## Environmental Product Declaration

# Sealers

S-102™, SEALER SG™, LITHOHARD™




SINAK's sealers are designed to help protect and preserve concrete for many years to come.

SINAK
SUSTAINABLE BUILDING SOLUTIONS

SINAK Corporation is a concrete chemical manufacturer on a mission to Build Something Better. With unmatched field performance and some of the highest performance criteria in the industry, SINAK's range of products set the tone for decades of future innovations.

SINAK's sustainable technology demonstrates the company's dedication to excellence. All SINAK curing products have been listed "Super Compliant" with SCAQMD and are UL GREENGUARD Indoor Air Quality Certified. Products with GREENGUARD Certification or GREENGUARD Gold Certification can contribute to the achievement of points in established green building rating systems, such as LEED, BREEAM, Fitwel and U.S. Green Building Council. SINAK is also a proud member of the UN Global Compact, mirroring the excellent standards of fair and equal business practice that the company strives to uphold.

UL
CERTIFIED
ENVIRONMENTAL
PRODUCT DECLARATION
UL.COM/EPD

# ENVIRONMENTAL PRODUCT DECLARATION

**Sealers**
S-102, Sealer SG, LithoHard

**According to ISO 14025, and ISO 21930:2017**

| | | |
|---|---|---|
| EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE | UL ENVIRONMENT<br>333 PFINGSTEN ROAD NORTHBROOK, IL 60611 | HTTPS://SPOT.UL.COM/<br>HTTPS://WWW.UL.COM/ |
| GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER | General Program Instructions v2.7 2022 | |
| MANUFACTURER NAME AND ADDRESS | SINAK Corporation<br>4901 Morena Blvd #601<br>San Diego, CA 92117 | |
| DECLARATION NUMBER | 4789863926.103.1 | |
| DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT | One square meter of substrate covering and protecting solid coating used over 60 years | |
| REFERENCE PCR AND VERSION NUMBER | ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services. | |
| DESCRIPTION OF PRODUCT APPLICATION/USE | Sealer for concrete substrate | |
| PRODUCT RSL DESCRIPTION (IF APPL.) | 60 years | |
| MARKETS OF APPLICABILITY | North America | |
| DATE OF ISSUE | July 1, 2022 | |
| PERIOD OF VALIDITY | 5 Years | |
| EPD TYPE | Product-specific | |
| RANGE OF DATASET VARIABILITY | n/a | |
| EPD SCOPE | Cradle-to-grave | |
| YEAR(S) OF REPORTED PRIMARY DATA | 2020 | |
| LCA SOFTWARE & VERSION NUMBER | GaBi 10.0.1.92 | |
| LCI DATABASE(S) & VERSION NUMBER | GaBi Database Service Pack 2021.1 | |
| LCIA METHODOLOGY & VERSION NUMBER | TRACI 2.1 | |

| | |
|---|---|
| The PCR review was conducted by: | International Standards Organization ISO<br>ISO / TC 59 / SC 17<br>Standardization@afnor.org |
| This declaration was independently verified in accordance with ISO 14025: 2006.<br>☐ INTERNAL ☒EXTERNAL | Cooper McC<br>Cooper McCollum, UL Environment |
| This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by: | James A. Mellentine<br>James Mellentine, Thrive ESG |

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

# 1. Product Definition and Information

## 1.1. Description of Company/Organization and Products

Based in southern California, SINAK Corporation is a concrete chemical manufacturer that specializes in sustainable building materials that are easy to apply and ultimately save customers time and money. SINAK's commitment to environmental responsibility has been a part of the company's culture from the very beginning. SINAK manufactures the following concrete product types: vapor control, curing agents, sealers, hardeners, densifiers, finishing aids, and evaporation retarders.

The product descriptions can be found with the results in section 3.

