

Institute of Refractories Engineers

Other Insulation Materials

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Cellular Glass



Diatomite

Diatoms are microscopic sea creatures with a silica shell

In some areas, the dead shells form layers of rock known as diatomite.

Each fossil is hollow





Diatomite

Diatomite is mixed with clay for plasticity and sawdust to add porosity

Production is same as Insulating Firebrick





Diatomite - Properties

Bulk Density	0.4-0.7 kg/m ³
CCS	1.5-4.0 MPa
Thermal Conductivity at RT	0.1-0.15 W/mK
Classification Temperature	850-950 °C



Calcium Silicate

Made from Amorphous Silica and Calcined Lime

Cast as a slurry

Cure in an autoclave



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Magnesium Silicate

Similar to Calcium Silicate but higher strength and density

Bulk Density	1.2-1.5 kg/m ³
CCS	15-40 MPa
Thermal Conductivity at RT	0.2 – 0.3 W/mK
Classification Temperature	1050 °C





Microporous Insulation

What is it?

ASTM C168

Material in the form of compacted powder or fibers with an average interconnecting pore size comparable to or below the mean free path of air molecules at standard atmospheric pressure. Microporous insulation may contain opacifiers to reduce the amount of

Microporous insulation may contain opacifiers to reduce the amount of radiant heat transmitt`ed.

The mean free path of air is <100nm or <0.1 μ m



Microporous Insulation

The pores are much smaller than one millionth of a metre across

- No convection
- · Reduced conduction in gas phase
- Reduced radiation across pores

Therefore thermal conductivity is VERY low



Microporous Insulation

Made from very fine silica powder. Often with titania and or alumina addition

Usually a thin panel (10-20mm) encapsulated in a protective envelope

Or a block or board (up to ~50mm)





Cellular Glass

What is it?

A glass material with a large volume of CLOSED pores

Closed pores mean that

- It does not absorb water or other liquids
 Does not allow liquids (esp acids) to pass through
 Protects the steel casing from acid





Cellular Glass

Bulk Density	0.1-0.15 kg/m ³
CCS	0.6-1.0 MPa
Thermal Conductivity at RT	0.04-0.05 W/mK
Classification Temperature	450-500°C



Thank you for your attention

Any Questions?