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Hydrophilic Polyurethane Impregnated Rubber for Sealing Water Leaks

Innovative material could be used to permanently seal problematic water leaks in hard to access locations

What Is The Problem?

Repairing leaks in water conveyance and storage structures can be challenging, as leaks are often in difficult to access or hazardous locations. In some cases, it is necessary to repair leaks while the structure remains in operation, with water flowing and under pressure.

Current methods to repair large water leaks under flowing and pressurized conditions are inadequate. The materials used with current methods can fail to adequately seal the leak, are washed away, or become dis-bonded before they cure. Even when the materials remain in place and properly cure, subsequent movement of the sealant often causes it to leak. When “in-the-wet” leak repairs cannot be performed or fail, significant costs can be incurred and/or water services interrupted when the structure is de-watered for repairs.



What Is The Solution?

Reclamation’s Materials Engineering and Research Laboratory has conceived and patented a concept for producing a unique material for repair of large pressurized flowing water leaks. The concept is to develop a compound made up of two materials that are commonly used to control water leakage: hydrophilic rubber and polyurethane. Hydrophilic rubber (a type of rubber that swells when wet) is used as a water-stop to control leakage in the joints of concrete structures. Polyurethane liquids, pastes and foams are used to repair water leaks, including small flowing and pressurized leaks.

These two materials can be combined into a hydrophilic polyurethane impregnated rubber compound that has combined swelling and adhesion properties. A porous type of synthetic rubber (vulcanized chloroprene) is impregnated with polyurethane resin powder, both of which swell when contacted with water. The compound can be cut into various shapes (pellets, strings, chips, etc.) that are appropriate for a given leak configuration. When the material is placed near the leak source (on the “upstream” side), water flow draws the material into the void space where it swells and adheres to eliminate the leak. The swelling and adhesive characteristic of this compound should be far superior to existing products, resulting in an effective and long-lasting repair for large water leaks.

Who Can Benefit?

The owners of large water storage and conveyance structures such as dams, water storage tanks, canals and pipelines would benefit from this method of improved leak repair. Other potential applications include using it as a drilling mud additive (mud filtrate control) and as an alternative to traditional grouting of voids for dam foundation preparation.

Future Development Plans

Reclamation is currently seeking qualified industry partners to collaborate in the development, testing and application of the hydrophilic polyurethane impregnated rubber leak repair materials. Interested parties should contact Reclamation to learn about required qualifications and explore partnership opportunities.

More Information

Patent information is available at <http://patft1.uspto.gov/netacgi/nph-Parser?patentnumber=6541106>

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Collaborators

Reclamation’s Science and Technology Program and Materials Engineering and Research Laboratory