## 1.2. Technical Specifications

| Parameter | Test Method/ Standard | S-102 | Sealer SG | LithoHard |
|---|---|---|---|---|
| **Static Coefficient of Fiction** | **ASTM C-1028** | | Dry 24% improvement<br>Wet 36% improvement | Dry 24% improvement<br>Wet 36% improvement |
| **Abrasion Resistance** | **ASTM C-944** | | | 52% improvement |
| **Schmidt Hammer Test** | **ASTM C-805** | | | 11% Improvement |
| **Adhesion** | **ASTM D-3359** | | | No Bond Failure |
| **Surface Abrasion Resistance** | **ASTM C 501** | Wear Index: 38% Improvement<br>Depth of Wear: 21% Improvement | | |
| **Surface Scaling** | **ASTM C672** | None | None | |
| **Freeze-Thaw Testing** | **ASTM C666** | Pass | Pass | |

## 1.3. Material Composition

The materials that make up the product are indicated in Table 2.

| Product | Lithium Polysilicate | Sodium Silicate | Water |
|---|---|---|---|
| S-102 | - | 11% | 89% |
| Sealer SG | - | 11% | 89% |
| LithoHard | 3% | 18% | 795 |

# 2. Life Cycle Assessment Background Information

## 2.1. Functional Unit

The functional unit was chosen to align with the NSF Architectural Coatings PCR and is one square meter of covered and protected substrate for a period of 60 years. The mass of product per functional unit is shown in the following table. No colorant is needed.

| PRODUCT | MASS PER FUNCTIONAL UNIT (KG) |
|---|---|
| S-102 | 2.22E-01 |
| Sealer SG | 2.54E-01 |
| LithoHard | 1.04E-01 |

The reference service life (RSL) of the products is 60 years. Since these products are reactive agents whereby they penetrate the concrete after application and create permanent bonds with the concrete substrate on a molecular level, they will not need to be replaced over the life of the substrate.

## 2.2. System Boundary

This LCA is a Cradle-to-Grave study, including all life cycle modules from A1 to C4.

## 2.3. Estimates and Assumptions

All estimates and assumptions are within the requirements of ISO 14040/44. The majority of the estimations are within the primary data. The primary data was collected as annual totals including all utility usage and production information. For the LCA, the usage information was divided by the production volume to create an energy use per declared unit. Other assumptions are listed below:

- The inclusion of overhead energy data was determined appropriate due to the inability to sub- meter and isolate manufacturing energy from overhead energy.
- Availability of geographically more accurate datasets would have improved the accuracy of the study.
- Since this LCA uses the cut-off approach to recycled material in the product, no credit is given to product system but rather is exempted from the burden of extracting virgin material in place of using recycled material.
- Only known and quantifiable environmental impacts are considered.
- Due to the assumptions and value choices listed above, these do not reflect real-life scenarios and hence they cannot assess actual and exact impacts, but only potential environmental impacts.

## 2.4. Data Quality

The overall data quality is considered very good.

Geographical Coverage

The geographical scope of the manufacturing portion of the life cycle is San Diego, CA USA. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered excellent.

The geographical scope of the raw material acquisition is the United States. Customer distribution, site installation, and use portions of the life cycle is mostly the United States.

In selecting secondary data (i.e. GaBi Datasets), priority was given to the accuracy and representativeness of the data. When available and deemed of significant quality, country-specific data were used. However, priority was given to technological relevance and accuracy in selecting secondary data. This often led to the substitution of regional and/or global data for country-specific data. The geographical coverage of secondary datasets can be referenced in the dataset references table in Appendix A. Overall geographic data quality is considered good.

Time Coverage

Primary data were provided by the manufacturer and represent all information for calendar year 2020. Using these data meets the PCR requirements. Time coverage of these primary data is considered excellent.

Data necessary to model cradle-to-gate unit processes was sourced from Sphera GaBi LCI datasets. Time coverage of the GaBi datasets varies from approximately 2017 to present. All datasets rely on at least one 1-year average data. Other than GaBi datasets, the study also utilize three additional external studies. Though the studies are beyond a 5-year period, efforts has been made to mitigate the impact: only unit processes were extracted from the studies and up-to-date datasets from GaBi are used to represent the intermediate flows and to replace the obsolete datasets. Overall time coverage of the datasets is considered good and meets the requirement of the PCR.

