

## 14.b Industrial Acoustic Pipe Insulation

### Question:

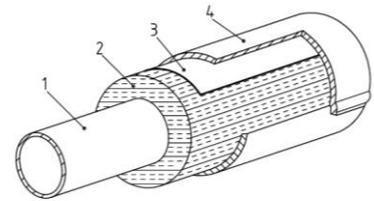
Is thermal pipe insulation also acoustic pipe insulation?

### Answer:

Acoustic insulation for pipes looks nearly identical to thermal insulation for pipes. The principle of acoustic pipe insulation is based on the installation of a noise-proof wall around the pipe, blocking the direct noise from the pipe to the environment. The cylindrical jackets (cladding) of the acoustic insulation are usually made of steel or aluminum plate. The pipe wall radiates noise (energy) into the cavity between the pipe and the cladding. The porous layer (insulation) dissipates the noise through friction (heat).

Based on a bare pipe the acoustic insulation system is built up like:

- 1. Pipe
- 2. Porous layer
- 3. Optional: Added mass or damping layer
- 4. Cladding

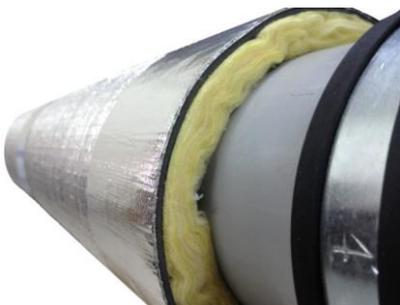


Since acoustic absorption is based on flow resistance, only open cell material can be used for the porous layer. Most of the suitable resilient or porous materials for acoustic insulation will have thermal insulation properties also.

It is allowed to combine acoustic and thermal insulation for pipes. If hot insulation is required for thermal as well as for acoustic insulation, the same (open cell) material may be used for both purposes. The thickness of the porous (insulation) layer shall be determined by the more stringent of the two requirements.

Rigid thermal insulation (e.g. calcium silicate or cellular glass) have very low acoustical properties and cannot be used for acoustical insulation purposes.

A



B



Figure 1: Mineral wool acoustic insulation system (A) & flexible plastic open foam acoustic insulation system (B)

Cold insulation materials have a closed cell structure, both systems must be applied separately. The cold insulation system must be applied to the pipe first; than on top of that the acoustic insulation. For cold insulation situations, use the standards and guidelines under FAQ 14.a.

In contrast to thermal pipe insulation systems, in an acoustic pipe insulation system the function of the porous (insulation) layer is also a vibration-insulating support for the cladding. The materials for the porous layer must be in the form of pre-formed pipe sections or blankets. All the materials must be suitable for the maximum operating temperatures and for the chemical nature of the environment.

Examples of suitable materials for the porous layer are mineral wool (glass, stone, ceramic) and open cell flexible plastic foams. The most of these materials have also thermal insulation properties.

Fibers of insulation systems that are perpendicular to the pipe wall can increase the stiffness and thereby reduce the performance of the acoustic system (for example, lamella mats), see figure 2.

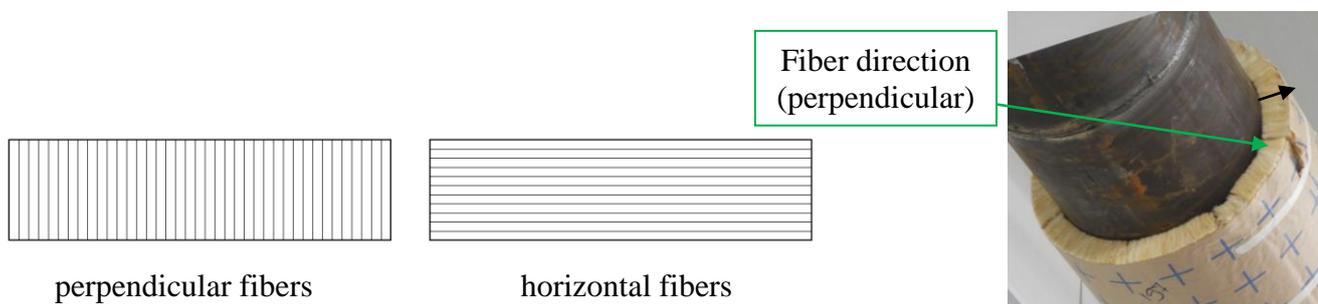


Figure 2: Example of insulation material with perpendicular fibers to the pipe wall.

In general, the same metal cladding materials for thermal pipe insulation can be used for acoustic pipe insulation, but heavier. For example a heavy steel plate cladding has a more significant sound reduction effect than a light aluminum cladding. Acoustics leaks must be avoided by using overlaps and decent sealings.

Examples of most common suitable materials for the cladding are steel (galvanized, stainless or aluminized) and aluminum.

An additional mass layer provide extra mass to the cladding to increase the sound insulation of a specific thickness of insulation. For example in situations with limited space. A damping layer can be applied to provide mechanical damping for a lower noise radiation of the cladding (the damping layer increases the loss factor). The damping layer shall be in direct contact with the cladding (usually inside).

Examples of materials are bitumen based free damping layers (anti-drumming), high mass per unit limp rubber, visco elastic polymer damping compounds (sheets or spray-ons).

Be aware that adding a damping material can influence (decrease) the fire class rating of the total pipe insulation system.

For an impression of the performance of acoustic pipe insulation and the most common standards and guidelines, see FAQ 14.a

Distance and support rings to support the cladding should be avoided as far as possible, because of the risk of acoustic bridges and therefore reducing the performance of the sound insulation system, see FAQ 14.c