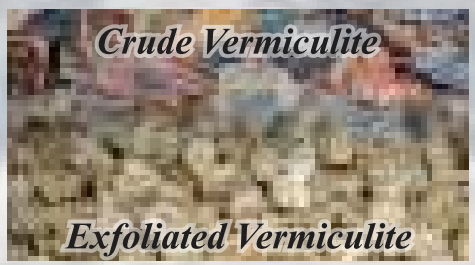
SAMREC VERMICULITE (ZIMBABWE) (PVT) LTD

WHAT IS VERMICULITE?

Vermiculite is a naturally-occurring mineral composed of shiny flakes resembling Mica. It is produced in different grades or sizes. When heated to high temperature, vermiculite flakes expand 8-30 times its original size (exfoliation) and loses weight. Most applications for vermiculite use exfoliated material.

KEY PROPERTIES

- Light weight
- Chemically and biologically inert
- Low thermal and electrical conductivity, good thermal insulation
- Odourless and high liquid absorption capacity
- Non-combustible, low density
- Fusion temperature of 1260°C



GRADE	SIZE		DENSITY		APPLICATION
	mm	inches	kg/cu.m	lbs/ft3	
Premium	<16	<5/8	56-72	3.5-4.5	Cavity fill, loft insulation
Large	<8	<5/16	64-85	4.0-5.0	Packaging, loft insulation
Medium	<4	<5/32	72-90	4.5-5.5	Soil amendment, seed propagation
Fine	<2	<0.08	75-112	4.7-7.0	General building, specialist plasters
Superfine	<1	<0.04	80-1445	5.6-10.0	Special plasters, building boards
Micron	<0.8	<0.02	90-160	5.6-10.0	Building boards, carrier uses

Source: Roskill Information Services Ltd

USES OF VERMICULITE

In general, coarser grades of vermiculite are used for loose fill insulation and horticulture, whilst finer grades are used in building boards/plasters and in carrier applications for animal feeds and fertilizers.

AGRICULTURAL

Seed Encapsulation
Soil Conditioner
Fertilizer Carrier
Animal Feed
Anti-Caking Material
Bulking Agent
Pesticide Carrier

HORTICULTURAL

Seed Germination
Sowing Composts
Blocking Mixes
Hydroponics
Micro-Propagation
Potting Mixes

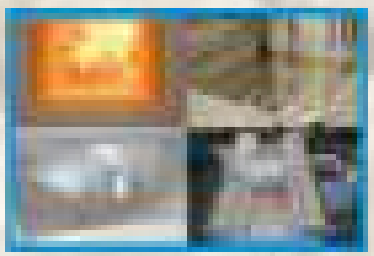
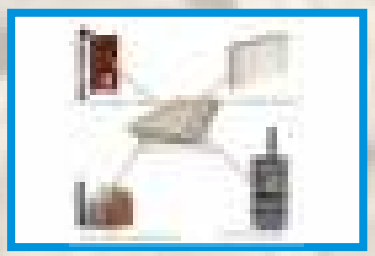
CONSTRUCTION

Acoustic Finishes
Passive Fire Protection
Floor & Roof Screeds
Insulating and Light-Weight Concrete
Gypsum Plasterboard
Loose fill Loft Insulation
Sound Deadening Compounds

INDUSTRIAL

Furnace Lining - e.g for Industry and Tobacco Barns
Absorbent Packing for Hazardous Goods
Brake Pads & Brake Shoes
Castables
Fireproof Safes
Fixation of Hazardous Material
Insulation Blocks & Shapes
Insulation - High & Low Temperature
Molten Metal Insulation
Nuclear Waste Disposal



AGRICULTURAL/HORTICULTURAL APPLICATIONS

Properties

- Improves aeration
- Increases moisture retention
- Excellent cation exchange properties
- Minimizes fertilizer leaching
- Has a near neutral pH
- Inorganic and Sterile

Advantages of Vermiculite

- Promotes early germination
- Plants survive longer in seasons of dry spells due to increased moisture retention
- For crops under irrigation it means less water is required per hectare, thereby saving on energy costs, machine wear and tear and labour costs
- Improves oxygen supply to roots
- Excellent cation exchange properties results in high nutrient retention
- Improves yields
- Excellent for pest and disease control

How to use Vermiculite in Horticultural and Hydroponic Industry

Exfoliated vermiculite is an excellent growing medium and can be mixed with peat and/or pine bark. When used on its own it is necessary to add nutrients. Vermiculite has different grades and is packed in different quantities. It is important not to squash the vermiculite as the material is friable/easily crumbled. The air trapped between the laminae is important to the life of the plant. The word Hydroponics is derived from Greek meaning water and work. In hydroponic propagation, plants are grown in sterile growing media such as vermiculite.

SEED SOWING - Sow seeds into pure Vermiculite or mix with peat/pine bark in seedling trays. Press seeds down firmly and cover with a layer of Vermiculite and mist (spray) with water daily. Seeds will germinate within a few days. It will however be necessary to add nutrients after a few days as Vermiculite is sterile.