Technological Coverage

Primary data provided by the manufacturer is specific to the technology the company uses in manufacturing their product. It is site-specific and considered of good quality. It is worth noting that the energy used in manufacturing the product includes overhead energy such as lighting, heating and sanitary use of water. Sub-metering was not available to extract process-only energy use from the total energy use. Sub-metering would improve the technological coverage of data quality.

Data necessary to model cradle-to-gate unit processes was sourced from GaBi LCI datasets. Technological coverage of the datasets is considered good relative to the actual supply chain of the manufacturer. While improved life cycle data from suppliers would improve technological coverage, the use of lower-quality generic datasets does meet the goal of this LCA.

Completeness

The data included is considered complete. No known flows above 1% were excluded and the sum of all excluded flows totals less than 5%.

## 2.5. Period under Review

The period under review is calendar year 2020.

## 2.6. LCA Scenarios

**All Stages – Transport Scenarios**

| Life Cycle Stage | Parameter | LithoHard | S-102 | Sealer SG |
|---|---|---|---|---|
| A2 (incoming raw materials) | Type of Vehicle | Tank Truck | Tank Truck | Tank Truck |
| | Distance [km] | 155.66 | 17.7 | 17.7 |
| | Fuel Efficiency [L/100km] | 41.56 | 41.56 | 41.56 |
| A4 (transport to building site) | Type of Vehicle | Truck | Truck | Truck |
| | Distance [km] | 1207.01 | 1207.01 | 1207.01 |
| | Fuel Efficiency [L/100km] | 38.81 | 38.81 | 38.81 |
| A5 (installation waste to EOL) | Type of Vehicle | Truck | Truck | Truck |
| | Distance [km] | 11.27 | 11.27 | 11.27 |
| | Fuel Efficiency [L/100km] | 41.56 | 41.56 | 41.56 |
| C2 (installed product to EOL) | Type of Vehicle | Truck | Truck | Truck |
| | Distance [km] | 32.19 | 32.19 | 32.19 |
| | Fuel Efficiency [L/100km] | 41.56 | 41.56 | 41.56 |

**Installation Scenario**

| Parameter | LithoHard | S-102 | Sealer SG |
|---|---|---|---|
| Description | The installation varies based on the scale of the project, but this study assumed the use of electric airless sprayers with a flow rate of 0.52 gallon per minute and an engine power of 0.56 kW. | | |
| Electricity Usage [kWh] | 4.38E-04 | 9.30E-04 | 1.06E-03 |
| Waste Rate to Landfill* | 10% | 10% | 10% |

*This amount was chosen to align with the NSF Architectural Coatings PCR but the actual wastage rate is expected to be much lower.

**Use Scenario**

| Parameter | LithoHard | S-102 | Sealer SG |
|---|---|---|---|
| Emissions During Use [kg] | None | None | None |

**End of Life Scenario**

| Parameter | LithoHard | S-102 | Sealer SG |
|---|---|---|---|
| EOL Destination | Landfill (100%) | Landfill (100%) | Landfill (100%) |

## 3. Life Cycle Assessment Results

| | PRODUCT STAGE | | | CONSTRUCT-ION PROCESS STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **A1** | **A2** | **A3** | **A4** | **A5** | **B1** | **B2** | **B3** | **B4** | **B5** | **B6** | **B7** | **C1** | **C2** | **C3** | **C4** | **D** |
| | Raw material supply | Transport | Manufacturing | Transport from gate to site | Assembly/Install | Use | Maintenance | Repair | Replacement | Refurbishment | Building Operational Energy Use During Product Use | Building Operational Water Use During Product Use | Deconstruction | Transport | Waste processing | Disposal | Reuse, Recovery, Recycling Potential |
| **EPD Type: Cradle-to-Grave** | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | MND |

All results are given per functional unit which is one square meter of covered and protected flooring surface for 60 years. Biogenic carbon, calcination, and carbonation are not relevant for these products and therefore the indicators reporting carbon emissions and removals are not reported.

