.8G + 0.94Q + 1.16Q<sub>neve</sub>)   Flecha max. na consola (L/150 = 1000/150 = 6.66mm)</b>					
Deformação [mm]					
Flecha max. (L/300) [mm]	13.33	15.00	16.67	18.33	20.00

- Flecha máxima final (L/300) com 1.5 metro de consola livre

Vão [m]	4.0	4.5	5.0	5.5	6.0
<b>Carga max. [kg/m<sup>2</sup>] para além de: pp painel + Q = 40 kg/m<sup>2</sup> + Q<sub>neve</sub> = 110 kg/m<sup>2</sup></b>	<b>700</b>	<b>600</b>	<b>435</b>	<b>240</b>	<b>125</b>
<b>FLECHA INSTANTÂNEA   ELS - Combinação (P<sub>sd</sub> = G+Q)   Flecha max. na consola (L/200 = 1500/200 = 7.5mm)</b>					
Deformação [mm]					
Flecha max. (L/360) [mm]	11.11	12.50	13.89	15.28	16.67
<b>FLECHA FINAL   ELS - Combinação (P<sub>sd</sub> = 1.8G + 0.94Q + 1.16Q<sub>neve</sub>)   Flecha max. na consola (L/150 = 1500/150 = 10mm)</b>					
Deformação [mm]					
Flecha max. (L/300) [mm]	13.33	15.00	16.67	18.33	20.00

### 3. Verificação da cantoneira metálica de suporte à laje CRIPTOLAM F210

Valores resistentes $V_{Rd}$ (kN)			Valores atuantes				
Espessura das chapas [mm]			Vão (m)	1.35G (35+50) +1.5Q (200)		Admissível <sup>a)</sup>	
e=10	e=8	e=6		Carga (kg/m <sup>2</sup> )	$V_{Ed}$ (kN)	Carga (kg/m <sup>2</sup> )	$V_{Ed}$ (kN)
22.14	14.17	7.97	4.0	415	5.05	1177	12.67
			4.5		5.68	840	10.46
5.0	6.31	624	8.92				
5.5	6.94	475	7.77				
6.0	7.57 <sup>b)</sup>	374	6.96				



a) Considerando um limite de L/300; b) Considerando um limite de L/200

### 4. Tensão resistente a considerar na verificação das paredes

No que diz respeito à verificação da segurança das paredes do sistema construtivo, o valor da resistência à compressão perpendicular às fibras a considerar deverá ser aquele prescrito pela norma NP4544:2015, uma vez que todos os ensaios realizados conduziram a valores superiores para a resistência à compressão perpendicular às fibras da madeira de criptoméria.

Dados	Classe de Qualidade (NP 4544:2015)	
	CYS II	CYS I
Valor característico de resistência à compressão perpendicular às fibras $f_{c,90,k}$ (MPa)	1.80	2.20
Valor de cálculo de resistência à compressão perpendicular às fibras $f_{c,90,d}$ (MPa)	1.25	1.52
Valor mínimo encontrado nos ensaios CD_DCC $f_{c,90}$ (MPa)	1.60	

## 5. Verificação de um apoio nas paredes de uma viga de cumeeira

Dados	Classe de Qualidade (NP4544:2015)	
	CYS II	CYS I
Valor característico de resistência à compressão perpendicular às fibras $f_{c,90,k}$ (MPa)	1.80	2.20
Valor de cálculo de resistência à compressão perpendicular às fibras $f_{c,90,d}$ (MPa)	1.25	1.52
Valor mínimo encontrado nos ensaios CD_DCC $f_{c,90}$ (MPa)	1.60	
<b>Carga máxima admissível nas Paredes W180</b>	<b>15.95</b>	<b>19.50</b>
<b>Carga máxima admissível nas Paredes W90</b>	<b>7.98</b>	<b>9.75</b>

Com a aplicação dos valores sugeridos pela NP4544:2015 para a resistência à compressão perpendicular às fibras, as forças máximas aplicáveis são de 15.95kN e 7.98kN para as paredes exteriores (W180) e interiores (W90), respetivamente.

## 6. Resistência à compressão no plano das paredes W180

Considerando as duas classes de qualidade previstas pela norma NP4544:2015 para a madeira de criptoméria, de seguida apresentam-se os valores para as cargas máximas admissíveis a considerar para as paredes W180.

Tabela – Cargas máximas admissíveis para as paredes W180

Dados	Classe de Qualidade	
	CYS II	CYS I
Valor característico de resistência à compressão perpendicular às fibras $f_{c,90,k}$ (MPa)	1.80	2.20
Valor de cálculo de resistência à compressão perpendicular às fibras $f_{c,90,d}$ (MPa)	1.25	1.52
<b>Carga máxima admissível nas Paredes W180 (kN/m)</b>	<b>99.65</b>	<b>121.85</b>