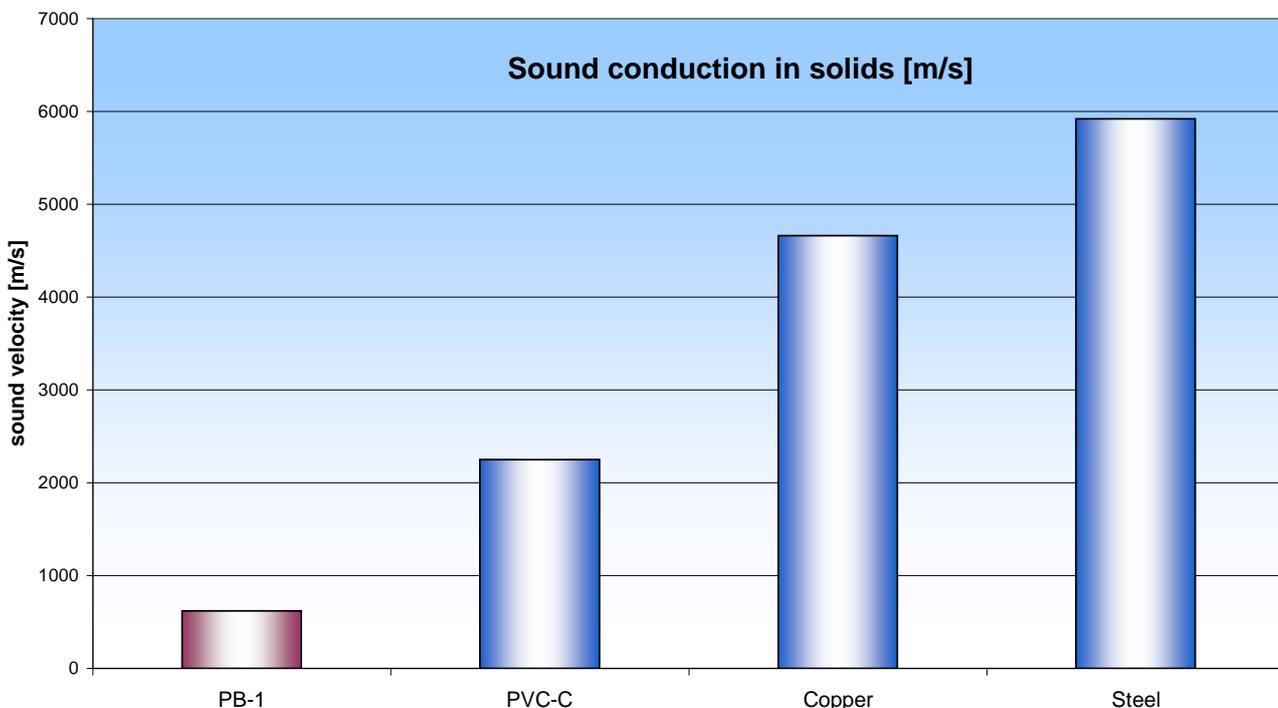


## 1) Basic Information

For sound conduction through solids, the sound insulation and absorption of the material are important criteria and this is a function of the density and elasticity of the material. The acoustic properties of plastics, when plotted over broad ranges of frequencies and temperature, are usually determined by the glass transition temperatures of the particular plastic material. At temperatures above the glass transition temperature,  $T_g$ , the sound speed is greatly reduced and sound absorption is greatly increased. The  $T_g$  of Polybutene-1 homopolymers is  $-18^{\circ}\text{C}$ . The typical service temperature of a heating or potable water installation is well above this  $T_g$  so sound transmission is significantly reduced. With metals such as copper, no glass transition exists so sound transmission remains high, even at temperatures approaching the melting point of the material.

For materials generally, it is observed that the higher the density, the higher the sound speed. The data presented in the table below clearly shows this relationship for a selection of common plumbing materials.

## 2) Grafic overview



## 3) Results

The mechanical noises which accompany the heating and cooling cycles of heating pipe systems made from metals are reportedly almost eliminated when plastic piping systems are employed: plastic pipes reduce and muffle the transmission of both mechanical noise and 'water hammer' effects.

Obviously, design of the installation is critical in ensuring the quiet operation of a plumbing system. To achieve the best results, due consideration should be given to the choice of pipe and fitting materials and the optimum layout of the piping system relative to the building's construction.

## 4) References

The famous Royal Albert Hall has been equipped with PB-1 pipes due to their low sound transmission.

Technical data are subject to alteration.

