AV-100 Chemical Grout (Powder Blend)

Chemically Activated Gel

General Specifications

Description

AV-100 Chemical Grout is a mixture of three or more water soluble chemicals which produce stiff gels from properly catalyzed solutions. AV-100 is also the name of the base chemical in the mixture, which is a blend of Acrylamide Monomer (AM) and Methylenebisacrylamide (MBA).

AV-101 Catalyst T+

AV-101 Catalyst T+ acts as a buffer and sometimes appears to act as a catalyst in the AV-100 gel mix. Triethanolamine (TEA) is the primary ingredient in AV-101 Catalyst T+. The proprietary blend of other additives with the TEA makes up a liquid which actually functions as an activator for the reaction. These other ingredients allow field use of AV-101 in cold weather without the annoying occurrence of crystallization or "freezing" to which normal TEA is subject.

AV-102 Catalyst AP

AV-102 Catalyst AP (ammonium persulfate) is a granular material and a strong oxidizing agent. It is the initiator that triggers the reaction. Generally, AP is dissolved in water and added as a 1 to 3 percent solution to the catalyst-side tank.

General Uses

- Sewer joint sealing
- Sewer laterals
- Manhole waterproofing
- Soil stabilization
- Tunnels/Dams waterstop
- Not for potable water applications
- Not suitable for above grade applications

Viscosity

1 to 2 CPS in solution

Ratio

1:1 (Water to Resin)
1 50 lb. bag = 60 Gallon batch (requires AV-101, AV-102 and water)

Catalysts

- AV-101 Catalyst T+ – Activator **MIX IN AV-100 TANK**
- AV-102 Catalyst AP – Initiator **MIX IN CATALYST TANK**

Additives

- AV-105 Ethylene Glycol – Protects against freezing **SUBSTITUTE FOR EQUAL VOLUME OF WATER IN BOTH TANKS (MAX 2.5 GAL. PER TANK)**
- AV-257 Icoset – Increases compressive and tensile strength **DO NOT ADD TO AP TANK- REPLACES WATER IN AV-100 TANK (MAX 2 TO 3 GAL.)**
- Potassium Ferricyanide (KFe) – Extends Gel time O**NLY ADD VERY SMALL AMOUNT TO AV-100 TANK (1 TO 2 TEASPOONS TO START)**
- AC 50W - Root Inhibitor - Slows new growth in roots **(3.2 OZ. BY WEIGHT)**
- Dye - Tracer Dyes - add 2 to 10 grams, **ADD TO AV-100 TANK**

Packaging

Drum (contains (4) 50 lb. bags) – Gross Weight 230 lbs. ea. – 4 drums/pallet
Pallet (contains contains (25) 50 lb. bags) – Gross Weight 1300 lbs. ea.

Shipping

Motor Class 77.5
Hazard Class: 6.1

Motor Freight required for:

Drum – AV-100 Chemical Grout

Pallet – AV-100 Chemical Grout

Air Freight is NOT available.

Cleaning Products

To clean AV-100 after mixing with additives, use water with a light detergent. If the AV-100 is still in powder form and has not been catalyzed, follow HANDLING procedures and be aware of the TOXICITY issues described in the Technical Specification of the AV-100.

AVANTI
AvantiGrout stops leaks. Permanently.

Webster, Texas 77598 / 800.877.2570
www.avantigrout.com / sales@avantigrout.com

Technical Specifications

Description
Extremely low viscosity acrylamide resin with gel times from 5 seconds to several hours. Nonflammable.

Properties Uncured
Understanding the properties of AV-100 Chemical Grout in its various forms from initial chemical components that make up the product to the in-place final gel is important. An awareness of the inherent hazards of handling any chemical component can minimize potential dangers to workers and the environment by assuring proper application of a product. Strict adherence to the SAFE OPERATING PRACTICES PROGRAM is critical and will assure safe and successful application programs.

Handling of Solid AV-100 Chemical Grout
Skin which comes in contact with solid AV-100 should be washed immediately in running water, and dust inhalation should be avoided. Use the same protective measures as described below under "Handling of AV-100 Solutions". Avoid rough handling of AV-100 containers to prevent spilling.

Solid AV-100 is shipped in disposable containers and should be stored in the original containers until used. Empty containers should be buried in an approved landfill and not used for any other purpose.

Corrosiveness
AV-100 solutions containing AV-101 Catalyst T+ are non-corrosive to common steels, aluminum, brass and rubber.

To protect against skin irritation from AV-101 Catalyst T+, operators should wear glasses and rubber gloves. Spills on the skin should be washed off with water. In case of contact with eyes, wash the eyes immediately for at least 15 minutes with plenty of water and then seek proper medical attention.