Transfer of the seedlings into the growing beds will be easily accomplished as the roots will be protected with Vermiculite which will also act as an insulating and moisture retaining medium.

SOIL CONDITIONER - Mix Vermiculite in roughly equal proportions with clay soil (by volume) in order to absorb the excess water. Similarly, equal parts of Vermiculite mixed with sandy soil will help to aerate the soil, stop compaction and it will improve both its water holding capacities and its surface tension.

TYPICAL VERMICULITE GROWING MEDIA MIXES

Grain size (mm)	Peat (%)	Vermiculite (%)	Application
1-3	0	100	Quick germination of fine seed
2-5	0	100	Quick germination of large seed
1-3	50	50	Slow germination of fine seed
2-5	25	75	Slow germination of large seed
2-5	50	50	Soft wood cuttings: on open bench
2-5	25	75	Soft wood cuttings: under plastic
2-5	75	25	Potting mix for house plants
0-5	60	40	Potting mix for vegetable plants
2-5	75	25	Potting mix for bedding plants

Source: Roskill Information Services Ltd

LAWN CONDITIONING - Fork/Spike the area well and then sprinkle vermiculite over the surface. Brush or water the vermiculite into the open areas. Alternatively mix exfoliated vermiculite with lawn food before watering. **Ideal for golf courses.**

CUTTINGS - Simply place cuttings (preferably treated with a growth hormone) into wet Vermiculite (exfoliated vermiculite). A mixture of Vermiculite/peat may also be used in the proportion 50.50 by volume. Place cuttings in semi shade and mist over light each morning till the cuttings take.

POINTS TO REMEMBER

- Vermiculite is sterile so avoid contamination with dirty tools, infected soil etc.
- Plastic and Polystyrene seedling trays should cleaned by steam or with a mixture of bleach and water to kill bacteria from the previous growing season.
- Vermiculite is sterile and will therefore need to have nutrients added to the growing mixture.

It is difficult to cover the requirements for all vegetables as well as flowers/seedlings but a mixture of 50:50 Vermiculite/peat is a good foundation once the seedling has germinated and grown to about 4 leaves in the seedling "plugs" (or the pure Vermiculite starting medium). The pH may be corrected to suit individual requirement.

CONSTRUCTION APPLICATIONS

Building products
Vermiculite is used in building products because of its low density, good insulation properties and fire resistance qualities.

Building boards
Many boards are manufactured by adding potassium and/or sodium silicate to the aggregate until the resultant mixture is 'earth damp', this is then hydraulically pressed into shape in a mould, and then heat cured at appropriate temperature for up to 24 hours depending on the thickness of the board. Boards manufactured this way can withstand high service temperatures. This process can also be used to manufacture acoustic panels.

General building plasters
Vermiculite is used in general building plasters, both hand and spray applied to improve coverage, ease of handling, adhesion to a wide variety of substrates, fire resistance and resistance to cracking or shrinkage. Vermiculite may be used on its own in plaster formulations or combined with other aggregates.

Specialist plasters
Including fire protection and acoustic products where vermiculite is combined with a binder such a gypsum or Portland cement. Exfoliated vermiculite is used in structural fire protection mixes to improve application and to impart a high degree of fire resistance. It is efficient at retaining moisture and in the event of fire this turns to steam which has a cooling effect on the steel substrate and thus delays its temperature rise. It is also used as a constituent of some acoustic plasters which are generally applied to ceilings or the higher areas of walls to control the echo/reverberation time in contained interior areas such as those found in offices, swimming pools, conference centres, courts, concert halls etc

Roof and floor screeds
Exfoliated vermiculite especially the finer grades can be added to Portland cement and other aggregates, placing acids and water to produce roof and floor screeds which have the benefit of being light weight and insulating

INDUSTRIAL USES

The uses of vermiculite are varied and utilize many of the properties such as those in the building products and horticultural sections. For example, exfoliated vermiculite is replacing products such as asbestos which has proved to present environmental hazards.

Furnace Insulation

Vermiculite based blocks and boards, which are typically silicate bound are often used as back up or hot face application in furnaces.

Packaging

Due to its low density, ease of pouring around complex shapes, ability to withstand shock/impact caused by improper handling, clean and inert nature, fire resistance and absorbent capacity which minimizes leakage in the event of breakage, larger grades of exfoliated vermiculite are used in the packaging market. Also ideal for hazardous chemicals.

Brake Linings

Finer grades of exfoliated vermiculite are being used to replace asbestos in brake linings in the automotive market. In some cases crude vermiculite is used. This is because vermiculite is heat resistant, easy to add with other raw materials thereby achieving a homogenous mix, shape and surface characteristics.

Insulation mixes

Exfoliated vermiculite is usually combined with calcium aluminate cements and other aggregates such as clay and slate to produce insulation concretes. Apart from insulation importance, mixes containing vermiculite are also used in areas were strength and corrosion/abrasion resistance are of importance.

It is beyond the scope of this brochure to deal with all technical aspects of applications. Other information may be obtained from Samrec Vermiculite Zimbabwe (Pvt) Ltd Marketing Department or from specialists in the field of application.

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