**Description of Results Indicators**

| Abbreviation | Indicator | Abbreviation | Indicator |
|---|---|---|---|
| | **LCIA Impact Indicators – TRACI v2.1** | | |
| AP | Acidification potential of soil and water | ODP | Depletion of stratospheric ozone layer |
| EP | Eutrophication potential | Resources | Depletion of non-renewable fossil fuels |
| GWP | Global warming potential (100 years, includes biogenic CO2) | POCP | Photochemical ozone creation potential (Smog) |
| | **Resource Use Parameters** | | |
| RPRE | Use of renewable primary energy excluding renewable primary energy resources used as raw materials | SM | Use of secondary materials |
| RPRM | Use of renewable primary energy resources used as raw materials | RSF | Use of renewable secondary fuels |
| RPRT | Total use of renewable primary energy resources | NRSF | Use of non-renewable secondary fuels |
| NRPRE | Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials | FW | Net use of fresh water |
| NRPRM | Use of non-renewable primary energy resources used as raw materials | RE | Recovered energy |
| NRPRT | Total use of non-renewable primary energy resources | | |
| | **Waste Parameters and Output Flows** | | |
| HWD | Disposed-of-hazardous waste | MR | Materials for recycling |
| NHWD | Disposed-of non-hazardous waste | MER | Materials for energy recovery |
| HLRW | High-level radioactive waste, conditioned, to final repository | EEE | Exported electrical energy |
| ILLRW | Intermediate- and low-level radioactive waste, conditioned, to final repository | EET | Exported thermal energy |
| CRU | Components for reuse | | |

**Sealers**
S-102, Sealer SG, LithoHard

According to ISO 14025 and ISO 21930

## 3.1. S-102

SINAK S-102™ was formulated to waterproof, protect, and preserve, concrete, even in the most adverse environments. SINAK S-102™ works by penetrating into concrete and reacting with the soluble calcium compounds within to form additional calcium silicate, a major factor in sound, healthy concrete. The newly formed, breathable protective barrier cannot be removed chemically or physically, and there is no surface coating or film that can be worn or weathered away. The appearance of treated concrete is unchanged.

The results presented below are for one functional unit or one square meter of covered and protected flooring surface for 60 years.




| Impact Category | A1-A3 | A4 | A5 | B1 | B2-B7 | C1 | C2 | C3 | C4 |
|---|---|---|---|---|---|---|---|---|---|
| **LCIA Impact Categories** | | | | | | | | | |
| AP [kg SO2 eq] | 1.01E-04 | 1.17E-04 | 3.26E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.25E-06 | 0.00E+00 | 4.63E-05 |
