Ch 10. Modulus of Foundation

Wear Slabs Poured over Rigid Insulation

- Load capacity is a function of:
  - Concrete strength
  - Concrete thickness
  - Reinforcement
  - Modulus of Foundation of substrate

Modulus of Foundation of Plastic Foam Insulation

- Density and resultant compressive strength of rigid foam insulation
- Thickness of layers
- Number of layers

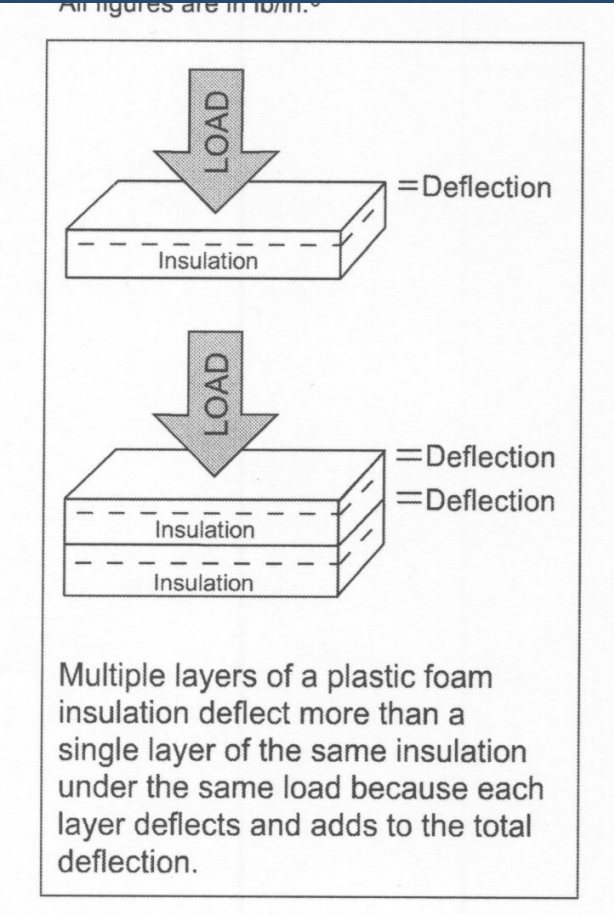
Modulus of Foundation of Plastic Foam Insulation

Table I – Foundation Modulus for STYROFOAM Brand Insulation[1]

Grade of STYROFOAM Brand Insulation	Thickness of Insulation (in.)					
	1	1.5	2	2.5	3	4
FREEZERMATE	–	–	700	655	610	525
High Load 40	1275	1100	980	850	750	600
High Load 60	1600	1400	1250	1100	1000	800
High Load 100	2300	2050	1800	1600	1400	1100

[1]All figures are in lb/in.3

Multiple Layers of Insulation

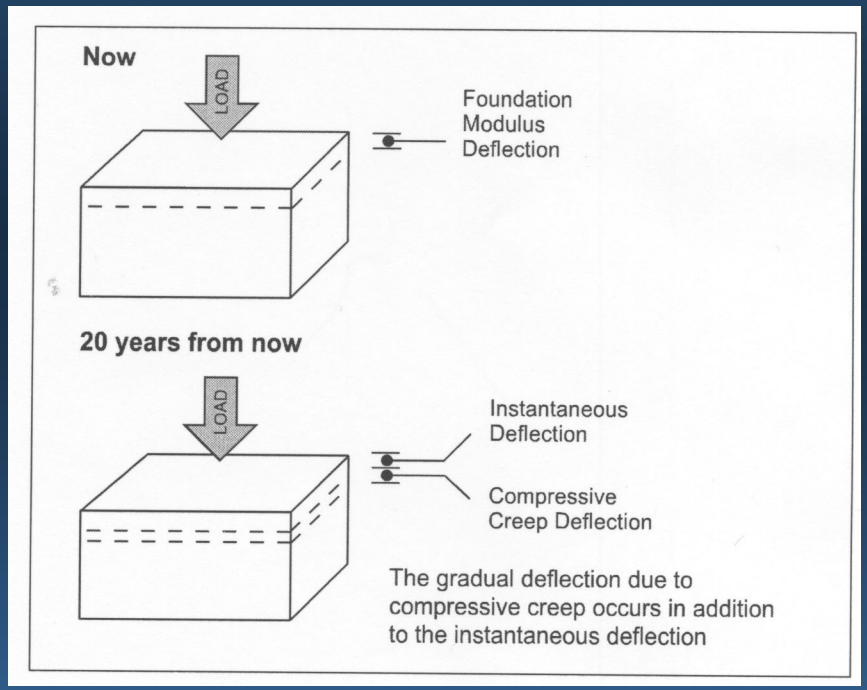


Multiple layers of a plastic foam insulation deflect more than a single layer of the same insulation under the same load because each layer deflects and adds to the total deflection.

The Foundation Modulus for multiple layers of insulation is equal to the Foundation Modulus of one of the layers divided by the total number of layers, if the layers are identical

Compressive Creep

- Creep is gradual, permanent deformation under constant load that is in addition to elastic deformation.
- Known as Compressive Creep



Limiting Compressive Creep

- Guidelines:
  - Compressive Creep should be limited to 2% of insulation thickness
  - To achieve guideline, do not exceed a load of one third the compressive strength of the insulation
  - Also – live loads should be limited to one fifth of the design compressive strength

Example Live and Dead Loads

Load Limit	Grade of STYROFOAM brand insulation			
	FREEZERMATE	High Load 40	High Load 60	High Load 100
Live (lb/in.^{2})	6.0	8.0	12.0	20.0
Dead (lb/in.^{2})	10.0	13.3	20.0	33.3

Example only – unique to Styrofoam Brand Insulation

Design of Concrete Slabs

- Based on the Theory of Plates on Elastic Foundations

Source: Theory of Plates ans Shells, Timoshenko and Woinowsky-Krieger: McGraw Hill 1959

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