

TGN 24.3 [Technical Guidance Note] Ballast Calculations – Inverted Roofs

To calculate the amount of gravel ballast required to prevent an insulation board from floating on a standard inverted roof*, you need to consider the buoyancy force acting on the board and counterbalance it with the weight of the gravel. The below is a working example to assist in undertaking these calculations.

*** This guidance does not apply to an inverted blue roof, which is likely to require significantly increased ballast weights due to the potential build-up of water a blue roof is designed to accommodate.**

The buoyancy force on an object submerged in a fluid is equal to the weight of the fluid it displaces. In typical inverted roofs, the fluid is air, and the insulation board is preventing it from flowing through the roof. Therefore, the buoyancy force is equal to the weight of the insulation board itself.

The weight of the insulation board can be calculated by multiplying its volume by its density. The density will depend on the material used for the insulation board.

Let's assume the volume of the insulation board is 1 cubic meter (1 m^3), and its density is 1000 kg/m^3 . Therefore, the weight of the insulation board is:

$$\text{Weight} = \text{Volume} \times \text{Density} = 1 \text{ m}^3 \times 1000 \text{ kg/m}^3 =$$

$$\text{Weight of Insulation} = 1000 \text{ kg}$$

To prevent the board from floating, the weight of the gravel ballast should be equal to or greater than the weight of the insulation board. Let's assume the density of the gravel is 1500 kg/m^3 . Therefore, the volume of the ballast required can be calculated as:

$$\text{Volume of ballast} = \text{Weight of insulation board} / \text{Density of gravel} = 1000 \text{ kg} / 1500 \text{ kg/m}^3 =$$

$$\text{Volume of ballast} = 0.67 \text{ m}^3$$

This returns a value of approximately 0.67 cubic meters (m^3) of gravel ballast will be required to stop the insulation board from floating on the inverted roof.

Critically, Moy Materials Ltd recommend an appropriate safety factor is added to any calculation.