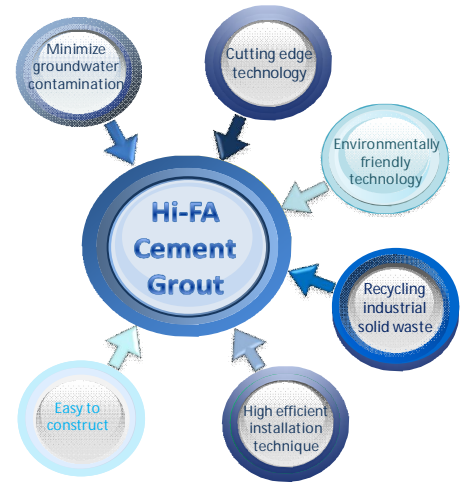


General Description

ReEn Hi-FA is a new Non-dispersion Grout Admixture (NGA) developed for cement grouting admixture in water environment construction. Unlike similar Anti-Washout Admixture (AWA) products, ReEn Hi-FA is formed with mixed surfactants system and has both viscous and transmittable characteristics during casting under water. ReEn Hi-FA provides a reliable, cost effective grouting solution for your challenging construction projects. Application includes, but not limited, to grouting to tunnels under water, bridge foundation, slopes with water flowing condition, grouting at gravels/rubbles, residential use to repair swimming pools and so on. ReEn Hi-FA is manufactured either in liquid state (ReEn Hi-FA 220) or in solid powder state (ReEn Hi-FA 500P).

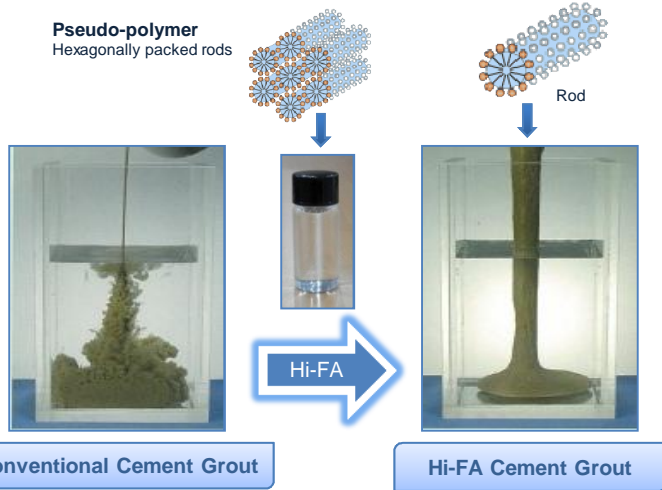


Dosage Recommendation

ReEn Hi-FA is recommended for use at a dosage range of 2 to 3 percent of water used in cement mix for conventional cement grout purpose. Because of variations in materials, jobsite conditions and/or applications, dosages outside of the recommended range may be required.

Hi-FA Mechanism

Component Structure of Hi-FA Grout Material



Characteristics of Hi-FA

Non-Dispersion

- Non-dispersion capacity
- Constant water/cement ratio
- Fast curing time
- Minimum washout

Counterfort Maintainability

- High viscosity
- No casing is needed
- High skin friction for pile foundation

Self-Leveling

- High fluidity
- Excellent workability

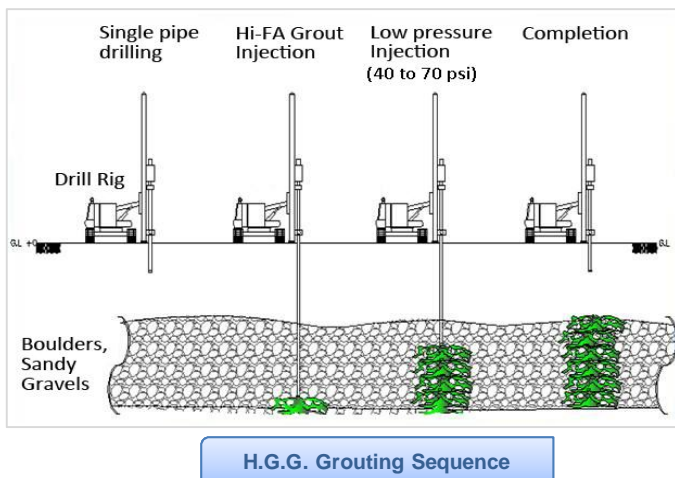
High Mobility

- High groutability of voids in sandy gravels and boulders
- Minor impact to adjacent structures

Hi-FA Green Grout

H.G.G. (Hi-FA Green Grout Method)

Hi-FA green grout method utilizes no-pressure or low-pressure grouting system. The Hi-FA Green Grout is especially effective for grouting for boulder, sandy gravel layers.



