CMT
CONTRARIAN MICRO TEXTURES
by Rigidized® Metals Corporation

Technical Information

Thermal Conductivity

Thermal conductivity of architectural metals used to clad the exteriors of buildings is a significant factor in energy efficiency. The purpose of insulating materials is to limit the transfer of heat in or out of the structures, so as to maintain a comfortable temperature at a reasonable cost. Popular cladding materials like aluminum, copper and carbon steel are very efficient conductors of heat. They depend upon insulation to create an energy efficient system, be it a roof or an exterior wall. However, if less thermally conductive metals are used, the insulation layer has less work to do, and the energy efficiency of the building system will be improved.

We need only think of cookware, to gain an appreciation for the relative thermal conductivity of different metals. Stainless steel is a very popular cookware material, since it is easy to clean and doesn't oxidize in service, despite exposure to salt and heat. However, its thermal conductivity is so poor, that stainless cookware invariably has copper or aluminum cladding on the bottom, or uses tri-clad material, consisting of an aluminum or carbon steel core flanked by outside layers of stainless. If stainless steel cannot reliably transfer enough heat to cook a meal efficiently, imagine the benefit of cladding a building in this material.

Table I: Thermal Conductivity of Metals

Near Room Temperature, cal/cm^2.s.°C

METAL	THERMAL CONDUCTIVITY
Copper	.941
Aluminum	.370
Bronze	.290
Zinc Alloy	.250
Carbon Steel	.112
Titanium	.043
Stainless Steel	.036

In the United States, high performance metals have not been widely used in architectural applications. Very little data have been developed that demonstrate the energy savings that can be realized by employing less thermally conductive metals. However, Table I shows the thermal conductivities for popular construction metals. We predict that stainless steel and titanium provide engineers with opportunities to design more energy efficient buildings.

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