| EP [kg N eq] | 9.24E-06 | 1.09E-05 | 4.64E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.61E-07 | 0.00E+00 | 2.58E-06 |
| GWP [kg CO2 eq] | **5.20E-02** | 2.34E-02 | 1.46E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.01E-04 | 0.00E+00 | 1.05E-02 |
| ODP [kg CFC 11 eq] | 2.17E-16 | 4.67E-18 | 3.03E-17 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.60E-19 | 0.00E+00 | 3.63E-17 |
| Resources [MJ] | 1.15E-01 | 4.38E-02 | 2.11E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.50E-03 | 0.00E+00 | 2.11E-02 |
| POCP [kg O3 eq] | 2.14E-03 | 2.71E-03 | 6.74E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.11E-05 | 0.00E+00 | 8.22E-04 |
| **Resource Use Indicators** | | | | | | | | | |
| $RPR_E$ [MJ, LHV] | 1.14E-01 | 1.36E-02 | 1.64E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.67E-04 | 0.00E+00 | 1.38E-02 |
| $RPR_M$ [MJ, LHV] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| $RPR_T$ [MJ, LHV] | 1.14E-01 | 1.36E-02 | 1.64E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.67E-04 | 0.00E+00 | 1.38E-02 |
| $NRPR_E$ [MJ, LHV] | 8.72E-01 | 3.31E-01 | 1.62E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.13E-02 | 0.00E+00 | 1.66E-01 |
| $NRPR_M$ [MJ, LHV] | 1.67E-01 | 0.00E+00 | 1.86E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| $NRPR_T$ [MJ, LHV] | 1.04E+00 | 3.31E-01 | 1.80E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.13E-02 | 0.00E+00 | 1.66E-01 |
| SM [kg] | 6.51E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| FW [$m^3$] | 6.70E-04 | 5.82E-05 | 9.30E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.00E-06 | 0.00E+00 | 2.28E-05 |
| **Output Flows and Waste Categories** | | | | | | | | | |
| HWD [kg] | 8.96E-11 | 2.76E-11 | 1.56E-11 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.48E-13 | 0.00E+00 | 1.57E-11 |
| NHWD [kg] | 2.03E-03 | 3.04E-05 | 3.58E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.04E-06 | 0.00E+00 | 2.47E-01 |
| HLRW [kg] or [$m^3$] | 4.35E-08 | 1.11E-09 | 5.28E-09 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.82E-11 | 0.00E+00 | 1.60E-09 |
| ILLRW [kg] or [$m^3$] | 3.63E-05 | 9.39E-07 | 4.42E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.22E-08 | 0.00E+00 | 1.38E-06 |
| MR [kg] | 0.00E+00 | 0.00E+00 | 1.50E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MER [kg] | 0.00E+00 | 0.00E+00 | 1.86E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EEE [MJ, LHV] | 0.00E+00 | 0.00E+00 | 9.88E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EET [MJ, LHV] | 0.00E+00 | 0.00E+00 | 3.96E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

