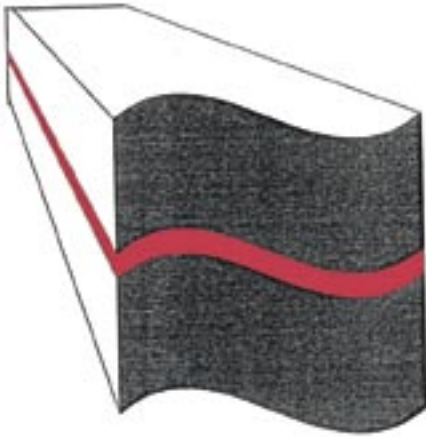


Structure-borne damping sheet metal laminate antiphon® MPM™ is a range of products for effective damping of structure-borne sound with no additional weight. The material is a formable and weldable sandwich consisting of two metal facing sheets enclosing a viscoelastic core constrain layer damping. The letters MPM stands for Metal-Polymer-Metal.



antiphon MPM

Acoustic material laminated sheet metal



- Metallic skin $T = 0,4 - 3 \text{ mm}$
- Innerlayer, polystyrene-butadiene-styrene triblock copolymers with different additives $T = 0,035 - 0,1 \text{ mm}$
- Metallic skin $T = 0,4 - 3 \text{ mm}$

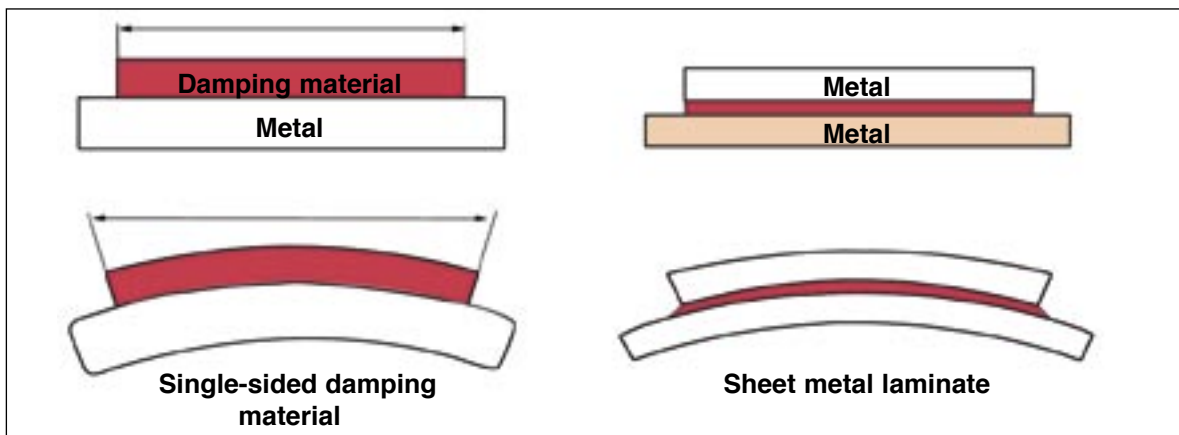
MATERIAL DESCRIPTION

Saves both space and weight

antiphon® MPM™ provides two functions. It does not just damp structure-borne sound, it also replaces existing sheet metal. This means that in most cases, you do not have to add material to damp the structure, and thus save both weight and thickness.

antiphon® MPM™ is delivered with various different innerlayers, optimised for temperatures between $+5^\circ$ and $+125^\circ\text{C}$.

The grade of sheet metal used for antiphon® MPM™ often consists of cold rolled or coated sheet metal, but all kinds of metals and alloys can be used. The sheet metal thickness is generally the same on both sides, but a certain amount of asymmetry can be used without affecting the sound damping properties to any greater extent.



The illustration shows the difference in function between a single-layer damping material and a constrained layer damping material such as laminated sheet metal. In a single-layer damping material only bending stress is obtained, whereas with a sheet metal laminate such as antiphon® MPM™, both bending and shear stress occur, which gives a higher damping performance.