Advantages

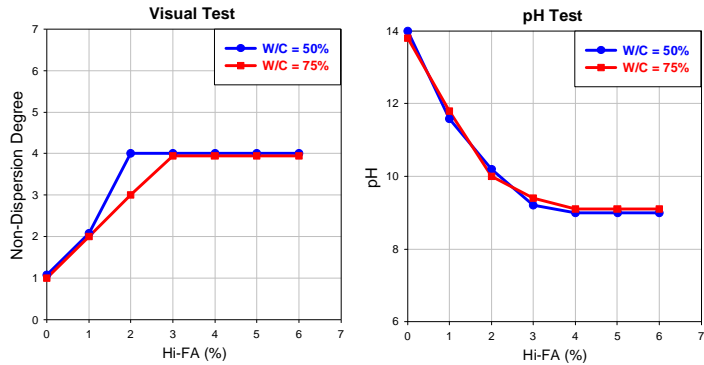
- No change in water/cement ratio due to non-dispersion characteristic
- Ground disturbance is minimized and homogeneous property is maintained by low pressure injection due to high fluidity
- Environmentally friendly construction due to no cement leaching even in water flow condition
- Fast construction due to fast curing speed and low water/cement ratio
- Large diameter grouting pipe is usable due to high mobility in gravel or sand gravel layers
- Effective cavity filling methodology due to no bleeding
- Economically efficient grouting methodology

Physical and mechanical properties

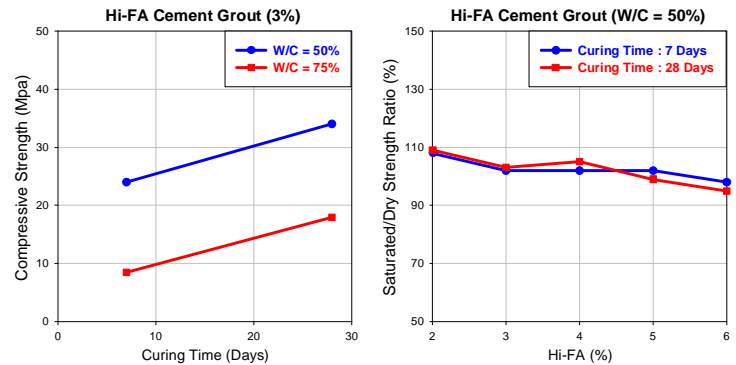
Hi-FA Physical properties

Appearance	pH	Specific Gravity (PCF)	Viscosity(cps)
Colorless or pale yellow liquid	7.0 ~ 9.0	59 ~ 65	9

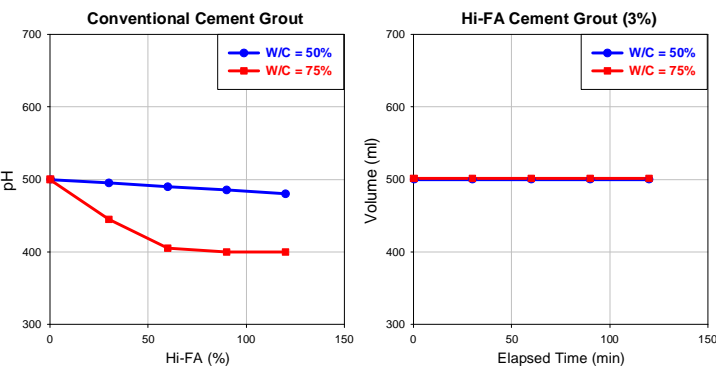
Non-dispersion Test



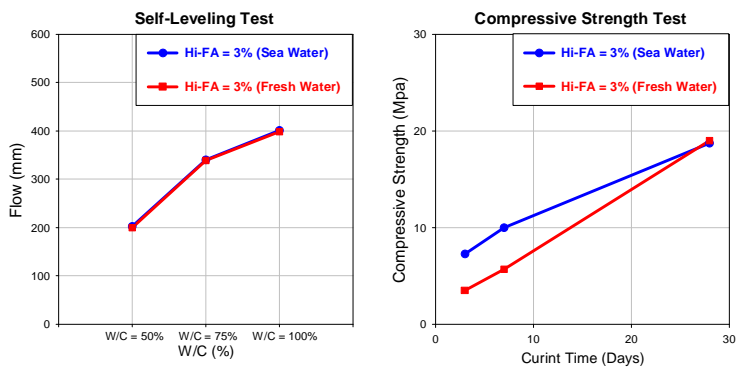
Compression Strength



Bleeding Change vs. Elapsed Time



Sea water safety test



Applications

Tunnel Grouting

Diagram: Shows a Jack up Barge (EL +4.73) over a sea. A shield tunnel is being grouted. The grout zone is 30 ~ 45 ft deep, with a 3 ~ 7 ft thick grout zone. The tunnel is 23 ~ 33 ft in diameter. The ground consists of SM (Soft Mud) and GM (Gravelly Mud).

Photos: A 16-inch diameter grout pipe, boulders in the grout zone, and the Hi-FA Grout material.

- Ground improvement for underwater tunnel project
- 725psi to 1,450psi of post-grouting strength obtained
- Highly effective in water proofing

Bridge Grouting

Diagram: Shows an Existing Pier and a New Pier. A Drill Rig is used for H.G.G. Grouting. The grout zone is 30.8 ft deep. The ground consists of Alluvium (20/30, 4/30), Sandy gravel, and Soft rock. The rock line is at EL -30.8 and EL -41.8. The existing pier is at EL -151.017.

- New foundation construction adjacent to an existing bridge pier structures
- Ground improvement is needed to minimize impact on the existing bridge super structures
- Hi-FA grout is selected due to high mobility, low pressure grouting to minimize ground movement, and environmental friendly grouting method
- 9,500 psi to 10,900 psi of post grouting strength obtained