Due to the impacts being zero for all impact categories, the following life cycle stages are combined to save page space: B2-B7.
Due to the impacts being zero for all life cycle stages, the following impact categories are not included in the table: RSF, NRSF, RE, and CRU.
The embodied carbon value is bolded for easy identification.

## 3.2. Sealer SG

SINAK Sealer SG™ is formulated to waterproof, protect, and preserve concrete even in the most adverse environments. Concrete treated with Sealer SG™ is permanently protected against water penetration, de-icing agents, chloride intrusion (salts), efflorescence, and freeze-thaw conditions. Sealer SG™ protects from foreign contaminants and improves abrasion resistance. Sealer SG™ creates a protective barrier that cannot be removed chemically or physically, and there is no surface coating or film that can be worn or weathered away. Concrete treated with Sealer SG™ retains its natural appearance. Sealer SG™ is designed and tested to be used for potable water applications such as pumping stations, water storage facilities, and wildlife enclosures. In addition, Sealer SG™ is approved for use on concrete structures in/or spanning rivers and streams.




The results presented below are for one functional unit or one square meter of covered and protected flooring surface for 60 years.

| Impact Category | A1-A3 | A4 | A5 | B1 | B2-B7 | C1 | C2 | C3 | C4 |
|---|---|---|---|---|---|---|---|---|---|
| **LCIA Impact Categories** | | | | | | | | | |
| AP [kg SO2 eq] | 1.15E-04 | 1.34E-04 | 3.72E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.57E-06 | 0.00E+00 | 5.29E-05 |
| EP [kg N eq] | 1.06E-05 | 1.25E-05 | 5.31E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.98E-07 | 0.00E+00 | 2.95E-06 |
| GWP [kg CO2 eq] | **5.94E-02** | 2.68E-02 | 1.67E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.16E-04 | 0.00E+00 | 1.20E-02 |
| ODP [kg CFC 11 eq] | 2.48E-16 | 5.33E-18 | 3.46E-17 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.83E-19 | 0.00E+00 | 4.15E-17 |
| Resources [MJ] | 1.31E-01 | 5.01E-02 | 2.41E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.72E-03 | 0.00E+00 | 2.42E-02 |
| POCP [kg O3 eq] | 2.45E-03 | 3.10E-03 | 7.71E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.85E-05 | 0.00E+00 | 9.39E-04 |
| **Resource Use Indicators** | | | | | | | | | |
| $RPR_E$ [MJ, LHV] | 1.31E-01 | 1.56E-02 | 1.88E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.34E-04 | 0.00E+00 | 1.58E-02 |
| $RPR_M$ [MJ, LHV] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| $RPR_T$ [MJ, LHV] | 1.31E-01 | 1.56E-02 | 1.88E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.34E-04 | 0.00E+00 | 1.58E-02 |
| $NRPR_E$ [MJ, LHV] | 9.97E-01 | 3.78E-01 | 1.85E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.30E-02 | 0.00E+00 | 1.90E-01 |
| $NRPR_M$ [MJ, LHV] | 1.91E-01 | 0.00E+00 | 2.13E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| $NRPR_T$ [MJ, LHV] | 1.19E+00 | 3.78E-01 | 2.06E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.30E-02 | 0.00E+00 | 1.90E-01 |
| SM [kg] | 7.44E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| FW [$m^3$] | 7.66E-04 | 6.66E-05 | 1.06E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.28E-06 | 0.00E+00 | 2.61E-05 |
| **Output Flows and Waste Categories** | | | | | | | | | |
| HWD [kg] | 1.02E-10 | 3.16E-11 | 1.78E-11 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.08E-12 | 0.00E+00 | 1.79E-11 |
| NHWD [kg] | 2.32E-03 | 3.48E-05 | 4.09E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.19E-06 | 0.00E+00 | 2.83E-01 |
| HLRW [kg] or [$m^3$] | 4.97E-08 | 1.27E-09 | 6.05E-09 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.37E-11 | 0.00E+00 | 1.83E-09 |
| ILLRW [kg] or [$m^3$] | 4.15E-05 | 1.07E-06 | 5.06E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.68E-08 | 0.00E+00 | 1.58E-06 |
| MR [kg] | 0.00E+00 | 0.00E+00 | 1.71E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MER [kg] | 0.00E+00 | 0.00E+00 | 2.13E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EEE [MJ, LHV] | 0.00E+00 | 0.00E+00 | 1.13E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EET [MJ, LHV] | 0.00E+00 | 0.00E+00 | 4.53E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

Due to the impacts being zero for all impact categories, the following life cycle stages are combined to save page space: B2-B7.
Due to the impacts being zero for all life cycle stages, the following impact categories are not included in the table: RSF, NRSF, RE, and CRU.
The embodied carbon value is bolded for easy identification.

## 3.3. Lithohard




SINAK LithoHard™ is the latest advancement in lithium technology to densify, harden, and dustproof new and existing concrete. The proprietary formulation and chemical sequencing of LithoHard™ allows for early application to concrete in as little as five days after placement. The environmentally friendly formula eliminates scrubbing, rinsing, and costly disposal of caustic wastewater.

LithoHard™ is a ready to use, zero VOC concrete densifier that outperforms all traditional sodium, lithium, potassium, and magnesium fluosilicate products. The chemistry of LithoHard™ does not require free calcium to react which allows for early application.

The results presented below are for one functional unit or one square meter of covered and protected flooring surface for 60 years.

