

ULTIMATE DAMPING ALLOY M2052

BY SEISIN ENGINEERING CO., LTD., JAPAN

M2052 invented and developed by Dr. Kohji Kawahara (*1) of National Research Institute for Metals of former Science and Technology Agency (presently National Institute for Materials Science) in 1990's, is composed of Mn-20Cu-5Ni-2Fe (atomic %), has a superior damping capacity and strength balance in comparison to any damping materials on the market. M2052 is a metal but possesses the same level of loss coefficient of rubber. In addition, its coefficient of elasticity is incomparably better than that of rubber. It is unlike unsteady rubber characteristics and has strength similar to soft copper. In terms of strength, unlike lead or light metal alloy, M2052 functions as constructional material and is a favorable alloy for today's needs of compactness.

For use in audio applications, you can instantly hear the difference very easily and clearly. The vibration absorbing capability of M2052 is derived from its peculiar crystal construction and when external force is applied, twin crystal condition comes about and the heat caused by the friction among the crystals absorbs vibration energy covering the wide frequency range from 0.01Hz up to 10MHz. It has recently been found, when M2052 is once cooled down to nearly -75°C where twin crystal is likely to come about and returned to the normal temperature, that sound quality is greatly improved. With this special process, the bass sound is more fulfilled and the high note becomes clearer. Most importantly, the amount of midrange information increases and musically pleasing sound can be obtained.

The biggest benefit of using M2052 among other damping materials on the market is that M2052 does not add any colors coming from the material itself to the reproduced sound, while it is capable of absorbing vibration most effectively for a wide range of frequency.

Various unique M2052 damping products developed by Seisin Engineering and have been sold in Japan since 1999. Seisin Engineering is well-known and has already built up trust in Japan.

(*1) Former Executive Officer and the present Technical Adviser of Seisin Engineering Co., Ltd

What is M2052?

M2052 is a manganese-based damping alloy and is categorized into bicrystal type. The maximum logarithmic attenuation rate of M2052 in laboratory is "0.72". The range of 0.2~0.3 is possible even for commercial products.

FEATURES

Effective damping for a wide range of frequency (0.01Hz~10MHz) without coloring sound

Almost non-magnetic material

Anti-amplitude-dependent

The more amplitude increases, the more effective M2052 is.

(except the condition that causes permanent deformation of the material)

Perform well even at extremely low temperatures such as liquid helium gets

Excellent workability

Any fabrications, not only cutting and molding but also processing hot and cold, welding, press working, etc. are possible.

SPECIFICATIONS

1. Specific Gravity: 7.25 (similar to Fe)
2. Coefficient of Thermal Expansion: $22.4 \times 10^{-6} / ^\circ\text{C}$ (similar to Al and Cu)
3. Coefficient of Thermal Conductivity: $10\text{W}/\text{m} \cdot \text{K}$ (similar to Ti)
4. Mechanical Properties (after annealing):
Tensile Strength: 500MPa / Young's Modulus: 47GPa / Proof Stress (0.2%): 200MPa

EXAMPLES OF USAGE

1. For visual and audio equipment
2. For tooling parts (prevent chatter vibration, improve tool life and profile irregularity)
3. To prevent machine vibration
4. To prevent bearing vibration
5. To prevent automotive noise

Examples of M2052 Damping Alloy for Audio Applications:

1. Insulators for Loudspeakers
2. Screws, Washers and Other Fastening Parts
3. CD Players and Amplifiers
4. Analog Record Players