

Acceptable Polymer Slurry Systems



The BIG-FOOT[®] polymer slurry system is formulated to make a viscous slurry fluid to fortify the most challenging soil conditions. BIG-FOOT soil stabilizing polymer is an easy mixing, 100% active polymer packaged as a granular powder.

Due to its concentrated formula, small amounts of BIG-FOOT earth-reinforcing polymer mixed with fresh water builds high viscosity. BIG-FOOT is ideal for drilled shafts, mini-piles, slurry trenching, diaphragm walls, HDD, reverse circulation (RC) rotary drilling and tunneling.

Benefits of BIG-FOOT

- Stabilizes reactive clay and shale formations
- Mixes smoothly into flowing water with minor sheer
- Self-cleaning no solids equipment required
- Improves skin friction & end bearing capacity
- Non-gelling, even at high viscosities, facilitating settlement of fines and maintenance of a clean fluid
- Binds excavated sand & gravel soil for fast drilling and removal of spoils

TYPICAL PROPERTIES	
Appearance	White granular solid
pH (0.25% Solution)	8.5 to 9.0
Specific Gravity	1.00-1.01 (water= 1.0)
Bulk Density lb/ft ³	52
Odor	Odorless

MIXING DOSAGE: BIG-FOOT should be mixed at a minimum rate of 8 to 9 lb/1,000 gal of fresh water pretreated with M-BOOSTER[®]. For larger projects this should be done in a properly designed mixing tank.

SOIL FORMATION	BIG-FOOT [®] POLYMER MIX DOSAGE*			MARSH FUNNEL VISCOSITY
	lb/yd ³	lb/1,000 gal	kg/m ³	sec/qtr
Clay & Shale	0.8-1.0	4.0-5.0	0.5-0.6	40-45
Silt & Fine-Medium Sand	1.2-1.25	6.0-6.5	0.7-0.75	50-55
Coarse Sand-Pea Gravel	1.4-1.6	7.0-8.0	0.8-0.9	60-70
Gravel-Cobble	1.7-2.0	9.0-10.0	1.1-1.2	75-95

* In application where brackish, salt or seawater contaminates slurry or is used as make-up water,



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MIXING FORMULA (IN ORDER OF ADDING):

- 1 Prepare the make-up water** by adding M-BOOSTER at a concentration of 6 to 7 lbs/1,000 gal (0.7 to 0.8 kg/m³) for a target pH of 9.0 to 10.0.
- 2 Add BIG-FOOT polymer** through the same mixer at a dosage of 8.0 to 9.0 lb/1,000 gal (1.0 to 1.1 kg/m³) of mix water depending on desired viscosity.
- 3 Check slurry properties** as listed below and record time taken. Check slurry properties when each hole is completed and make required adjustments to bring slurry back into desirable property range.
- 4 Once desired slurry properties are reached, the slurry is ready for use.**
- 5 The slurry level should always be higher than the water table** or river level in the open-hole section to maintain a constant hydrostatic loading on excavation.
- 6 Measure Marsh funnel viscosity.** Target viscosity should be in the range of 70 to 80 sec/qt.
- 7 If Geology consists of gravels and sand with little or no fines add FORTIFY[®]** at a concentration of 5 to 6 lb/1,000 gal (0.6 to 0.7 kg/m³) via MATRIX high shear mixer to promote enhanced rate of hydration and reduce the amount of un-yielded material ("fish eyes").

On smaller projects or mobile projects, such as Transmission Line and Cell Towers, BIG-FOOT may be added at the excavation by sprinkling carefully into a stream of water directed into the excavation or an agitator mix tank.

Fanning the water stream over a sloping pan or across the blade of an auger facilitates lump-free mixing. If mixed directly in excavation, the tool should be reciprocated gently after product is added to distribute and homogenize the polymer. After completing the addition of BIG-FOOT into the excavation raise and lower the drilling tool from the top of the excavation to the bottom to assist in the proper distribution of the product.

For best results add 6-7-lb M-BOOSTER/1,000 gal of mix water for a pH of 9-10.

- Total chloride (salt) should be less than <1500 ppm (mg/L).
- Total hardness (calcium) less than <100 ppm.
- Total chlorine less than <50 ppm.

BREAK-DOWN: BIG-FOOT slurry can be chemically broken down using NEUTRALIZER[®]. This dry breaker when added into a slurry mixed with BIG-FOOT polymer at a dosage of 15 lb/3,500 gal will reduce the viscosity of the slurry preparing for disposal.