AV-102 Catalyst AP is a strong oxidizing agent and should always be handled with glasses and rubber gloves. Skin areas which have come in contact with AP should be washed with water. If spilled on clothing, AP will discolor or make holes in some fabrics.

Solubility
At normal temperatures, AV-100 solutions up to 40% are easy to prepare. Catalyst and inhibitors also dissolve easily at concentrations which are much higher than those normally used. Sodium carbonate will dissolve easily in sufficient amounts to bring the solution pH up to 10. Disodium phosphate requires vigorous mixing.

Stability
AV-100 powder will retain its properties for years at temperatures below 70°F (21 °C) if stored dry in the original containers. Storage at higher temperatures will cause small insolubles to form and may cause small changes in gel time. After filtering, AV-100 solutions which contained insolubles are acceptable for use.

AV-102 Catalyst AP and AV-101 Catalyst T+ may be stored in their original unopened containers for up to a year. AV-102 deteriorates (weakens) upon repeated exposure to air.

Properties: Solutions
Density
The density of a 10% solution (catalyst at 68°F) of AV-100 is 1.04 grams per cubic centimeter.

Viscosity
The viscosity of a 10% solution (catalyst at 68°F) of AV-100 is 1.2 centipoise (water = 1 centipoise).

Penetrability
AV-100 solutions can generally be pumped anywhere water will flow at the same flow-rate/pressure relationship required for water.

Stability
A 10 to 30 percent solution (uncatalyzed 68 to 122°F [20 to 50°C]) will usually be stable for at least four months. Keep solutions from contact with brass, copper or iron. Solutions should be kept out of direct sunlight.

Properties: AV-100 Gel
Density
The density of AV-100 gel is essentially/he same as a solution, 1.04grams per cubic centimeter or slightly above that of water.

Shrinkage
When shrinkage in soil does occur, it produces tensile forces which increase apparent unconfined compression strength. However, these forces will never exist below the water table. If drying is severe, rupture of the bond between gel and soil grains will occur. This may appear as a visible shrinkage crack.

When rewetted, the gel will swell to its initial volume and again fill the voids. Ruptures will not heal, however, and the stabilized mass may not have quite the strength it first had. The degree of permeability of dried stabilized sand that is re-wetted has been measured at 10 -4 to 10 -6 cm/sec.

Loose soils will show shrinkage when gel dries since tensile forces move the soil grains closer together. Job excavations have indicated that under moist conditions gels have been unchanged for over 30 years.

Shrinkage due to drying does not occur below the water table. Field experience also indicates that drying is usually not significant in soils that are six to seven feet below ground surface (even if above the water table) as long as the soil humidity level exceeds 80% to 90%. Shrinkage due to drying is a problem only when the stabilized soil is close to an underground heat source or is very close to the ground surface. AV-100 gels shrink if heated under low humidity, but when heated in water are stable to at least 150°F (77°C).

Syneresis
Syneresis is a process whereby water is squeezed out of a gel under gravitational forces due to the weight of the gel. AV-100 gels are not subject to syneresis.

Permeability
AV-100 gels are substantially impermeable (k= 10-'°cm/sec), except that gels containing less than eight to ten percent AV-100 will swell slightly when immersed. The gels are impermeable to gases and to hydrocarbons such as kerosene. Ions will migrate through the gel.

Longevity
Chemical data and job histories from over 40 years lead to the conclusion that for all practical purposes, AV-100 gels may be considered permanent.

Mixing Procedure
Note: Stainless steel, glass and plastic are satisfactory materials for wetted surfaces in contact with the grout solutions. Other materials should not be used.

Technical Specifications

Special Additives

Increased Density
If required, the density of AV-100 can be increased by the addition of diatomaceous earth (DE) -- approximately 5% of the weight of the total mixed batch weight. Not only will the density increase, the compressive strength of the grout (into such applications as crushed stone bedding) will increase as well.

Dye in the Grout Solution
To trace the path of an injected solution, it may be useful to use dye. The recommended dye for this purpose is TADCO Tracer Water Soluble Dyes at a concentration of 2 (.07 oz.) to 10 g. (.35 oz.) per 26 gals. of solution. This solution can be stored for one day only and must remain completely out of sunlight.

Influences on Gel Times and Characteristics

The gel time is the period between the mixing of the two primary solutions together and gelation of the final solution. When gelation occurs, the viscosity of the grout instantly increases to yield a cohesive, transparent gel. Gel time of the AV-100 grout can be controlled by changing the catalyst ratios. The two catalysts AV-102 Catalyst AP and AV-101 Catalyst T+ are the additives which exert the primary influence on gel time. If a long gel time is needed (especially when working with high temperatures) sufficient Potassium Ferricyanide (KFe) must also be added.

