The Performance of Felt Material in:

Sound Attenuation
Vibration Isolation
and Shock Absorption

The performance of felt material in sound attenuation, vibration isolation and shock absorption is based on the unique properties of wool felt fibers in a non-woven matrix of various densities. Shock implies a single, sharp displacement that may or may not excite resonant vibration. In general, periodic oscillation up to about 50 cycles is considered vibration; above that frequency it is considered sound or, if it includes a mixture of frequencies not harmonically related, noise.

Since the effectiveness of vibration/sound absorption increases with frequency, it can be assumed that, as felt is effective at very low frequencies, it is even more effective at higher frequencies Felt when properly selected for machine load conditions, can reduce the vibration energy transmitted from a machine to its foundation. Studies indicate that, under the most suitable conditions, isolation of vibration can be made up to 85 percent effective.

Similarly, felt mountings under precision instruments afford equal protection against externally generated noise and vibration.

Felt is durable and is stable in the presence of moisture, lubricating oils and greases, detergents, salts, and many other chemicals. Its ability to conform to uneven surfaces prevents the unwanted intrusion of dirt, oil, and other foreign substances beneath the load-bearing area.

Felt provides near permanent resilience, as it is composed of millions of individual wool fibers, selected, blended, and felted to provide a material with maximum vibration-energy absorption and isolation characteristics. The naturally resilient construction is maintained under the compressive stresses of heavy static and dynamic loads without deterioration. An important feature is that felt retains its resilience at low temperatures where some other materials become hard and brittle. The impact absorption capacity limits rebound, reducing wear and tear on equipment. Impact absorption and flexing properties remain constant over years of use, assuring dependable performance.

WOOL FELT:

Tensile Strength	800 PSI
Density	35 pounds per cubic foot

Sound Attenuation, Vibration Isolation, and Shock Absorption

There is an optimum felt density for sound absorption. Sound Absorption occurs by causing the vibration of individual fibers within a felt and thereby dissipating the energy by frictional heat loss. Because of this mechanism, it is understandable that a very open (low density) felt will not cause enough frictional heat to be dissipated and therefore it will be a poor sound absorber. On the other hand, too dense a felt will not allow enough fiber motion to occur and will therefore be a poor absorber.

Sound Insulation is preventing the generation of sound. For this reason, the higher the felt surface density, the better the sound insulation. If a machine vibration frequency is 1 1/2 times greater than the natural vibration frequency of the wool felt, then such a felt material should perform adequately from the point of view of sound insulation.

When felt is used as a vibration-isolation material, the greatest isolation efficiency is obtained by using the smallest possible area of the softest felt, in maximum thickness under a static load that the felt will withstand without excessive compression or loss of structural stability. It has a high damping factor and thus is particularly useful in reducing amplitude of vibration at resonance. The amplification factor at resonance is almost independent of amplitude and load is about 4 for soft wool felt. For general purposes, felt mounting of 1 to 2.5cm (1/2 to 1 inch) thickness is recommended, with an area of 5 of the total area of the base if the machine has a flat bed. In installations where vibration is not excessive, no bonding is necessary between the felt and the machine.

Felt pads are used for applications when an isolation material with good cementing characteristics is important. Felt has found widespread use in the textile machinery field and it is recommended when machinery movement or rebound must be closely controlled.

The forgoing information was derived completely from Metric Felt Company, Mokena, IL except for Tensile Strength and Density numbers.