PACKAGING: BIG-FOOT dry polymer is packaged in 55 lb (25 kg) poly bags, 30 per pallet, and 35 lb (15.88 kg) plastic pails, 36 per pallet.

AVAILABILITY: BIG-FOOT dry polymer can be purchased through any MATRIX Construction Products Distributor. To place an order contact MATRIX Construction Products.

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POLYMER SLURRY REQUIREMENTS FOR MATRIX BIG-FOOT^A			
Property	API RP^B 13B-1	Requirement	
		In Tanks and Excavation During Drilling	In Excavation Before Final Cleaning and Placing Concrete
Density ^C (Mud Weight)	Section 4 Mud Balance	≤ 64 lb/cf	≤ 64 lb/cf
Viscosity	Section 6.2 Marsh Funnel	30 – 125 sec/qt	55 – 114 sec/qt
Sand Content	Section 9	---	≤ 1 %
pH	Section 11 Glass Electrode pH Meter ^D	8.5 – 10.5	8.5 – 10.5

- A.** Slurry temperature of at least 40°F required.
- B.** American Petroleum Institute Recommended Practice.
- C.** Increase density requirements by 2 lb/cf in saltwater.
- D.** pH paper is also acceptable for measuring pH.

SHORE PAC®

VISCOUS SOIL STABILIZING POLYMER

DESCRIPTION

SHORE PAC is an easy mixing, water soluble, polymer supplied as a granular powder. SHORE PAC is designed for preparation of viscous earth-reinforcing fluids or slurries for a variety of drilling, trenching, and walling applications in the geo-construction industry.

RECOMMENDED USE

SHORE PAC is ideal for slurry trenching, diaphragm walls, drilled shafts/bored piles, and tunneling.

CHARACTERISTICS

- Can be mixed directly in the borehole or excavation
- Stabilizes borehole while excavating; improves skin friction
- Non-gelling, even at high viscosities, facilitating settlement of fines, and maintenance of a clean fluid
- High cohesiveness to bind excavated soil and gravel
- Improves loading and removal of spoils
- Works well in both fresh and saltwater

MIXING AND APPLICATIONS

SHORE PAC should be mixed by sifting carefully into a stream of water directed into the excavation or an agitator mix tank. Fanning the water stream over a sloping pan or across the blade of an auger facilitates lump-free mixing. If mixed directly in excavation, the tool should be reciprocated gently after product is added to distribute and homogenize the polymer. Make-up water should have a pH of 8-10; add 6 lbs SODA ASH per 1,000 gallons water.

PACKAGING

36 lb pail, 36 per pallet, 6-7.5 lb jugs - 45 lb case, 36 per pallet, or 55 lb bags, 36 per pallet.



FORMATION	SHORE PAC DOSAGE RATE*		MARSH FUNNEL VISCOSITY
	Lbs/1,000 gal	Kg/m ³	
Clay & Shale	3.4 - 4.0	0.4 - 0.5	35 - 50
Silt & Fine to Medium Sand	4.0 - 5.0	0.5 - 0.6	45 - 55
Coarse Sand to Pea Gravel	6.0 - 8.0	0.7 - 0.9	60 - 70
Gravel to Cobbles	9.0 - 12.0	1.0 - 1.3	80-125

* In application where brackish, salt, or seawater contaminates slurry or is used as make-up water, SHORE PAC dosage should be increased

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FORM: TDS_SHORE_PAC_AM_EN_201507



POLYMER SLURRY REQUIREMENTS FOR CETCO SHORE PAC^A			
Property	API RP^B 13B-1	Requirement	
		In Tanks and Excavation During Drilling	In Excavation Before Final Cleaning and Placing Concrete
Density ^C (Mud Weight)	Section 4 Mud Balance	≤ 64 lb/cf	≤ 64 lb/cf
Viscosity	Section 6.2 Marsh Funnel	33 – 74 sec/qt	≤ 57 sec/qt
Sand Content	Section 9	---	≤ 1 %
pH	Section 11 Glass Electrode pH Meter ^D	8 – 11	8 – 11

- A. Slurry temperature of at least 40°F required.
- B. American Petroleum Institute Recommended Practice.
- C. Increase density requirements by 2 lb/cf in saltwater.
- D. pH paper is also acceptable for measuring pH.



