UNISORB®
INSTALLATION SOLUTIONS

GB-0213-1.1

FOUNDATION ISOLATION INFORMATION

Description Of Material

Unisorb foundation isolation materials are manufactured by the traditional “felting” process. The materials are manufactured in two densities (the harder for application to the base surface foundation blocks and the softer for the application to the vertical sidewall surfaces). These materials have a surface treatment consisting of a nylon fabric covering sealed with an acrylic coating to prevent the incursion of fluid concrete during the construction phase. The dense material is designated IB-500-B1 and is manufactured in a 3’ x 6’ sheet, ½” thick. The soft material is designated IB-500-S2, and is also manufactured in a 3’ x 6’ sheet, ½” thick.

It is our standard practice to furnish these materials in two ways, in bulk (3’ x 6’ sheets), or in a custom cut-to-size kit which exactly fits the foundation to which it is going to be applied. The approach chosen is strictly a matter of customer preference. The material can be easily cut with a sharp knife and when foundation dimensions are apt to vary, it is recommended that the material be purchased in bulk. When a considerable amount of cutting will be required, it is often to the customer’s cost advantage to purchase from us a custom kit which would require no field modification before installation.

In most installations a single layer of ½” IB-500-S2 is used on the vertical sidewall portions of the foundations, with two layers (each ½” thick to make a total 1” thick layer) of IB-500-B1 applied to the base surface. The 1” thickness of the base is desirable to provide load deflection characteristics which will optimize the performance of the isolation system. A single layer can be employed but will result in a reduction in overall efficiency.
Installation Techniques

Installation Techniques

Installation is usually accomplished in one of two ways. The first approach involves preparing an excavation the exact size of the finished foundation. Pad material is then placed on the bottom and on the sides of the excavation with the concrete foundation being poured directly into the cavity. This approach normally works well with inertia block up to about 3’ deep. The limiting factor here is the stability of the soil and whether or not a vertical wall can be dug.

The second method involves excavation to dimensions a couple of feet oversize, placing the base material and forming the sidewalls of the foundation. The inertia block is then cast inside the forms. After the forms are removed the isolation material is applied to the perimeter of the inertia block foundation and back-filling against the isolation pads completed.

In some soil conditions it may be necessary to cast a concrete vault into which the isolation material and subsequently inertia block foundation are placed.

As wet concrete will be placed directly against the isolation material surfaces, it is important that the joints in the isolation material be sealed with vinyl tape (or equivalent) to assure that no fluid concrete enters the joint thereby “short circuiting” the isolator.

It is recommended that the exposed edge of the isolation material (at floor level) be sealed with a pliable mastic compound.

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Theory of Operation

In the installation of precision tools there are two main objectives: That the machine be properly supported and that adequate isolation from external disturbances (shock/vibrations, etc.) be provided.

The isolated inertia block approach provides a solution to both problems in a cost effective manner. The primary considerations are:

1. Machine support is provided. The massive foundation block represents a uniform stiff member to which the machine is connected. Properly designed, the reaction to dynamic loads will be the same at any point on the foundation, contributing to overall consistency of performance.

2. The use of isolation material in conjunction with a large foundation block significantly limits outside disturbances felt by the machine. (It is important to note that the mass of block itself is a very necessary part of the system.) Ambient shock and vibration may be reduced as much as 80% or better in the average installation.

3. The disturbances that do arrive at the foundation proper tend to cause the machine and foundation to move as a single unit—having an equal affect on all portions of the machine. Also, the inertia block is free from stress induced by changing loads imposed on building floors. Without the isolated inertia block this would cause inconsistencies in the way the floor reacts to a given machine imposed load.

Why Not Other Materials

Traditionally, several other materials have been used to isolate foundations. They include: Cork, fiberboard, various types of foam material, wooden timbers and “dried river-bottom sand.” Each of these approaches has merit but over the long run, they have all proven inferior to the Unisorb felt isolation material both in performance and durability.

CORK: Cork sheeting is occasionally specified for foundation isolation material. The basic problem with cork is its tendency to crumble under long exposure to vibratory loads. Several cases can be cited where foundations have settled unevenly as the cork material beneath their base is deteriorated. Vibration isolation performance with cork is acceptable, with durability being the primary problem. Typical life expectancy for a cork isolated foundation would be less than 5 years.

FIBERBOARD: (Referring to many items in a family of asphalt impregnated fiber boards commonly used for expansion joint material in concrete construction.) In the application for which they are intended their performance is fine. The problem comes when these materials are used for vibration isolation. They have a tendency to compact into a dense thin mass with continued exposure to shock and vibration. Once this compaction has taken place, they present no barrier to the transmission of shock and vibration. It has been our experience that foundations so installed typically exhibit significant changes within the first year of life.

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FOAMS: There are several products available that fall into the category of foamed plastic materials which are occasionally used for foundation isolation. A main problem with these materials is durability when exposed to oils and other chemicals found in the typical industrial environment. The performance of these materials as vibration isolators depends on their remaining in good condition. The primary difference between foam and felt is that the foam does not have the ability to dissipate as much energy internally as the felts; and the difference is clearly seen in the more severe applications.

WOODEN TIMBERS: Wood has often been specified to maintain a barrier around the perimeter of foundations to prevent transmission of heavy shocks. Where conditions are extreme, some relief can be obtained through the use of wood over having done nothing at all. For the most part, wooden support systems tend to be too stiff and, therefore, transmit a high percentage of shock and vibration loads directly into the foundation. Another problem is life expectancy for below grade installations. The life expectancy problem coupled with the overall low efficiency of this approach makes it a poor choice.

RIVER SAND: Many manufacturers of machine tools requiring foundations have specified the use of dried river-bottom sand around the perimeter of the foundation. This approach does offer some vibration isolation with the primary mechanism being the ability of the river sand (which has rounded corners) to permit the inertia block to move slightly when excited by an external force. The problem with the river sand approach lies in that the sand compacts with time into a stiffer mass. Also, the presence of ground water may cause the sand to migrate from its original location and will accelerate the compaction of the material into a hard mass which is capable of transmitting nearly 100% of incoming shock and vibration to the foundation.

Advantages of Unisorb Felts

When compared with the materials above, Unisorb felts offer superior performance as a vibration isolator because they have been specifically engineered to provide load/compression rates which are optimum for the inertia block foundation. Also, it is the natural property of the felted materials to have a higher coefficient of internal damping (and hence the ability to absorb significantly more energy) than any of the other materials noted. As far as durability is concerned, Unisorb felts are totally unaffected by oils, coolants and other cutting fluids normally found in the industrial environment. In the foundation isolation application, the materials are very conservatively applied to assure that no change in physical properties will occur over an extended period.

The overall suitability of these materials for this application is borne out by the fact that we have documented installations ranging back to the 1950's with performance continuing unchanged today. The variety of equipment installed using Unisorb foundation isolation felts ranges from the most precision machine to presses in the 1200 ton capacity and above range.

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