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HYDROTITE ST-591

AND THE ACTIVATED OAKUM PROCESS

INTRODUCTION

ST-591 HYDROTITE is a special dry oakum in rope form which can be used to make Reinforced Foam Seals in leaking concrete joints and cracks. ST-591 Hydrotite is made from selected jute which is carefully carded to remove almost all hard fibers and undesired contaminants. Hydrotite rope has seven or eight strands with about 1.5 twists per foot. The loose rope is approximately two inches in diameter and weighs about 0.4 pounds per foot.

ST-591 Hydrotite packs solidly into joints and cavities, and its double-yarn configuration is easily unstranded where thinner strips are needed. Only dry unoiled jute is appropriate for use with Strata Tech's hydrophilic injection resins in concrete joint sealing applications. ST-591 Hydrotite contains less than 8% oil by weight.

ST-591 Hydrotite is wound into a 50 pound coil and packaged in a cardboard box. The coil can be easily pulled out of the carton by working from the center of the coil. Each 50 pound coil can be unwound into separate smaller strips to make approximately 1000 lineal feet of 0.5 inch diameter strands. Each strand is loosely twisted to allow quick absorption of its companion sealant and to provide easy packing properties in narrow joints and small cavities.

ST-591 Hydrotite conforms to Federal Specification H.H.-P-117, Section IV, Part 5, of the *Federal Standard Stock Catalog,* approved by the Director of Procurement, November, 1940 for use by all Departments of the Federal Government. An excerpt of the specification is attached. Copies of the complete specification may be obtained from the Superintendent of Documents, Washington, DC.

HISTORY

The *Activated Oakum Process* was accidentally discovered by a sewer repair crew. The men were trying without much success to seal the annular space around a polyethylene slip line pipe that had been installed within an older sewer pipe. In a last frustrated attempt to stop groundwater leakage, the crew soaked jute strips in a foaming urethane grout compound and packed them into the space between the inner and outer pipes. To their delight, the seal worked. In fact, the seal was so effective and so easy to install that word of their success spread quickly.

Others quickly tried the idea in all sorts of subgrade leak situations including large concrete pipe joints, expansion joints, manhole corbel voids, and abandoned pipe junctions. The effective seal made by the Reenforced Foam was dense enough to handle high head pressures yet flexible enough to allow structural movement. Users also found the RF Seals successfully resisted freeze-thaw attack, wet-dry cycles, vibration, traffic impact, repeated compression-relaxation, and groundwater extrusion.

INSTALLATION

Placement of the RF Seal is a simple two-step process s usually accomplished with minimal preparation. If the joint contains large quantities of grease, slime, loose old sealants, or debris, best results are obtained by first removing as much of them as possible.

ST-591 Hydrotite is first placed in a container and saturated with one of Strata Tech's flexible hydrophilic foam grouts, such as ST-504 or ST-520 Injection Resin. A strip of the resin-saturated Hydrotite is lifted by one end and pulled through lightly circled fingers to strip off unneeded resin. The saturated strand is then packed into the joint, where the resin reacts with water and expands. The packing can be done using gloved hands, wooden dowels, or other suitable tools. If the joint is not leaking, additional water can be sprayed on the placed strips to hydrate the Injection Resin.

When the expansion reaction is complete, the foamed resin sets into a stiff rubber-like foam. The rubbery foam usually bonds strongly to rough wet concrete even in underwater applications - including saltwater.

The thickness of the needed seal is usually determined by the seal strength required and the size of the gap being treated. In deep joints, the strips can be built up by installing and tamping the Hydrotite and Resin in layers

until a seal of the desired thickness is formed. Application usually stops about 1 inch below the gap surface to allow room for foam expansion without run over. Excess foam in the joint can be hand wiped as it expands to create a smooth seal surface.

Where the joint surface area is very smooth, the bond may not be great enough to hold against high groundwater pressure. These joints should be roughened mechanically or the RF seal should be tamped in deeply around any corners in the gap for a good mechanical grip. Bonds on smooth surfaces are also improved by painting the surface with pure resin prior to placement of the Hydrotite.

If necessary, the seal can be made even stronger by injecting additional resin into the original seal using a *Steel-Stik* grout needle and a grease gun or pump. The Hydrotite in the seal acts as reinforcement much like steel in concrete, and also reduces the amount of sealant needed to fill the cavity. The finished seal is quite strong. Tensile strengths of activated oakum strips in bench tests have approached 5000 psi.

ESTIMATING

Estimates of material requirements for any project will vary based on the assumptions of the estimator. The applicator will also affect quantities used, especially by how much waste he allows and how tightly he holds his fingers when he wipes away material before strip placement.

Strata Tech's hydrophilic resins are capable of expanding up to 10 times the raw resin volume when reacted with an equal volume of water without being confined in any way. The foam which results from unconfined expansion has a relatively low density (about 7 lbs per cubic foot) which does not produce the best seal. The estimator should not, therefore, use the full expansion factor in his calculations of material requirements. Best results are usually obtained when the amount of reaction water is about 50% of resin volume and the expansion factor is held below 3.

For most jobs, the ratio of estimated Hydrotite weight to estimated resin weight will be approximately 1:1. First, calculate the volume of the space to be sealed. Then, estimate the percentage of that volume which must be filled by ST-591 Hydrotite without allowance for any resin and convert that volume to lineal feet of 2 inch diameter rope. Finally, calculate the weight of Hydrotite to be used at 0.4 to 0.5 pounds per lineal foot of Hydrotite. The pounds of ST-591 Hydrotite required will approximately equal the weight in pounds of resin which will join it to make the seal under average conditions using normal methods.

For slipline terminal seals, seal size depends most on the size of the inserted liner relative to the diameter of the host pipe. A little pipe inside a big pipe will need more sealant than will a liner pipe which is close to the size of the host pipe. Under "average" conditions, however, the pounds of Hydrotite needed to make a good seal will be approximately 0.25 times the I.D. of the host pipe.

Material quantities found by these steps should be adjusted upward for special conditions, cold temperatures, fast flowing water leakage, and high static groundwater head pressures. The degree of adjustment is best determined by the prior experience of a good grouting contractor and augmented by appropriate field tests if necessary.

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STATEMENT

Strata Tech believes that the information herein is an accurate description of the general properties and characteristics of the product(s), but the user is responsible for obtaining current information because the body of knowledge on these subjects is constantly enlarged. Information herein is subject to change without notice. Field conditions also vary widely, so users must undertake sufficient verification and testing of the product or process herein to determine performance, safety, usefulness, and suitability for their own particular use.

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