

ProTurf SUPER FILL SPECIFICATIONS

WHAT IS ProTurf SUPER FILL?

Product Description

- Mineral: Consists of a volcanic mineral called "clinoptilolite"
- Size: 3/8"x1/4", 4x8, 4x14, 14x40, 40x100, -40 mesh
- GRAS: Classified as "GRAS" (generally regarded as safe) under 21 CFR Part 182.2729, 40 CFR 180.1001
- Color: Pale green when dry, dark green when wet.
- Moisture: Holds up to 55% of its weight in water
- Surface Area: High surface area 24.9 square meters/gram
- Weight: 55 pounds per cubic foot
- CEC: High cation exchange capacity (CEC) of 160 to 180 meq/100grams
- Hydrophilic

This almost pure clinoptilolite product is sold and marketed under several product names including ProTurf SUPER FILL. Its general formula is of $(Na, K, Ca)_2-3Al_3(Al, Si)_2Si_13O_{12}H_{20}$. The balance is primarily opaline or non-crystalline silica. It contains approximately 3.5% potassium which is a plant nutrient. It contains approximately 1.6% calcium which is a pH buffer for soils and plant nutrient. It contains less than 0.5% sodium, which is toxic to plants. None of the sodium is water-soluble. It holds up to 55% its weight in water. It has a high cation exchange capacity (CEC) of 160 to 180 meq/100 grams. It has a very large surface area that is approximately 24.9 square meters per gram. It is hard and resistant to attrition. It weighs 55 pounds per cubic foot. It is hydrophilic. The high CEC (see CEC explanation below) allows the SUPER FILL to be loaded with 1.8 to 2.1% nitrogen as ammonium. A low clay content makes SUPER FILL non-clouding in water and also low dust. SUPER FILL has good oil adsorption qualities. When dry SUPER FILL is light green, when wet the color is darker green.

SUPER FILL (clinoptilolite) refers to a group of minerals that are basically hydrated calcium potassium sodium aluminosilicates in which the water is held in cavities in the lattice. The lattices are negatively charged and they loosely hold cations such as calcium, sodium, ammonium, potassium and water. Their ability to exchange one cation for another is known as their "cation-exchange capacity" or "CEC". Cation-exchange capacity is a measure of the number of cations per unit weight available for exchange, usually expressed as milliequivalents per 100 grams of material. These are also referred to as "molecular sieves", because the channel ways within the crystalline structure are extremely small and they can be used to separate large molecules from smaller molecules.

Our SUPER FILL deposits are located in several areas of Idaho, Montana and Utah. They are conveniently located by railroad lines and major interstate highways, allowing for fast delivery throughout the United States and for easy shipments to overseas locations. Although the reserves have not been drilled, dozer cuts and outcrops indicate a geologic resource of more than 200,000,000 tons. The

processing plant consists of crushers, blenders, dryers, screens, and baggers to make various products.

General Uses of ProTurf SUPER FILL

- **Artificial Grass Top Fill**

Most Artificial Grass companies use silica sand or crumb rubber for top fill on their artificial grass. These products have serious and inherent health issues. SUPER FILL totally eliminates all health concerns related to silica sand and crumb rubber. SUPER FILL is safe and its dark green color looks like natural soil on any Artificial Grass.

- **Environmental Cleanup**

The cation exchange capability (CEC) of SUPER FILL makes it an excellent candidate for the cleanup of oil, diesel, and gasoline, PCB's, soluble heavy metals such as mercury, chromium, lead, zinc, arsenic, molybdenum, nickel, cobalt, antimony, silver, and uranium from water, feed lots, leaching of nitrogen fertilizers into the groundwater, organically polluted water; acid mine drainage, smelter slags, metal contaminated blast sand, metal plating sludge, contaminated soils, solidification and stabilization of hazardous waste, oil refinery and oil field sludge, leach residues, batteries, possibly MTBE and various other organic toxins, and radioactive nuclides such as Sr90, Cs137.

- **Soil Amendment**

The ability of SUPER FILL to hold ammonium and its high potash content, low sodium content, and ability to hold water make SUPER FILL an excellent soil amendment for golf courses, sport fields, parks, common areas, lawns, gardens, all sandy soils, and agricultural applications.

