ROGERS CORPORATION

BISCO® Silicones

High Performance Foams Division
www.rogerscorp.com

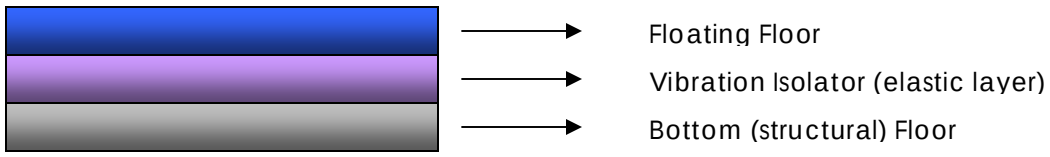
Technical Bulletin

Reducing Noise and Vibration within Passenger Railcars

The impact of vibration on product quality and consumer satisfaction makes vibration control a key design factor in all passenger rail cars. Low levels of noise and vibration are important elements for commercially competitive products because they affect traveler's comfort and satisfaction. In trains, noise performance can be significantly improved by reducing the transmission of structure-borne vibration and airborne sound from the tracks to the passenger compartment via the floor. Rogers BISCO® Silicones are reactive solutions to noise that block the path of sound and vibration into the vehicle.

Vibration control is an important design consideration in transportation vehicles as the constant motion of parts while the vehicle is moving can result in noise and possible damage to the structural frame or components. Vibration occurs in a frequency range of 0 - 500 Hz in various areas of a railcar. Although spray damping treatments are often applied to various surfaces of the railcar body to dissipate structure-borne vibration, this solution alone will not provide optimal noise reduction. Individual components such as HVAC units, fans, interior panels, floors, and seats must be isolated from vibration as well to improve function and reliability and to provide a quiet ride. Rogers High Performance foam tapes, such as laminated grades of Rogers BISCO BF-1000 and BF-2000 foams, can be selectively applied throughout the interior to prevent parts from touching or rattling during railcar movement.

In trains, the significance of the low frequency region is particularly important since most of the excitation energy coming from the track-wheel interaction is at low frequencies (16 - 80 Hz). The floating floor technique is regarded as a useful solution for achieving low levels of noise and vibration inside a transportation vehicle. It consists of a three-layer floor in which the top and bottom layers are isolated by an intermediate layer that can be spaced by spring-like supports or by a continuous elastic layer. In railcar applications, a thin floor slab on top is supported by a resilient or elastic layer (such as BISCO HT-800 Silicone foam) which is bonded to a much thicker structural floor on the bottom.



There are several phenomena that can make a properly designed and manufactured isolator appear to provide significantly less than the theoretical isolation efficiency (transmissibility). For an isolator to provide vibration isolation, it must be able to deflect. **REMEMBER: NO PROTECTION WITHOUT DEFLECTION.** In general, the more the mount deflects, the more vibration isolation will be provided. However, if the support structure below the mount, or the equipment support above the mount, is too soft, the structure will take some of the deflection that is intended for the mount. This will reduce the effectiveness of the mount and may also result in structural fatigue problems.

The graphs below illustrate the transmissibility or isolation efficiency of various grades of BISCO Silicone foams. BISCO foams are highly resilient and are able to continually deflect vibrations over long periods of time without experiencing any changes in stiffness due to stress relaxation. BISCO HT-800 is the ideal vibration isolator for floating floor cushions as it provides a high level of isolation, long-term resilience, and enough support to reduce structural damage to the floor when subject to vibration or compression.