Factors of neutralization of concrete
Alkali aggregate silica reaction

Factors and countermeasures and refurbishment method of alkali aggregate silica reaction

HydroSky

HydroSky Co.,Ltd.

Impregnation method

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It is possible to prevent long-term neutralization by suppressing neutralization by using an impregnation type coating material and performing waterproof / waterproof treatment by injection treatment of fine powder silica blended furnace slag cement, Suppression of reaction can also be expected.

Impregnation method

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Latency treatment is possible by impregnating and impregnating (silicate) HYDROSKY SKY-SP (Silicate + Lithium Silicate) (Water-soluble glass) for efloresense preventing treatment and water-stopping treatment at the splicing point of concrete, Cold Suppress joints.

Impregnation method

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Further, the adhesion of the mating surface is increased, and the strength of the frame itself is also increased.
The surface layer part is usually protected by a water repellent effect using a silane type impregnating agent, but at present it can only be expected to be effective for several years.

Hydrofit construction method

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The Hydrofit construction method effectively prevents various deterioration by HYDROSKY each product and fine powder silica blended blast furnace slag cement and composite construction method using injection jig.

Hydrofit construction method

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Various effects and long-term stability can be expected by combining these materials, inorganicized modified silicone, etc., as well as materials hybridized with a special silicone coupling agent.

Hydrofit construction method

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HydroSky SKY-G1 has the effect of inhibiting silica gel by combining cement hardened body and aggregate particles. This curing reaction proceeds from a pozzolanic reaction to a carbonation reaction over a long period of time, so it has an action (healing ability) of restoring cracks by itself.

Hydrofit construction method

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HydroSky SKY-G1 is not hydraulic (cured) and also white, so it is easy to visually observe, and there are few variations in mixing and strength. Refers to a reaction in which an object to be treated that has absorbed calcium ions further reacts and hardens while generating stable crystalline minerals for a long time.

Hydrofit construction method

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This means that this reaction proceeds only in an alkaline atmosphere. Cracking in the alkali aggregate reaction of the existing concrete structure as a construction method,
SKY-SP is sufficiently impregnated, and finely powdered silica-mixed blast furnace slag cement is crushed into paste form by SKY-G1 and filled.

Hydrofit construction method

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The surface layer part is a silicone type SKY-MX, and it prevents alkali aggregate reaction by protecting it from seawater splash and acid rain etc. As a result, the eleventh coast guard office off the coast of Miyakojima "Fudeiwa" was selected as a material for the lighthouse and heliport repair work, just refurbished concrete which reacted with sea water and reacted with alkaline aggregate. (Reference material at the end)

Hydrofit construction method

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HydroSky gradually reacts with free alkali and amorphous silica inside the concrete as alkali reactive aggregate as mentioned above. It becomes a water-insoluble inorganic compound, and the alkalinity is stable by terminating the reaction.

Hydrofit construction method

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Silicone molecules similarly undergo chemical reactions on the surface and pores, and change into substances that do not allow water to enter inside the capillary and water gap, protecting the concrete. The features of this construction method are effective for those that can not be replaced or rebuilt, such as bridges and underground structures, whether the construction range is wide or narrow.

Hydrofit construction method

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Hydrofit method has no phytotoxicity of materials, and can be used immediately after construction. In addition, it also contributes to environmental conservation and also can expand the expression by adding color expression to maintenance of aesthetic appearance and repair of deteriorated surface part, as well as protection of landscape by SKY-MX color.

Hydrofit construction method

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Factors of alkali aggregate reaction and measures and remediation

Alkali-aggregate reactions are caused either at the time of manufacturing concrete structures or from outside aged. At the time of manufacturing, concrete has high alkalinity inherently, and alkali concentration abnormally increases due to use of cement and sea sand containing a lot of alkali content, causing a chemical reaction with aggregate and aggregate. When the reaction product is absorbed as an alkali silica gel, the concrete is expanded and deterioration phenomenon is caused by abnormal decrease of crack, strength, elastic modulus. From the outside is cryoprotectant or splash of sea water, so-called chloride infiltration, also due to the supply of moisture to concrete.

Hydrofit construction method

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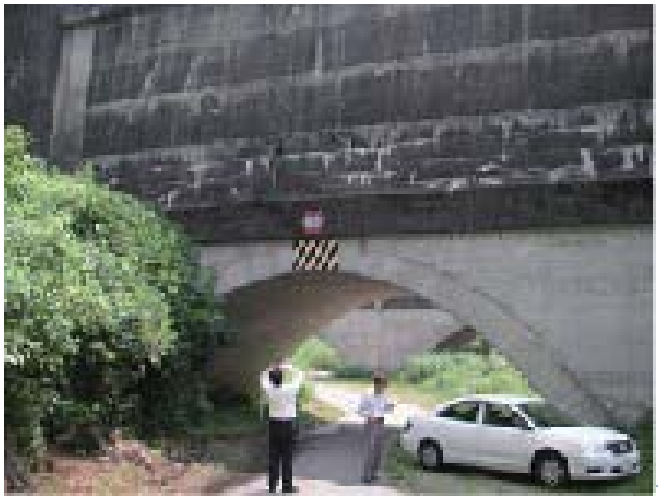
Degradation Properties of Concrete Structures by Alkali Aggregate Reaction



