1. Center of gravity (centroid) calculation:

$$\mathbf{X_{cg}} = \frac{\sum(Xi\ .\ Wi)}{\sum Wi}$$

$$\mathbf{Y_{cg}} = \frac{\sum(yi\ .\ Wi)}{\sum Wi}$$

where,

X_{CG}, Y_{CG} are the coordinates of the center of gravity

x_i, y_i are the coordinates of the centroid of each layer (internal, external, insulation, etc)

w_i are the weights of each layer (this could depend on thickness and material properties , e.g. density)

this formula ensures that the center of gravity is located within the object, as mentioned in the document.

2. Insulation layer thickness formula:

$$t_{4=}\ (t_2+t_3t_1)\ -t_5$$

where,

t_1, t_2, t_3 are the thickness of the internal, external, and other relevant layers.

t_5 is the cumulative thickness that includes the external, internal, and any existing layers´ thickness.

3. Area of holes in the layers:

For a circular hole

$$A_{hole} = \pi r^2$$

where:

r is the radius of the hole.

for rectangular holes, use:

$$A_{hole} = W.H$$

where:

.W and H are the width and height of the hole.

4. ## Common Surface Condition:

$$Y_2 < H_1, \text{ and } X_2 < W_1$$

this ensures that the two layers physically connect properly and don't have any disjointed edges, which would affect the insulation and structural stability.

Conclusion:

use center of gravity formulas to ensure stability
use the insulation thickness formula to adjust the insulation layer appropriately.
use area formula for the holes to assess their impact on weight distribution.
check the common surface condition for layer coherence.