| IMPACT CATEGORY | A1-A3 | A4 | A5 | B1 | B2-B7 | C1 | C2 | C3 | C4 |
|---|---|---|---|---|---|---|---|---|---|
| **LCIA Impact Categories** | | | | | | | | | |
| AP [kg SO2 eq] | 5.41E-05 | 5.49E-05 | 1.60E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.05E-06 | 0.00E+00 | 2.16E-05 |
| EP [kg N eq] | 4.83E-06 | 5.11E-06 | 2.23E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.22E-07 | 0.00E+00 | 1.20E-06 |
| GWP [kg CO2 eq] | **2.60E-02** | 1.10E-02 | 7.03E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.75E-04 | 0.00E+00 | 4.89E-03 |
| ODP [kg CFC 11 eq] | 8.99E-14 | 2.18E-18 | 9.99E-15 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.48E-20 | 0.00E+00 | 1.70E-17 |
| Resources [MJ] | 5.69E-02 | 2.05E-02 | 1.02E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.02E-04 | 0.00E+00 | 9.88E-03 |
| POCP [kg O3 eq] | 1.09E-03 | 1.27E-03 | 3.26E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.39E-05 | 0.00E+00 | 3.84E-04 |
| **Resource Use Indicators** | | | | | | | | | |
| $RPR_E$ [MJ, LHV] | 5.37E-02 | 6.38E-03 | 7.69E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.19E-04 | 0.00E+00 | 6.45E-03 |
| $RPR_M$ [MJ, LHV] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| $RPR_T$ [MJ, LHV] | 5.37E-02 | 6.38E-03 | 7.69E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.19E-04 | 0.00E+00 | 6.45E-03 |
| $NRPR_E$ [MJ, LHV] | 4.33E-01 | 1.55E-01 | 7.83E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.30E-03 | 0.00E+00 | 7.77E-02 |
| $NRPR_M$ [MJ, LHV] | 7.88E-02 | 0.00E+00 | 8.76E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| $NRPR_T$ [MJ, LHV] | 5.11E-01 | 1.55E-01 | 8.70E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.30E-03 | 0.00E+00 | 7.77E-02 |
| SM [kg] | 3.06E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| FW [$m^3$] | 3.37E-04 | 2.72E-05 | 4.60E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.34E-07 | 0.00E+00 | 1.07E-05 |
| **Output Flows and Waste Categories** | | | | | | | | | |
| HWD [kg] | 6.03E-10 | 1.29E-11 | 6.96E-11 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.43E-13 | 0.00E+00 | 7.34E-12 |
| NHWD [kg] | 1.51E-03 | 1.42E-05 | 1.68E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.87E-07 | 0.00E+00 | 1.16E-01 |
| HLRW [kg] or [$m^3$] | 2.01E-08 | 5.21E-10 | 2.43E-09 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.79E-11 | 0.00E+00 | 7.49E-10 |
| ILLRW [kg] or [$m^3$] | 1.68E-05 | 4.39E-07 | 2.04E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.50E-08 | 0.00E+00 | 6.46E-07 |
| MR [kg] | 0.00E+00 | 0.00E+00 | 7.05E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MER [kg] | 0.00E+00 | 0.00E+00 | 8.77E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EEE [MJ, LHV] | 0.00E+00 | 0.00E+00 | 4.65E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EET [MJ, LHV] | 0.00E+00 | 0.00E+00 | 1.87E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

Due to the impacts being zero for all impact categories, the following life cycle stages are combined to save page space: B2-B7.
Due to the impacts being zero for all life cycle stages, the following impact categories are not included in the table: RSF, NRSF, RE, and CRU.
The embodied carbon value is bolded for easy identification.

## 4. References

1. ISO 14044: 2006 Environmental Management – Life cycle assessment – Requirements and Guidelines.
2. ISO 14044: 2006/ Amd 1:2017 Environmental Management – Life cycle assessment – Requirements and Guidelines – Amendment 1.
3. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
4. ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.
5. TRACI: The Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts. Version 2.1 – User Guide - https://nepis.epa.gov/Adobe/PDF/P100HN53.pdf.
6. Product Category Rule for Environment Product Declarations – Architectural Coating: NAICS 325510, NSF, 2017
7. US Patent – Method for the Preparation of Lithium Silicate Solutions – US3576597A
8. Roes, A.L., Tabak, L.B., Shen, L. et al. Influence of using nanoobjects as filler on functionality-based energy use of nanocomposites. J Nanopart Res 12, 2011–2028 (2010).
9. Fawer, M., Concannon, M. & Rieber, W. Life cycle inventories for the production of sodium silicates. Int. J. LCA 4, 207 (1999).
10. Dalton, J.S. & Janes, P. & Jones, N. & Hallam, Keith & Nicholson, J. & Allen, G.C.. (2001). Photocatalytic oxidation of NOx gases using TiO2: A spectroscopic approach. 45.
11. Life Cycle Assessment of SINAK Products. WAP Sustainability. 2022

Additional explanatory information on this life cyle assessment or environmental product declaration can be obtained by contacting info@sinak.com.