WIND LOAD CALCULATION

TLG MATERIALS ACM strength calculations:

The composite technology of TLG MATERIALS ACM makes the material very light and extremely rigid. For these reasons, TLG MATERIALS ACM is used across the world in many different sign and architectural projects, including those at substantial height subjected to high wind load and wind suction conditions.

The following guide has been designed to enable easy calculations for any ACM project subject to windy conditions.

TLG MATERIALS presents a "truss" where characteristics of the panel are determined by characteristics of its upper and bottom Aluminum layers. Our Aluminum layers are made of Aluminum alloy with tensile yield strength of 22000psi.This is the maximum tension that material can bear before deformations become irreversible.

TLG MATERIALS ACM is available in different thicknesses so, please refer to the following formula and table to calculate the apparent thickness of your exact ACM type.

T- apparent thickness of ACM

$$T=\sqrt{\frac{Tpanel^3 - Tcore^3}{Tpanel}}$$

Tpanel- total thickness of ACM

Tcore- thickness of core material

The next considerations are loading and support conditions. Support conditions are determined by the installation methods used. Wind pressure and suction loads are determined by height on which panels are going to be installed and the situation of the building -local building and wind codes should be referred for this information. Depending on support conditions,diferent calculation methods should be used. Please choose your support conditions from the table below and use the appropriate formula from the next column to calculate the exact figure of the stress.

W-unit area load,psf

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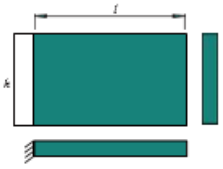
Please see table for apparent thicknesses for ACM types:

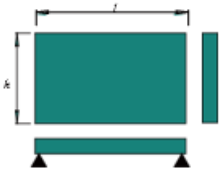
Product	Panel Thickness (mm)	Aluminum Layer Thickness(mm)	Apparent Thickness
ACM 2	2	0.3	0,0638
ACM 3	3	0.3	0,0827
ACM 4	4	0.3	0,0976
ACM 5	4	0.5	0,1197
ACM 6	6	0.5	0,1531

1. 1 side fixed, 3 sides free;
evenly distributed load.



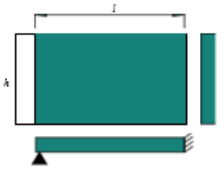
$$\sigma = \frac{3wl^2}{T^2}$$

2. 2 sides simply supported,
2 sides free;
evenly distributed load.



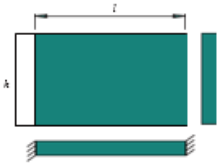
$$\sigma = \frac{3}{4} \times \frac{wl^2}{T^2}$$

3. 1 side fixed opposite side
simply supported, 2 sides free;
evenly distributed load.



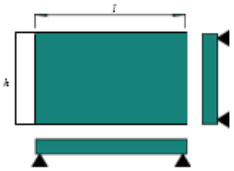
$$\sigma = \frac{3}{4} \times \frac{wl^2}{T^2}$$

4. 2 sides fixed, 2 sides free;
evenly distributed load.



$$\sigma = \frac{1}{2} \times \frac{wl^2}{T^2}$$

5. 4 sides simply supported;
evenly distributed load.



$$\sigma = \beta \times \frac{wl^2}{T^2}$$

l/h	1	1.2	1.4	1.6	1.8	2.0	3.0
ß	0.2874	0.3762	0.4530	0.5172	0.5688	0.6102	0.7134

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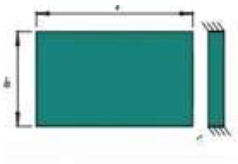
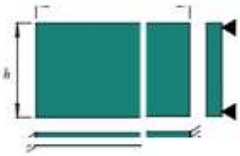
6. Four sides fixed;
evenly distributed load.



$$\sigma=\beta \times \frac{wl^2}{T^2}$$

l/h	1	1.2	1.4	1.6	1.8	2.0	∞
ß	0.3087	0.3834	0.4356	0.4680	0.4872	0.4974	0.05

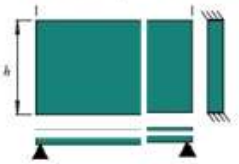
7. Longer sides fixed, shorter sides simply supported;
evenly distributed load.



$$\sigma=\beta \times \frac{wl^2}{T^2}$$

l/h	1	1.2	1.4	1.6	1.8	2.0	∞
ß	0.4182	0.4086	0.4860	0.4968	0.4971	0.4973	0.5

8. Longer sides simply suported, shorter sides fixed;
evenly distributed load.



$$\sigma=\beta \times \frac{wl^2}{T^2}$$

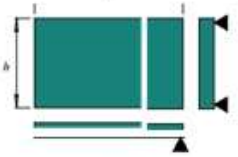
l/h	1	1.2	1.4	1.6	1.8	2.0	∞
B	0.4182	0.5208	0.5988	0.6540	0.6912	0.7146	0.75

9. 1 longer side fixed, another longer side free, shorter sides simply supported;
evenly distributed load.

$$\sigma=\beta \times \frac{wl^2}{T^2}$$

l/h		1.5	2	3	∞
ß	0.714	1.362	1.914	2.568	3

10. 1 shorter side free, other sides simply supported;
evenly distributed load.



$$\sigma=\beta \times \frac{wl^2}{T^2}$$

l/h	1	1.5	2	4
ß	0.67	0.77	0.79	0.8

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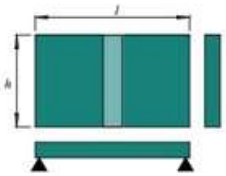
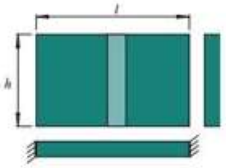
11.2 sides simply supported,2 sides free,centre load



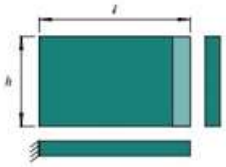
$$\sigma = \frac{3}{4} x \frac{wh}{lT^2}$$

12.2 sides fixed,2 sides free, centre load



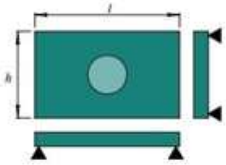
$$\sigma = \frac{3}{4} x \frac{wh}{lT^2}$$

13.1 side fixed,other sides free, tip load



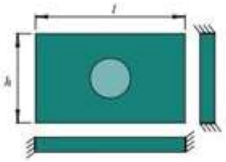
$$\sigma = 6 x \frac{wh}{lT^2}$$

14.4 sides simply supported, concentrated centre load



$$\sigma = 0.145 x \frac{w}{T^2} x (4.3 \log \frac{2l}{\pi r} + 1 - 3.3ß)$$

15.4 sides fixed,concentrated centre load



$$\sigma = \beta x \frac{w}{T^2}$$

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