SlurrySMART

Physical Data:

Appearance:	Opaque to white free flowing granular solid
Odor:	Odorless
pH:	NA
Freeze Point:	NA
Specific Gravity:	1.00-1.01 (Water = 1.00)

Description:

SlurrySMART forms a synthetic membrane on the sidewalls during excavation that controls loss of fluid to the formation. It also allows for positive pressure to be applied to the formation wall insuring excavation stability. Unlike bentonite, this membrane does not continue to grow on itself over time. SlurrySMART is able to react to field conditions and perform as needed based on system demands. **No pH adjustment** with caustic or soda ash is required when using SlurrySMART unless, extreme water hardness or salt water is encountered.

General Application and Instructions:

KB recommends SlurrySMART initially be mixed at a rate of 1.5 to 2.5 lb/yd³ of fresh water. For larger projects this should be done in a properly designed mixing tank; please see KB's "Mix Tank Diagram" for specifics. Many contractors find they can start with lower dosages and adjust as required for stability. On smaller projects or highly mobile projects, such as transmission lines, SlurrySMART may be applied at the point of excavation. Typical product consumption rates are suggested to be as follows; although many contractors find less is acceptable:

Formation Type	Suggested SlurrySMART Initial Dosage			Typical Marsh Funnel Visc.
	lbs/yd ³	lbs/1000 gals	kg/m ³	sec/qt
Clay & Shale	1.50-2.20	7.50-11.00	0.70-1.00	60-75±
Silt & Fine to Medium Sand	1.75-2.20	8.75-11.00	0.80-1.00	65-100±
Coarse Sand to Pea Gravel	2.00-2.50	10.00-12.50	0.90-1.15	75-100±
Gravel to Cobbles	2.20-3.00	11.00-15.00	1.0-1.40	85-100+

Formation Type	Suggested SlurrySMART Refreshment Dosage			Typical Marsh Funnel Visc.
	lbs/yd ³	lbs/1000 gals	kg/m ³	sec/qt
Clay & Shale	1.00-1.50	5.00-7.50	0.45-0.70	60-75±
Silt & Fine to Medium Sand	1.10-1.70	5.50-8.50	0.50-0.80	65-100±
Coarse Sand to Pea Gravel	1.25-2.00	6.250-10.00	0.60-1.00	75-100±
Gravel to Cobbles	1.266-2.109	6.259-10.432	0.75-1.25	85-100+

Additional SlurrySMART may be introduced at the point of excavation through a KB Eductor or into the mix tank or agitated slurry storage tanks. The addition of small quantities of SlurrySMART at the hole provides the following benefits: rapid increase in viscosity to stabilize highly permeable soils and immediate intervention in case of emergencies or other atypical situations. When adding at the point of excavation, please pour SlurrySMART slowly into a KB Eductor that feeds into an adequately flowing stream of slurry emptying into the excavation. SlurrySMART may also be added directly into the stream of fluid flowing into a pile while the excavation tool is one meter (3 feet) below the surface of the slurry. The tool rotates to form a vortex within the slurry column. Avoid clumping the dry SlurrySMART into "white gel balls" by slowly sifting product into the fluid stream. Feeding SlurrySMART too quickly, with lack of

proper agitation, causes balling of the polymer particles into “fish eyes” and larger polymer masses. After adding SlurrySMART to the any excavation, raise and lower the excavation tool from the top of the hole to the bottom to assist in proper distribution of the product throughout the slurry column. The slurry viscosity within the excavation should never be allowed to drop below 55 seconds per quart regardless of what type of soil is being excavated.

At least one sedimentation tank is always recommended for recaptured slurry to pass through prior to the mix tank and the re-addition of SlurrySMART.

The dosage rate of the SlurrySMART synthetic polymer in the initial make-up water should use the higher levels recommended in the dosage chart. Only after the slurry has been established, in a secure dosage and viscosity obtained, should the dosage be reduced.

If unusual site conditions arise during excavation recommendations should be sought from KB technical personnel to resolve the problem.

Special Operational Precautions and Instructions:

It is suggested that the specific gravity of a SlurrySMART fluid should not exceed 1.05 under normal operating conditions. If low hydrostatic conditions are encountered where the water table is less than 3 meters or 10 feet beneath the slurry level, the specific gravity of the slurry should be increased as required.