- **Fertilizer**

The ability of SUPER FILL to load with 1.8 to 2.1% nitrogen in the form of ammonium in its crystal structure makes it excellent for fertilizer applications. The nitrogen is not water-soluble, but it is plant accessible. The SUPER FILL holds the nitrogen in the root zone of the plant. In typical nitrogen fertilizer applications, as much as 35% of the nitrogen leaches out of the growth zone and reports to the aquifer to create nitrite and nitrate contamination. Consequently the SUPER FILL reduces the amount of nitrogen needed. SUPER FILL contains approximately 3.47% potassium, which is an important nutrient in fertilizers. The SUPER FILL holds at least 55% of its weight in water that protects the plant against drought. SUPER FILL has been successfully used for golf course, sports fields, parks and common areas, and high value crops.

- **Water Filtration and Waste Water Treatment**

SUPER FILL has been used as a filter media for particulate removal. Additionally they are used to remove nitrogen, certain organic hydrocarbons, and toxic cations such as silver, mercury, nickel, chrome, cobalt, antimony, arsenic, etc. Typical applications would include swimming pools, municipal water systems, and waste water treatment plants.

- **Odor Control**

One of the major causes of odor around animals is the generation of ammonia from urea and manure. Essential advantages of using SUPER FILL for odor control of cattle, hog and poultry feed lots are as follows; it captures ammonium and prevents the formation of ammonia that causes the noxious odor, it removes moisture, it prevents the leaching of the nitrogen to the groundwater, and the ammoniated SUPER FILL then becomes a secondary merchantable product as a fertilizer. Typical applications are for composting cattle, horse, and hog manure, poultry, dogs, cats ("kitty litter"), personal items, room air cleaners, carpet cleaning for pets, diapers, horse stalls, veterinary clinics, and bathrooms.

- **Animal Nutrition**

Generally, the feeding of SUPER FILL to animals has resulted in faster growth rates and weight gains, improved feed conversion, less diarrhea and other health problems, potentially less use of antibiotics, and drier and less odoriferous manure. In other countries it is recognized as a myco-toxin binder effective against aflatoxin, ochratoxin, fumonisin-toxin, and zearalenone. In the United States the USDA has not recognized it as a myco-toxin binder.

- **Air Filtration**

SUPER FILL has been used for the separation of gases such as nitrogen, carbon dioxide, sulfur dioxide, and hydrogen sulfide. Typical applications would include; enriched oxygen supplies for steel mills, smelters, re-oxygenation of downstream water from sewage plants, smelters, pulp and paper plants, fishponds and tanks, removal of carbon dioxide, and hydrogen sulfide from methane generators such as organic waste, sanitary landfills, municipal sewage systems, animal waste treatments facilities, the removal of sulfur dioxide from stack gases such as coal generating plants (to limit sulfur dioxide emissions to 100 ppm for EPA standards), coal gasification from underground sources for the removal of nitrogen and sulfur dioxide.

- **Aquaculture, Tanks, Ponds**

SUPER FILL is used for the removal of ammonium from water fisheries, trucks to transport fish, and aquariums. The addition of SUPER FILL to ponds and tanks often stops or inhibits the growth of algae by removing nitrogen from the water.

- **Catalysts and Petroleum Refining**

Although most of the catalysts used in the petroleum industry are synthetic, more natural SUPER FILL is being used. Typical applications include removing water and carbon dioxide from gaseous hydrocarbons, removing hydrochloric acid from gas streams, assisting in hydrogen or chlorine drying, assisting in chlorinated and fluorinated hydrocarbon purification, catalysis and natural gas separation.

- **Carriers**

SUPER FILL can be used as a carrier for insecticides, pesticides, and herbicides due to its large porosity. In animal feeds it is used as a carrier for antibiotics, enzymes, and other medicines.

- **Desiccants**

SUPER FILL has been used as a desiccant for drying natural gas, carbon dioxide, Freon gas, and organic chemical streams such as transformer oil and xylene.

- **Pellet Binders**

SUPER FILL allows the use of more steam and higher temperature in palletizing animal feeds. This in turn reduces friction and allows up to a 30% increase in production with no more energy. The increased temperature increases gelatinization and pellet durability. It also imparts a green color to hay pellets and cubes.

- **Flow Agent**

SUPER FILL helps the flow of animal feed and other products from bins and is an anti-caking agent. It is particularly helpful with urea, oils and other sticky ingredients.