As deterioration by the alkali aggregate reaction progresses, the concrete structure,

1) The occurrence of cracks,
2) Pop out
3) contamination of the concrete surface due to precipitates,
4) Variations in appearance such as occlusion, breakage, and displacement of joints due to partial expansion. In the pop out, the aggregate particles near the concrete surface expand and the concrete on the surface part pops out. Expansion of concrete by alkali aggregate reaction causes tensile stress which was not assumed in the design against reinforcing bars and PC tensioning agent and in some cases rupture of the reinforcing bars and lowers the strength of the structure.

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Collect cores and investigate whether alkali-reactive aggregate is used or observation with polarizing microscope.

In case of confirmation, carry out the accelerated expansion test of the core.

It is difficult to confirm the presence of alkali silica gel as a reaction product.

Determination of alkali content in concrete is almost impossible to guess.

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Measures for preventing alkali aggregate reaction

① Avoid using alkaline reactive aggregate
② Alkaline amount of concrete exceeding limit value
③ Water supply to concrete.
If any condition is lacking, alkali aggregate reaction does not occur. Avoiding the condition ① has no way of judging aggregate conditions and distribution processes of the country, and alkaline reactive aggregate at the site. It is considered difficult to cut off the supply of ③ water, and it becomes a method to limit the total amount of alkali in ② concrete. There is no method to stop the alkali aggregate reaction even if the total alkali is specified as 3 kg / m 2. This is the view so far.

Hydrofit construction method

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When calcium is added calcium ion becomes an adhesive and agglomerates particles inside the concrete. At this time, surplus hydroxide ions induce a pozzolanic reaction while fixing heavy metals.

Strength is due to the formation of crystalline minerals in pozzolanic reaction, so it is expressed in the long term.

In the pozzolanic reaction, crystalline minerals are formed in a gel state in concrete gaps and crystallize while combining with moisture in the surroundings, so the hydrides are high and the gas phase is small.

Therefore, the strength increases as the crystallization mineralization progresses, and the permeability coefficient decreases. This effect progressed in pozzolanic reaction even under water, and there is the development of strength.

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Hydrofit construction method

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Check the position of the internally arranged reinforcement and fix the core drill before construction. While sending water, open the core.

Immediately after removing the core, the rightmost bottle, the white part spraying the phenolphthalein solution is neutralized. This picture is in a dry state.

Hydrofit construction method

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We will mark the internal rebar by cutting sonar.

Before construction, check the position of the interior reinforcement and open the core while sending fixed water to the core drill.

Cut the concrete with diamond core drill of 10 cm long while sending water with a pump.

Hydrofit construction method

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Collect three specimens. Mark with each choke.



A wire is wrapped around the cut concrete, and the part there is cut off by hitting a tagger. If raising it slowly and testing at the building material center, wrap it immediately and prevent oxidation. Normally, a phenolphthalein solution is applied on the spot to see the reaction.



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Hydrofit construction method

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JR East Senju Power Station Exterior Wall Repair Work

Hydrofit construction method

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JR East Senju Power Station Exterior Wall Repair Work

Hydrofit construction method

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From the left bank of the Aganogawa Dam,
before construction

Hydrofit construction method

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Construction method

During washing, wash water curing is carried out firmly with river water which has been pumped in advance, and mosses and pop out are removed.

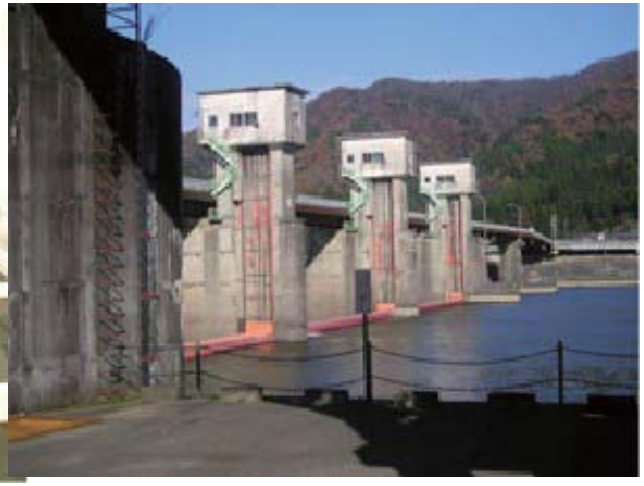
Application of degradation prevention and base conditioning agent, HYDROSky SKY - SP. Coverage is 0.2 kg / m2 on average. of defective part and junka part. Effectively use fine powder silica blended blast furnace slag cement.

