EQUIPMENT FOUNDATION SYSTEMS

Creating a Monolithic Foundation

For Pumps and Equipment

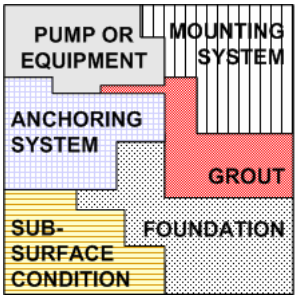
Technical Bulletin # 1034

Bulletin Description

Pump bases are mounted firmly on foundations to minimize movement during operation and to transmit pump loads and vibration down through the concrete foundation into the soil below. By eliminating movement and transmitting vibration, well designed pump foundations will result in less maintenance, higher reliability and lower equipment life-cycle costs. This Technical Bulletin discusses the impact of the grout on pump installation.

Advantages & Disadvantages

The designer of a pump installation must consider all of the components used in the pump installation and how they work together to eliminate movement, transmit load and absorb vibration. For optimum long-term performance and reliability of the pump, the entire foundation and all its components must create a "monolithic" structure for it to rest on. If any one of the foundation components is not solid or not well attached to the next, the structure will lose its monolithic nature. When this happens, parts of the structure arefree to move and vibrate independently and the ability to absorb or transmit load and vibration is significantly reduced.



Consider all of the components and and how they work together to create a monolithic structure when designing for optimum equipment performance

Creating a solid, monolithic pump foundation can be done using various grouting materials such as epoxy grout and cement grout. These materials can be used either individually or in combination. There are advantages and disadvantages to using each material. Cement grouts are initially very cost effective and have fairly low adhesive strength. For pours over 2 inches (50 mm), pea gravel must be added to the grout to absorb the heat of hydration and prevent cracking. Cement grouts take a minimum of 28 days to fully cure and are easily attacked and destroyed by water, fuel oil, lube oil and chemicals.

While initially more expensive, epoxy grout does a much better job of creating a monolithic structure because it adheres very well to both the pump foundation and to the concrete foundation and because it has a relatively low modulus of elasticity that allows it to absorb vibration. Epoxy grout is impervious to attacks by all hydrocarbons and most chemicals.

Combining Materials

The materials chosen to mount a specific pump usually depend on the size of the pump, the loads on the pump and how critical the pump is to the operation of the plant. Both types of grouts will produce good results if they are a part of a well designed mounting system.

The one practice that should be cautioned against is that of combining epoxy and cement grout or concrete. This is typically done to save money but often results in a poor quality foundation system. Instead of creating a high quality foundation system with epoxy grout helping to hold the major components together, a poor function system is created using some expensive and some cheap components. The following are the reasons why combining epoxy grout and either cement grout or concrete to create a pump foundation are not good practice.

A) The layer of concrete or cement grout that is poured on top of the Chockfast will not bond to the Chockfast. This alone prevents the entire foundation from becoming a monolithic structure. There are now layers of materials that can move and vibrate independent of each other.

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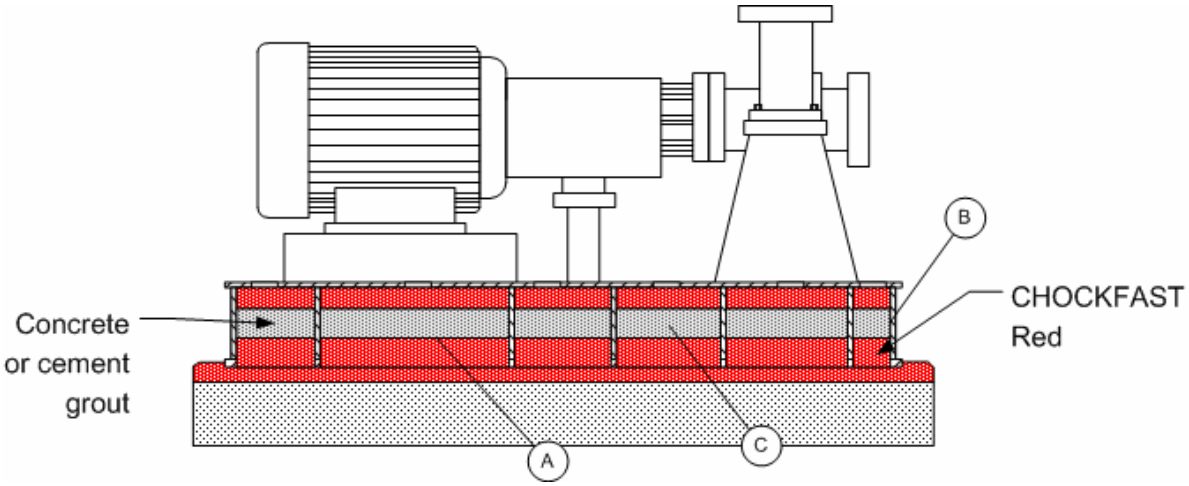
B – Neither concrete nor cement grout will bond to the steel around the sides of the baseplate. It will shrink as it cures and pull away from the sides and the monolithic integrity will be lost.



C - Concrete requires a minimum of 28 days to cure and lower its water content enough so the epoxy grout poured on top of it will bond. If epoxy grout is poured on top of the concrete too soon water will dissolve the epoxy hardener molecules at the bond line

D - Pouring a layer of concrete or cement grout between two layers of epoxy grout involves three separate operations of setting up, mixing and pouring. Also, the concrete or cement grout takes time to cure and the last layer of epoxy grout can be poured only after that. All this increases the total cost of the grout installation. Therefore, a single pour of epoxy grout achieves two key objectives: 1) It minimizes the Life Cycle Maintenance Cost of the installation by creating a good quality monolithic foundation system and 2) It minimizes the Total Installed Cost of grouting due to a single grouting operation that can be completed in a day or two.

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