



SUMMARY

The following are provided as general recommendations for injecting CAP 18® anaerobic bioremediation product and CAP 18 ME® anaerobic bioremediation product into a subsurface formation via permanently-installed injection wells. This document is not intended as a replacement for design by an experienced professional. The exact procedures utilized in the field will vary based upon the equipment staged onsite, unique site conditions, and project design.

RECOMMENDATIONS

Underground and overhead utility markout and drilling conflict identification are important safety requirements. For the health and safety of employees as well as to avoid any damage, always identify underground and overhead drilling conflicts prior to drilling. Adjust pre-planned locations as necessary to provide safe clearance of all underground and overhead drilling conflicts.

CAP 18 and CAP 18 ME do not generally require heating prior to injection. However, in cold weather (less than approximately 50-60°F), the product viscosity will increase and heating can make injection easier. If heating is desired, the easiest method is to use an electrical immersion heater placed in a drum of CAP 18 or CAP 18 ME. If the CAP 18 or CAP 18 ME is delivered to the site by tanker, then a large (200-400 gallon) poly tank can also be used. Do not warm the CAP 18 or CAP 18 ME to a temperature higher than 90°F (to prevent burns in the event of accidental exposure). Immersion heaters designed for 55-gallon drums with programmable thermostat and mounting bracket are available from McMaster-Carr (Example: part nos. 3567K811 and 3567K812 depending upon power supply).

CAP 18 or CAP 18 ME can be injected through injection wells installed specifically for the purpose of CAP 18 or CAP 18 ME injection. Wells can be installed with hollow-stem auger, direct-push, air rotary, or other standard methods. CAP 18 and CAP 18 ME are compatible with commonly used well construction materials (PVC, stainless steel). Wells should be installed with no more than 10 feet of screen to prevent preferential injection of the reagent to a narrow stratigraphic interval. The annular space above the screened interval should be sealed with tremied Portland cement grout to provide a competent seal. Allow sufficient riser at the surface to attach a PVC fitting (see below). Utilize a relatively large well vault (10-12 inches) to provide sufficient clearance in flush mount wells.

Do not use a packer system for a pressurized injection of CAP 18 or CAP 18 ME. CAP 18 and CAP 18 ME are effective lubricants that will diminish the packer seal integrity, potentially resulting in slippage from the well.

Glue (PVC) or weld (stainless steel) a threaded fitting to the well riser pipe. For example, gluing a 2-inch slip-to-thread adaptor onto a standard monitoring well allows a solid and safe connection for the injection, capping after injection with a threaded cap, and use of the well after injection for monitoring or other purposes.

The hose from the injection pump should be threaded to the well head. Teflon tape may be used for a leak-tight fitting. Ensure the hose is rated for a pressure that exceeds the maximum pump pressure by a significant margin. CAP 18 and CAP 18 ME are compatible with all standard hose materials, including PVC, polyethylene, metal pipe, nylon, polypropylene, Buna-N (nitrile), and silicone. Natural rubber should not be used. Ensure all hose and pipe fittings are leak-tight.

CARUS REMEDATION



Applications and Recommendations for
CAP 18® and CAP 18 ME® Anaerobic
Bioremediation Products

CAP 18® Anaerobic Bioremediation Products
TECHNICAL BRIEF

Double-diaphragm pumps such as the Yamada NDP series are very effective for pressure injection of CAP 18® anaerobic bioremediation product or CAP 18 ME® anaerobic bioremediation product (Santoprene is the optimal diaphragm material, but Buna-N or PTFE are also acceptable). These pumps are air-actuated and require a compressor for operation. The supply hose to the pump can be inserted into a drum of CAP 18 or CAP 18 ME and the pumps do not require priming. Alternatively, a hose can be connected to a bung at the base of a poly tank. Centrifugal pumps are not recommended for injection due to the variable injection pressure that may be experienced.

A digital totalizer provides an accurate measurement of the CAP 18 or CAP 18 ME injection volume. Ensure the totalizer is calibrated for the proper viscosity (100-200 centipoise).

During injection, a pressure gauge may be added to the system (for example, with a T-fitting at the well head) to monitor pressure in the system. Ensure pressures do not exceed the rated values of the hose and fittings. The pressure gauge can also be utilized to monitor aquifer refusal during injection. If refusal is experienced, ensure that pressure is relieved from the system safely before disassembling the injection system.

Pumps and fittings can be easily cleaned with a dishwashing liquid and warm water. Make sure to cycle the cleaning solution through the pump. Although CAP 18 or CAP 18 ME will not solidify, residual product should be carefully cleaned after each day of injection. Inspect hosing prior to re-use.

CARUS CORPORATION

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CORPORATE HEADQUARTERS | 315 Fifth Street, Peru IL 61354 | Tel + 1.815.223.1500 / 1-800-435-6856 | Fax + 1.815.224.6697 | Web: www.caruschem.com | E-Mail: salesmkt@caruschem.com
CARUS EUROPE | Parque Empresarial de ASIPO | C/Secundino Roces 3, Planta 1, Oficina 13-14 | 33428 Cayes, Llanera Spain | Tel +34.985.78.55.13 / Fax +34.985.78.55.10

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