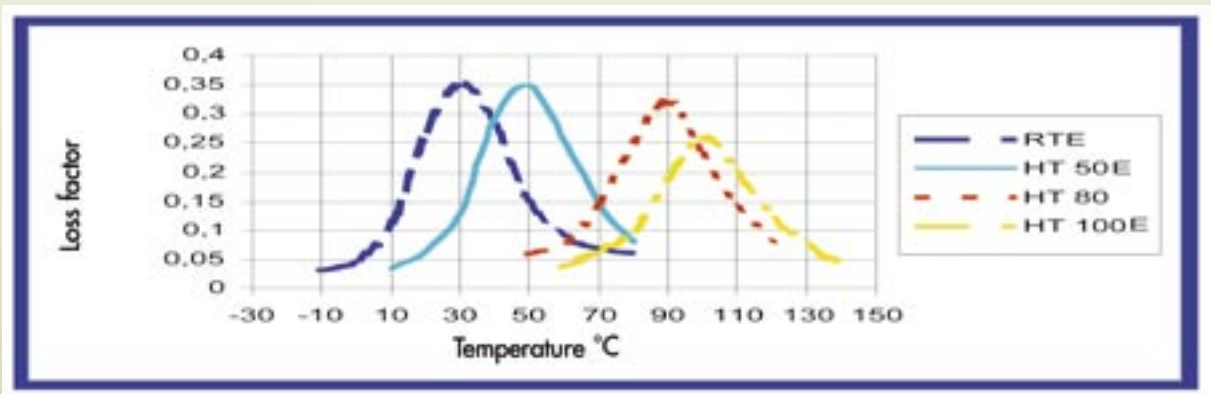
ACOUSTIC PROPERTIES

The acoustic loss factor η is generally used as a measure of the ability to damp structure-borne sound. This specifies the proportion of vibration energy in a steel plate etc. which is converted to heat, and therefore does not generate noise. A high loss factor reduces the vibration level in a structure and therefore reduces the noise given off. An un-damped steel structure has a loss factor of between 0.001 and 0.01. The highest theoretical possible loss factor is 1.0, but a structure-borne damping laminate is to be regarded as reasonable high if the loss factor exceeds 0.1.



High performance damping material

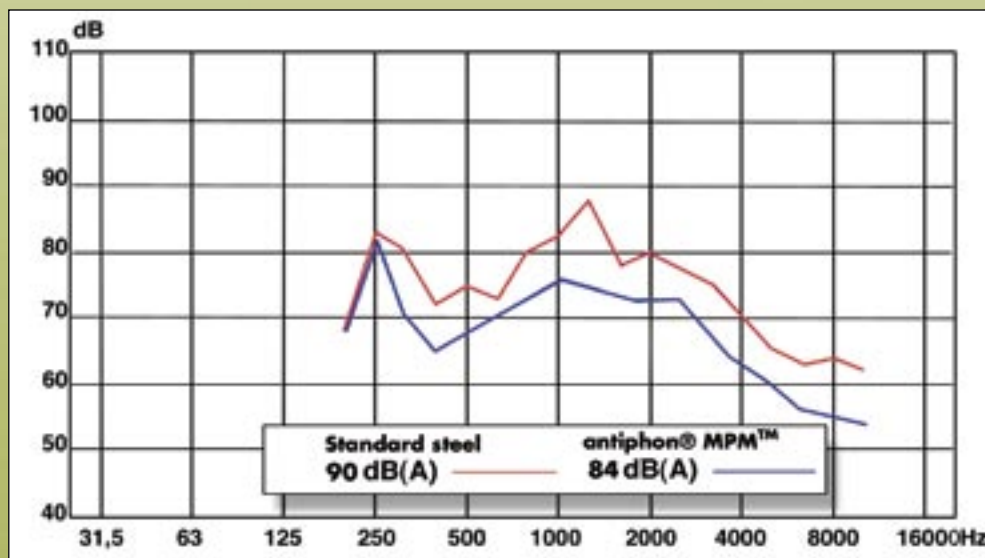
The properties of all damping materials are related to temperature and frequency. The illustration below shows the loss factor as a function of the temperature for various grades of antiphon® MPM™ at 200 Hz.



FUNCTION OF AIR-BORNE SOUND

Practically resonance free

In principle, antiphon® MPM™ obeys the acoustic mass law, which says that the reduction factor R is reduced by 6 dB for each doubling of weight and by 6 dB for each doubling of frequency. antiphon® MPM™ also has another important property. Because the products have such a high loss factor, practically no resonance occurs, which makes the product ideal for damping airborne sound both in single layer and in double-layer structures.