The gel time of AV-100 grout can also be significantly influenced by the grout temperature, the pH of the grout solution, and the amount of oxygen dissolved in the grout solution.

In addition, gel time can be influenced by contact with certain metals, by exposure to ultraviolet rays from sunlight, or by the presence of certain mineral salts in the water used to make the grout solution.
The gel time obtained from a given mix should be determined in the field. Tests of gel time under ambient conditions using water which will be mixed with the grout are recommended.

Influence of Temperature
Gel time for any given catalyst ratio will increase as the temperature of the grout solution decreases, and will decrease as the temperature of the solution increases. As a rough rule of thumb, gel time is reduced by half if the temperature of the grout solution rises 10°F.

Influence of pH
In general, as the pH of the grout solution drops, gel time will increase. However, with most water supplies, the grout pH is buffered between 8 and 9 when using 0.2 to 1% AV-101 Catalyst T+. As a practical matter, the use of highly alkaline or acidic water will significantly influence the gel time. Under such conditions, gel time becomes erratic.

Presence of Entrained Oxygen in the Solution
Oxygen entrained and dissolved during vigorous mixing of the solutions will increase gel time.

Contact with Particular Metals
Metals such as iron and copper have an unpredictable effect on the set time of the AV-100. The use of plastic or stainless steel tanks is recommended for mixing the grout solutions.

Influence of Ultraviolet Rays
Ultraviolet rays also initiate gelation. For this reason, the AV-100 solution must be kept out of direct sunlight. This would include all process equipment such as open drums, solution mixes, sight glass flow meters and pipes.

Presence of Mineral Salts
The presence of soluble salts (sodium chloride, phosphates, etc.) in the grouting solution can increase or decrease gel time.

Very Short Gel Times
Gel times from a few seconds up to 1 minute can be obtained by using high ratios of AV-102 Catalyst AP and AV-101 Catalyst T+.

Example of Formulation
If the grout solution is diluted by running water in the grout zone the gel time will be retarded, making the set time to solids formation longer. If this is undesirable, more catalyst must be added to the solution. The set time will be 2 to 4 times longer if the grout is diluted in the grout zone with an equal volume (100% dilution) of water.

Storage

AV-100 is sensitive to moisture and high storage temperatures. Protect from excessive heat, sunlight. Store in a dry area between 40 ° F and 80 ° F. Shelf life is several years when not mixed and properly stored in sealed containers.

MSDS

Available by request, or download at www.avantigrout.com/MSDS

Safety

AV-100 in its powder form (uncatalyzed) is a neurotoxin with LD 50 approximately 250 mg/kg of bodyweight (rat). It can enter the body through the nose, mouth or skin. Contact by these means should be avoided, and clean-up promptly achieved in case of an accident.

Standard protective clothing should be worn when working with AV-100, including:

1. Waterproof coat and pants.
2. Rubber gloves.
3. Rubber boots or rubber overshoes.
4. Eye protection (either glasses or goggles)
5. Respirators approved by the U.S. Bureau of Mines for protection against toxic dusts and vapors in confined or poorly ventilated places.

Long-sleeved coveralls or long-sleeved shirts may be worn instead of waterproof clothing if contaminated clothing is removed promptly and washed before re-use.

Use care in handling of solutions to prevent liquid from coming in contact with skin or clothing. If solutions are splashed on skin or clothing, the clothing should be removed promptly and the part of the body coming in contact with the solution washed with water. Change to clean clothing.

If contact is only on clothing that is not worn next to the skin, changing is not required, although it should not be worn again without laundering. If waterproof clothing is worn, it may not need to be changed if splashed, but the splash should be washed off with water.

Wash hands with soap and water before eating or smoking, and take a shower at the end of the work day. Work clothing should not be worn home. Areas where spills have occurred should be washed down with water. If the gel reaction is completed, ground contamination should not occur.

See the SAFE OPERATING PRACTICES PROGRAM booklet for additional information.

Technical Specifications

First Aid

Eyes: Immediately flush eyes with water for 15 minutes. Get medical attention.
Skin: Wash affected area with soap and water. Remove contaminated clothing.
Inhalation: Remove to fresh air. If breathing is difficult, get medical attention.
Ingestion: Drink 2 glasses of water. Call a physician.

Note: Never give anything by mouth to an unconscious or convulsing person.

Notice

The data, information and statements contained herein are believed to be reliable, but are not construed as a warranty or representation for which Avanti International assumes any legal responsibility. Since field conditions vary widely, users must undertake sufficient verification and testing to determine the suitability of any product or process mentioned in this or any other written material from Avanti for their own particular use. NO WARRANTY OF SUITABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE. In no case shall Avanti International be liable for consequential, special, or indirect damages resulting from the use or handling of this product.