



## Vermiculite in the Industrial Sector

Versatility Personified!!

### Friction Linings

Finer grades of exfoliated vermiculite are used in friction linings primarily for the automotive market. Vermiculite is used because of its thermal resistance, ease of addition to other raw materials, and its shape and surface characteristics.

*Friction linings and their raw material constituents including vermiculite, (Photo courtesy of Dupre Vermiculite)*



### High Temperature Insulation



Exfoliated vermiculite is used in the production of insulation shapes which are typically produced using finer grades of the mineral and sodium or potassium silicate. End uses for these shapes include night storage heaters, ceramic cooker hobs and boilers. In the production of silicate bound building boards, extra attention has to be paid to the dimensional stability of the shape as in many cases it has holes and penetrations through it to accept mounting brackets and fixing screws, and these have to be very accurately placed.

*Vermiculite shapes used with heating elements for ceramic hobs (Picture courtesy of Dupre Vermiculite)*

### **'Hot Topping'**

Vermiculite concentrate is used for 'hot topping' in the steel industry. Vermiculite concentrate when poured onto molten 'hot metal' exfoliates immediately and forms an insulating layer allowing the material to be transported to the next production process with a minimal loss of heat.

### **Mine Sealants**

Mine sealants are composed of a hydraulic binder (typically portland cement), fillers such as ground limestone, vermiculite and additives to help the product pump and spray. The product is mixed with water in a paddle blade mixer and then pumped through a rotor stator pump up to a gun head where low pressure air is injected before the product is spray applied.

These sealant products are used in underground mines to seal the appropriate surfaces of the roadways to prevent the ingress of methane ('fire damp') which might ignite/explode. The added benefit of the product is that its build up the walls helps replace any eroded material. This process helps with air change in the mine as the volume to be ventilated can be kept reasonably constant. Mine sealants should not give off any toxic fumes and/or smoke in the event of a fire and have to be reasonably durable.

### **Paints/Mastics/Sealants/Plastics**

Finely ground vermiculite is added to paints, mastics, sealants, ceramics and refractories to improve their flame retardancy and to enhance their performance in situations where there is an excessive amount of ultraviolet light.

When combined with other fillers milled exfoliated vermiculite and a 'paint type' binder can be used as a wet spray applied anti-drumming compound. These products are used extensively to damp the vibration of architectural panels such as those used in curtain wall construction or as claddings in railway stations and tunnels.

### **Refractory/Insulation gunning and castable mixes**

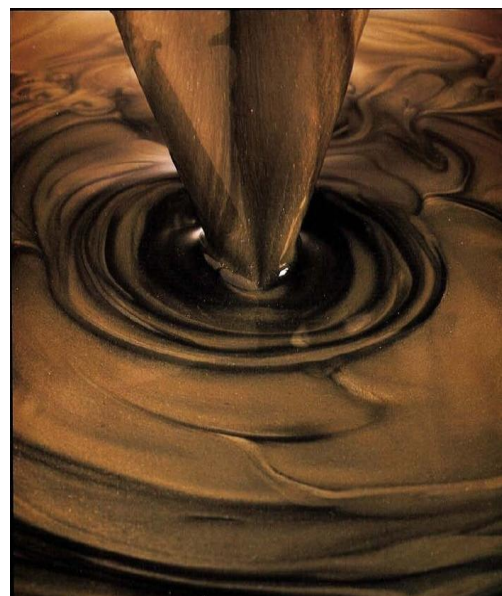
High alumina (also known as calcium aluminate) cements and exfoliated vermiculite can be combined with and other aggregates such as expanded shale, clay and slate to produce refractory/insulation concretes and mortars. These refractory/insulation mixes are normally applied by mixing with the appropriate amount of water in a paddle mixer with rubber tipped blades. They can then be cast by pouring, tamping and vibrating in to place. Alternatively mixes can be 'gun applied' using a gunite rig such as an Allentown which sprays at high pressure with the water being injected at the gunhead.

### **Vermiculite dispersions**

Specialist coatings containing vermiculite are made from dispersions of the mineral after it has been either chemically or physically very finely delaminated vermiculite.

Vermiculite dispersions are used in high temperature coatings or binders for construction materials, gaskets, weld curtains, specialty papers/textiles, oxidation resistant coatings on carbon composites, and as barrier coatings for films.

*Vermiculite dispersion (Photo courtesy of WR Grace)*



### **Waste Treatment/Packaging**

Exfoliated vermiculite's cation exchange capacity (up to 1000 milliequivalents per Kg) allows it to be used in fluid purification processes for waste water, chemical processing and the pollution control of air in mines and gases in industrial processes.

In addition vermiculite will retain liquids within the inter-laminar voids of the individual particles as well as between the particles themselves. Exfoliated larger grades of vermiculite are used extensively in the packaging market because of their

- Low density
- Ease of pouring around complex shapes
- Ability to withstand impact/shock caused by improper handling
- Clean/inert nature
- Fire resistance
- Absorbent capacity which minimises leakage in the event of breakage

### **Well Drilling Materials**

Exfoliated vermiculite is used as a 'lost circulation material' in drilling muds because of its ability to plug or seal holes in the formation being drilled.

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