APPLICATIONS IN THE AUTOMOTIVE INDUSTRY

Wide range of applications

antiphon® MPM™ is a thoroughly tested product, used for power-train applications. antiphon® MPM™ is currently used in products such as:

- Rocker covers, oil-sumps and timing covers
- Shields and encapsulations on engines
- Shields and covers for gearboxes

antiphon® MPM™ can also be used to improve acoustics and reduce weight in body components such as:

- Firewalls and bulkheads
- Floor panels
- Luggage compartment panels
- Wheel arches

By using antiphon® MPM™ in vehicle body panels, it is possible to reduce the use of other sound damping and sound absorbing materials to a minimum, at the same time as space and weight are saved.



antiphon® MPM™ can also help to solve acoustic problems in other vehicle components such as:

- Air filter housing
- Disc brake shields and shims for disc brake pads
- Brackets
- Bus engine compartment panels
- Encapsulation of compressors
- Boggy encapsulation in trains
- Floors and partition walls in passenger compartment, sleeping compartments in trains and ships
- In driver's cabs on tractors, site machinery and other operator areas
- In boats to damp vibration from engines and propellers

OTHER APPLICATIONS

Other applications are to be found within the white goods industries, including washing machines, dishwashers and compressors for refrigerators etc. In the plastics industry, antiphon® MPM™ is used to damp the noise generated by granulators.

As and when environmental legislation makes increasingly stringent demands for reducing high sound levels, new interesting applications will constantly be opened up for using antiphon® MPM™.



WORKING AND JOINING

Weldable

antiphon® MPM™ can be more or less handled in the same way as normal sheet metal, but the sound damping layer requires more consideration. When antiphon® MPM™ is welded methods which generate the minimum of heat have to be chosen. Spot welding, resistance welding, seam welding and arc welding, such as the MIG method, are suitable for welding antiphon® MPM™. In spot welding, both the sheets in the MPM system must have good electrical contact for the first weld to be done. We will assist and provide more detailed advice.



A lot of resources are put into research and development to improve antiphon® MPM™ for the future. In our endeavour to be at the forefront of developments of new sandwich materials, we collaborate with major universities and research institutes.

Our knowledge and experience are your guarantee for a good final product. This long term of experience and trouble-shooting in co-operation with customers in various industries have made us specialists in the use of and working with sheet metal laminate. So please contact us as early as possible, to discuss your product development and manufacturing plans.

Pressing

antiphon® MPM™ can be deep-drawn and stretch-formed in ordinary presses and using conventional tools. Since antiphon® MPM™ consists of two thin sheets of metal, it has a greater tendency to wrinkle than ordinary sheet metal. To counteract this, the blank holding force has to be increased. Due to the higher press force needed a stiffer tool design has to be regarded.

When antiphon® MPM™ components are designed to be deep drawn note that tapered and sloping walls are more difficult to press-form than straight ones. The walls of the component should be parallel with the direction of draw.

antiphon® MPM™ has lower bending stiffness than solid sheet metal, and this also applies to large, shallow pressed components with few reinforcements, but not the finished, assembled structure. In transfer presses and mechanised press lines, antiphon® MPM™ might require better material support in the gripper tool moving the work piece.



Shearing and die cutting

antiphon® MPM™ can be cut in power shears, and with a punch and die. It can even be nibbled. To give the best quality of cutted edges on the laminated sheets, clearance of edges in the cutting tool should be reduced by 50% of the normal clearance used for solid sheet metal of the same thickness as the antiphon® MPM™ system.

Sawing and cutting

antiphon® MPM™ can be sawn with standard sawing device and cut with plasma or laser cutting machine. Oxy-acetylene cutting has been found to be unsuitable. Please contact us for more information.

Bending

antiphon® MPM™ can be bent in a press brake or bending machine, but the result will be improved if bending is done with a press tool or special tool. Flanging can be done on antiphon® MPM™ in the same way as for ordinary sheet metal.

TECHNICAL DATA

Innerlayer:	0.035 - 0.10 mm, depending on application
Adhesion:	1.8 - 5 MPa, depending on type of sandwich material
Shelf life:	Depends on grade of sheet metal (Euro standard 10130)
Usage:	The material should not be cooler than room temperature when worked.
Recycling:	antiphon® MPM™ can be re-cycled in the same way as ordinary sheet metal.

Manufacturing programme

antiphon® MPM™ is made as cut-to-size panels in thicknesses from 0.75 - 6.10 mm to customer requirements. Maximum dimension is 1.5 x 3.0 metre. We are also able to provide tailor-made blanks.

antiphon® MPM™ is produced from various grades of sheet metal depending on customer request such as steel, stainless steel, aluminium or surface treated sheet metal.





antiphon

S-670 40 ÅMOTFORS Sweden
Tel. +46 (0)571 318 00

www.antiphon.se
info@antiphon.se