

RENEW® CONCRETE TREATMENT

CAS No. 7790-69-4

QS-PDS-804 Rev. 00

FMC Product Code No. 616-03



Description

Contains lithium nitrate (LiNO₃) in solution

Typical Properties

Density @20°C	1.20 g/cm ³ (10.0 lb/gal)
pH (1:6) dilution at 25°C	7 - 9
Freezing point	-20°C (-5°F)

What is ASR ?

Alkali-silica reactivity (ASR) is a chemical reaction that occurs between the reactive silica in aggregates used to make concrete and the alkalis (sodium or potassium) present in the concrete mix. The reaction causes the formation of a gel that absorbs water and swells, exerting internal pressure that can lead to cracking and premature deterioration of the concrete. The deterioration weakens the matrix so the concrete can be further damaged by traffic loading, vibrations and environmental stresses such as freeze-thaw cycles or steel corrosion.

The best way to avoid ASR in new concrete is to take precautions in the mix design. Guidelines for preventing ASR, as developed under the Strategic Highway Research Program (SHRP), include using non-reactive aggregates, in certain cases using low alkali cements, using suitable pozzolans, and using lithium-based Lifetime® Admixtures. Recently the American Association of State Highway and Transportation Officials (AASHTO) has approved a new guide specification addressing this approach.



ASR has caused severe damage to this pavement.

Dealing with ASR in existing concrete is a much more difficult task, because the ingredients that keep the reaction going are already built into the structure. Unless ASR is dealt with, traditional repairs made to concrete affected by ASR will not last as long as repairs made to otherwise sound concrete. If the expansion of the concrete is not minimized, new cracks will develop requiring continuous maintenance and repair. Indeed, in certain cases, traditional methods may increase expansion and ASR damage.

There are three possible ways to deal with ASR after it develops that were identified under SHRP: (1) If sufficient triaxial restraint can be applied to counteract the internal expansion forces, the expansion can be contained.

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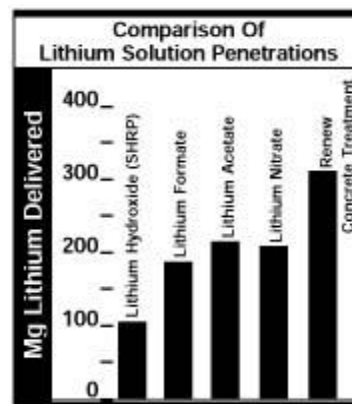
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MARKETS SERVED

This is not an option for most geometries, but may be possible for some columns that support large loads. (2) Drying the concrete will work if it can be achieved, but, in most outdoor structures, getting the moisture level sufficiently low (below 80% relative humidity) and maintaining below this level, is very difficult, if not impossible.

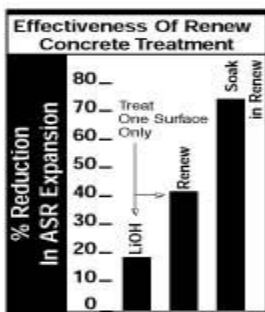
(3) The option that holds the most promise is to impregnate the concrete with sufficient lithium ions to control the reaction. Under SHRP this was demonstrated with lithium hydroxide solutions in the laboratory, even if the concrete was subsequently subjected to high levels of external alkalis. However, on scale-up, penetration obtained in the field was minimal. In addition, the caustic nature of lithium hydroxide made the procedure impractical in the field requiring protective equipment to prevent injury to workers.



Graph 1

What is Renew® concrete treatment ?

Renew concrete treatment is a safe-to-handle specially formulated lithium nitrate based solution for reducing concrete expansion due to ASR. FMC Corporation has tested every commercially available lithium formulation suitable for use on concrete, including a number of additives to aid penetration. Renew concrete treatment, patented, is the best penetrating lithium solution developed under this program. Graph 1 illustrates a portion of FMC laboratory data. From the graph, it can be easily seen that Renew penetrates significantly more than a solution of lithium nitrate of equal concentration.



Graph 2

Besides penetrating better than other lithium-based solutions, Renew concrete treatment significantly outperforms lithium hydroxide in reducing expansions from ASR (Graph 2). When the same amounts of lithium ions were placed on one side of a mortar bar made with highly reactive aggregate, Renew concrete treatment reduced expansion twice as much as lithium hydroxide for a single treatment. For comparison purposes, the graph also shows the significant reduction in ASR expansion attainable if the affected concrete can be soaked in Renew concrete treatment.

Covered by US Patent Numbers 5,837,315 and 5,985,011

How is Renew Used ?

Renew concrete treatment can be applied using the following techniques : 1) sprayed on concrete surfaces, 2) ponded on surfaces, 3) vacuum impregnation, 4) pressure-injection, 5) electrochemical injection. Demonstrations under way in the United States since 1995 indicate that treatments ranging from 3 to 9 gallons per 1000 ft² are adequate, with 6 gallons per 1000 ft² being the norm. Actual dosage depends on the application. When Renew concrete treatment is sprayed on (Photo 2), repeat applications over time should be considered.



Spraying concrete surfaces is one of three ways to apply Renew® Concrete Treatment.

Toxicity / Safety Data

Strong oxidizer if the solution is allowed to evaporate. Clear, odorless, water white to yellow solution. May be irritating to the eyes, skin and mucous membranes.

COMPLETE INFORMATION ON TOXICITY AND SAFETY IS CONTAINED IN THE FMC MATERIAL SAFETY DATA SHEET (MSDS) AVAILABLE FOR THIS PRODUCT.

Handling/Storage

Do not get in eyes, on skin or clothing. Avoid breathing vapors. Wash thoroughly after handling. Store away from readily oxidizable materials, strong acids and flammable materials. Keep container closed.

Shipping Containers

Renew concrete treatment is packaged and shipped in 55-gallon (200 L) single-use polyethylene containers, or in bulk in tank trucks, 4,500 gal (17,000 L) maximum load per tank truck.

Shipping Limitations

Shipments of Renew concrete treatment are not classified as hazardous in transport. Shipments by post, parcel (e.g. UPS), air, water, rail, or road are acceptable within each carrier's weight limits and packaging requirements.

For shipments within Europe labeling for supply requirements are:

Xn Harmful
R&S phrases see Material Safety Data Sheet

Responsible Care initiative dictates that all shipments of lithium chemicals must be transported in a DOT-approved vehicle in a responsible manner (i.e., no flat bed trucks).