Due to the unique characteristics of SlurrySMART as compared to bentonite, several key operational procedures are recommended to be modified from bentonite systems. These modifications will have a major impact on the overall effectiveness and successful use of SlurrySMART. For smaller projects, please consult KB International’s “General Operating, Product Addition, and Testing Procedures.” For larger or more complicated projects, please contact KB International for specific project planning.

Packaging:

25 kilo / 55 lb. poly bags

10 kilo / 22 lb. resealable plastic pails

Availability:

SlurrySMART is available out of KB International’s Charleston, SC warehouse and various other regional warehouses. Please check for availability in your area.

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POLYMER SLURRY REQUIREMENTS FOR KB SLURRYSMART^A			
Property	API RP^B 13B-1	Requirement	
		In Tanks and Excavation During Drilling	In Excavation Before Final Cleaning and Placing Concrete
Density ^C (Mud Weight)	Section 4 Mud Balance	≤ 67 lb/cf	≤ 64 lb/cf
Viscosity	Section 6.2 Marsh Funnel	50 – 120 sec/qt	≤ 70 sec/qt
Sand Content	Section 9	---	≤ 1 %
pH	Section 11 Glass Electrode pH Meter ^D	6 – 11.5	6 – 11.5

- A.** Slurry temperature of at least 40°F required.
- B.** American Petroleum Institute Recommended Practice.
- C.** Increase density requirements by 2 lb/cf in saltwater.
- D.** pH paper is also acceptable for measuring pH.

SUPER MUD

POLYMER SLURRY

DESCRIPTION

Super Mud is a liquid polymer slurry which is primarily used as a viscosifying agent and as a soil stabilizer to prevent sloughing and/or collapse of a borehole. **Super Mud** is far easier to use than any bentonite.

5 Gallons of Super Mud is Equivalent to 1 Ton of Conventional Bentonite

ADVANTAGES

1. Mixes easily in both fresh and saltwater.
2. Allows for faster drilling.
3. Non-fermenting and nontoxic.
4. Reduces wear on pump and bits; unlike bentonite, **Super Mud** slurry will always weigh approximately the same as water, therefore, requiring lower pump rate.
5. Eliminating swelling in most clays and shales.
6. Rapidly settles cuttings in bottom of pit.
7. Reduces fluid loss.
8. Can be readily broken down for easy disposal.

MIXING PROCEDURE

1. Pretreat makeup water with *Water Treat*, a pH conditioner, to pH of 8-10. Normally, 1 lb to 200 gallons of makeup water is sufficient for freshwater. For brackish makeup water, the ratio is 1 lb to 100 gallons.
2. Mixing Ratio **800 (Fresh water) : 1 (Super Mud)** These ratios yields Marsh Funnel Viscosity of 40 plus.
600 (Brackish water) : 1 (Super Mud)
This mixing ratio is sufficient for most drilling situations. Clay or rock formations require a lower mixing ratio.
3. Monitor the pH of the slurry, as it will change with the chemical structure of the formation. Add a cup or two of *Water Treat* into the flowing ditch to revitalize the slurry when pH drops or if salt or brackish water is encountered.
4. **Super Mud** slurry can be pumped into a storage tank for reuse or for breaking down with household bleach (5% Sodium Hypochlorite solution) or 3% Hydrogen Peroxide. The breaker should be added to the **Super Mud** slurry at a rate of 1 part to 800 parts of slurry. After the breaker is added, the entire system should be circulated to insure complete oxidation of all polymer molecules.

PACKAGING

Available in 5 gallon (19 liter) pails and ½ gallon (2 liter) jugs of six to a case.



POLYMER SLURRY REQUIREMENTS FOR PDS SUPER MUD^A			
Property	API RP^B 13B-1	Requirement	
		In Tanks and Excavation During Drilling	In Excavation Before Final Cleaning and Placing Concrete
Density ^C (Mud Weight)	Section 4 Mud Balance	≤ 64 lb/cf	≤ 64 lb/cf
Viscosity	Section 6.2 Marsh Funnel	32 – 60 sec/qt	≤ 60 sec/qt
Sand Content	Section 9	---	≤ 1 %
pH	Section 11 Glass Electrode pH Meter ^D	8 – 10	8 – 10

- A.** Slurry temperature of at least 40°F required.
- B.** American Petroleum Institute Recommended Practice.
- C.** Increase density requirements by 2 lb/cf in saltwater.
- D.** pH paper is also acceptable for measuring pH.