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Technical Bulletin TB-IG11-Pump

Installation Guidelines

Castable Pump Installation

This is a basic guide applicable for the pump installation of various grades of Plicast castables including: Plicast HyMOR (excluding vibration only grades), Plicast Super HyMOR (excluding vibration only grades), Plicast HyREZIST, PliFlow, Plishot, Plicast P series, ExoSet UNO and Plicast Si-Bond castables. To check the applicability of a specific castable, please contact the Plibrico technical Department. Please refer to the specific installation guides for each specific Plicast castable for storage, preparation and general mixing information.

Equipment & Setup

Mixer—A high intensity, large capacity (1500+lbs) mixer such as paddle type or high torque turbine mixer is recommended to minimize castable mix times. For large volume pumping, rotary drum cement trucks may be used though mix times will be increased and castable water contents may be higher than optimum. If lower capacity mixers (>1000lbs) are used, it may be necessary to use two (or more) mixers to adequately feed the pump.

Pump—A high pressure swing tube type piston pump with holding hopper with a mix agitator is preferred. Discharge cylinder/tube diameters up to 6 in. are acceptable though 3 to 4 in. cylinder/tube diameters are preferred to minimize line reduction. The pump should be positioned as close to the installation as possible to minimize the pumping distance and height and to maximize accessibility.

Pipe/Hose—Refractory castable is usually pumped through 2 1/2 to 3 in. line. A combination of hard pipe (slickline) and rubber hose should be utilized with as much slickline used as feasible to reduce flow resistance and lower pump pressures. Some items to consider are:

- Rubber hose should only be used for the final material distribution/placement sections. Rubber hose significantly increases flow resistance (~twice the resistance of an equivalent diameter slickline).
- Line diameter reduction should occur at the pump outlet with the reducer section being as long as possible to minimize flow resistance and the chance of a rock jam (blockage). Ideally, line reduction should be no greater than 1 in. diameter reduction over a 5 ft. length of reducer section.
- Slickline is preferred for all vertical runs.
- Since bends or elbows in the pipeline increase flow resistance and pump pressure, they should be as large as possible to minimize the resistance. Elbow pipe is available in various degrees of curvature (90°, 45°, 22 1/2°, and 11 1/2° are the common) and curvature line radii distances (C.L.R.). Larger C.L.R.'s (18+ in.) are preferred to reduce flow resistance and blockages.

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- Slickline and hose should be properly supported to reduce strain on the coupling joints.
- The proper couplings, compatible with the slickline/hose ends, must be used to insure safety.
- During assembly, care should be taken to keep the slickline sections reasonably in line to reduce pumping pressure and line wear.
- Discharge hose handling is strenuous requires adequate personnel. A 10 ft section of 3 in diameter hose filled with refractory castable weighs between 100 and 160 lbs.

Communication-For job safety and installation quality and efficiency, it is strongly recommended that a audio system be used to allow direct communication between the pump operator and the job supervisor and placement crew.

Pumping

Line Lubrication—Prior to mixing and pumping the castable, the pipeline must be lubricated. This generally done by mixing a slurry of a bentonite clay or other plastic clay and pumping the slurry though the pipeline. This slurry and the first amount of castable behind it must be discarded .

Mixing and Pumping– The first batch of castable to be pumped is generally mixed slightly "wetter' than optimum to insure that it will pass though the pipeline with no leaks or restrictions. Once this is established, subsequent batches are mixed and pumped at the desired placement consistency and at normal pump pressures. Once castable pumping begins it is important that the pumping operation be as continuous as possible. Refractory castable, even those designed especially for pumping, can have a relatively short working time and hot ambient conditions and pipeline exposed to the sun, can cause accelerated stiffening or setting. If a significant work interruption occurs or the pumping pressure increases (indicating the castable is stiffening in the line), the pipeline and pump hopper should be purged and cleaned.

Technical References

Castable Installation Guidelines

Plicast	TB-IG11-PC
Plicast HyMOR, Super HyMOR & HyREZIST	TB-IG11-HY
Plicast Al-Tuff & Al-Shield	TB-IG11-AT/AS
PliFlow	TB-IG11-PF
Plicast Si-Bond	TB-IG11-SB
ExoSet UNO	TB-IG11-EX

Technical Questions
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