After drying, adjust the color tone with SKY-MX color. (Landscape protection)

Fish road on the left bank of the Agano river

Full view of the Agano River fish way

Before construction of Agano River



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Before construction

Hydrofit construction method

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After construction

尖閣諸島フデ岩ヘリポート・灯台保護改修工事

Hydrofit construction method

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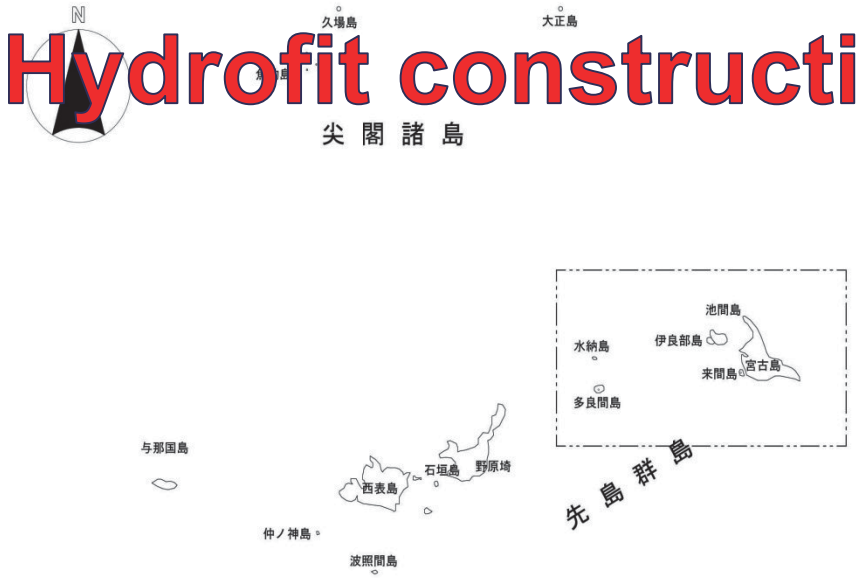
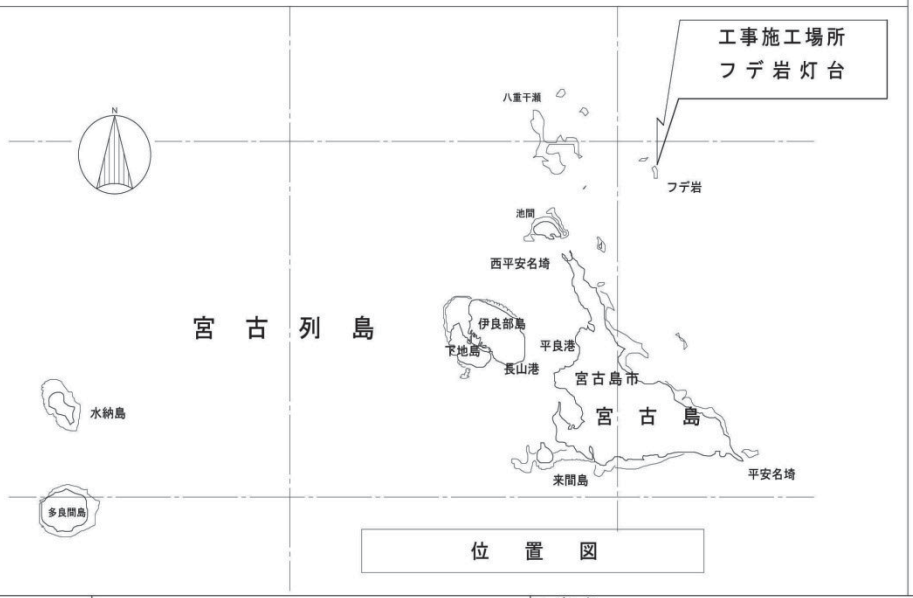


案　内　図



位　置　図

フデ岩　平面図

平成２１年度	第十一管区海上保安本部 交通整備課	工事名	作成年月	設計	製図	原図	縮尺	図面	図面番号
		フデ岩灯台改良改修工事	平成21年 7月	y.matsumoto				案内図・位置図・平面図	A-010

Hydrofit construction method

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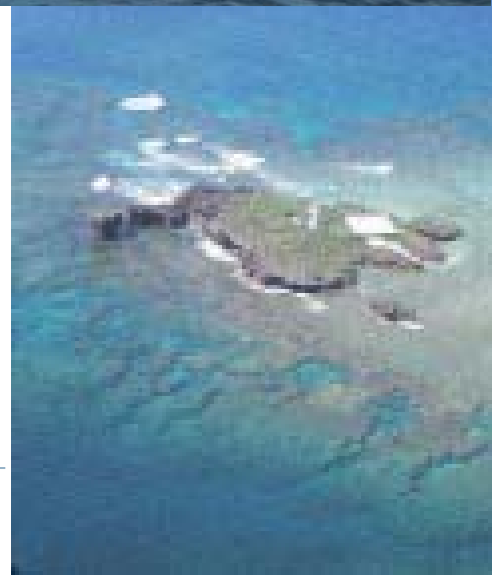
Senkaku Islands Fuda Rocks Heliport, Lighthouse Protective Repair Work



Hydrofit construction method HYDROSKY