



## TECHNICAL BULLETIN No. 1009

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**SUBJECT: INSULFOAM EPS IN BELOW CONCRETE SLAB APPLICATIONS**

Insulfoam's expanded polystyrene (EPS) products have been used in below-concrete slab applications for over 40 years. These applications include numerous residential and commercial projects including cold storage facilities, wineries, warehouses and distribution centers.

The key to successful use of Insulfoam's insulation products in these types of applications is to accurately determine the stresses that the below slab insulation will encounter. This determination can be accomplished by turning to *The Theory of Plates and Elastic Foundations* found in Theory of Plates and Shells, second Edition by Timoshenko and Woinowsky-Krieger, McGraw-Hill, 1959.

The maximum pressure on the elastic foundation under a given point load can be determined by using the following formula:

$$\text{Max Pressure on InsulFoam EPS} = \frac{P}{8} \sqrt{\frac{K}{D}}$$

Where:

P = Load on concrete slab (pounds)

K = Sub Grade Modulus (k/EPS thickness)

D =  $Eh^3 / 12(1 - u^2)$

E = Modulus of Elasticity of Concrete Slab 57000 \* SQRT(concrete strength)

h = Concrete Slab Thickness

u = Poison's Ratio of concrete (0.15)



The Sub-grade Modulus (k) for 1” of InsulFoam EPS is:

<b>Insulfoam EPS Type</b>	<b>k for 1” thickness</b>
Type I	360 lb/in <sup>2</sup>
Type VIII	580 lb/in <sup>2</sup>
Type II	730 lb/in <sup>2</sup>
Type IX	1090 lb/in <sup>2</sup>
Type XIV	1500 lb/in <sup>2</sup>
Type XV	1860 lb/in <sup>2</sup>

The Sub-grade Modulus (k) for 1” of InsulFoam R-Tech is:

<b>Insulfoam R-Tech Type</b>	<b>k for 1” thickness</b>
R-Tech	360 lb/in <sup>2</sup>
R-Tech X	730 lb/in <sup>2</sup>
R-Tech IV	1090 lb/in <sup>2</sup>
R-Tech VI	1500 lb/in <sup>2</sup>
R-Tech VII	1860 lb/in <sup>2</sup>

For product thicknesses greater than 1 inch in thickness, the K value for the total thickness of InsulFoam Insulation is determined by dividing the 1 inch thick value by the total thickness of the insulation.  $K=k(1\text{ inch})/\text{total thickness of insulation}$ . Since the stresses on the InsulFoam products are kept within the elastic range of the material, long term cold creep will not be a factor in determining the InsulFoam Insulation type.

The project designer must check the concrete slab to make sure it has adequate capacity.

For more information or to obtain help with the selection of the InsulFoam Insulation required on your project contact your local Insulfoam sales rep. You can obtain a current listing of all the Insulfoam Sales reps from our website at [www.insulfoam.com](http://www.insulfoam.com).