Environmental Product Declaration

Ready-Mix Concrete
(per ISO 14025 and ISO 21930)

Holliday Rock has been a constant presence in the Southern California construction market for over eighty years and is one of the largest independent producers of aggregate, ready mix concrete and hot mix asphalt in the United States. Started by Otha and Ethel Holliday in 1937 during the Great Depression, Holliday Rock has allowed three successive generations of the Holliday family to thrive and expand in an ever more challenging and competitive industry.

Holliday Rock holds the beliefs that long-term success requires common goals, adaptability shared values, and most importantly safety.

Authors of the Life Cycle Assessment:
A. Grosse-Sommer and D. Green BASF

Holliday Rock
1401 N Benson Ave
Upland, California
91786 888-273-2200
www.hollidayrock.com
### EPD Information

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Operator</td>
<td>NSF Certification, LLC</td>
</tr>
<tr>
<td>Declaration Holder</td>
<td>Holliday Rock</td>
</tr>
<tr>
<td>Product:</td>
<td>Date of Issue: January 17, 2020</td>
</tr>
<tr>
<td></td>
<td>Period of Validity: 5 Years</td>
</tr>
<tr>
<td></td>
<td>Declaration Number: EPD 10319</td>
</tr>
</tbody>
</table>

This EPD was independently verified by NSF Certification, LLC in accordance with ISO 14025 and ISO 21930:

- **Internal** [X]  
- **External**

Jenny Oorbeck  
joorbeck@nsf.org

This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR.

Jack Geibig  
jgeibig@ecoform.com

### LCA Information

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Basis LCA</td>
<td>Life Cycle Assessment Manager for Concrete Environmental Product Declaration June 2017</td>
</tr>
</tbody>
</table>
| LCA Preparers           | David Green/Anahi Grosse-Sommer BASF Corporation/BASF SE  
david.r.green@basf.com  
anahi.grosse-sommer@basf.com |

This life cycle assessment was critically reviewed in accordance with ISO 14044 by:

Jack Geibig - Ecoform  
jgeibig@ecoform.com
### North America PCR Information

<table>
<thead>
<tr>
<th><strong>Program Operator</strong></th>
<th>NSF International</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reference PCR</strong></td>
<td>Product Category Rules (PCR) for ISO 14025:2006 Type III Environmental Product Declarations (EPDs) of Concrete, Version 2.0.</td>
</tr>
<tr>
<td><strong>Date of Issue</strong></td>
<td>February 22, 2019</td>
</tr>
<tr>
<td><strong>PCR review was conducted by:</strong></td>
<td>Thomas P. Gloria, Ph.D, Industrial Ecology Consultants; Bill Stough, Sustainable Research Group; Dr. Michael Overcash, Environmental Clarity.</td>
</tr>
</tbody>
</table>

### EPD Software Tool

<table>
<thead>
<tr>
<th><strong>LCA Software &amp; Version Number</strong></th>
<th>GaBi ts 8.5.0.79</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LCI Database &amp; Version Number</strong></td>
<td>GaBi ts 8.5.0.79</td>
</tr>
</tbody>
</table>
ENVIRONMENTAL PRODUCT DECLARATION: DETAILED VERSION

Product Scope

This declaration and its LCA study are relevant to concrete and concrete products manufactured by Holliday Rock in the Southern California area. As the owner of the declaration, Holliday Rock shall be liable for the underlying information and evidence; the program operator shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Product Description

The nine products covered by this Environmental Product Declaration (EPD) are for concrete applications for commercial and/or residential construction developed and produced by Holliday Rock for markets in Southern California. The design compressive strength is 2,500 psi (17.2 MPA) at 28 days.

Concrete is batched and delivered in accordance with local standards. The producer provides product that meets or exceeds the standards based on standard operating procedures. Warranties and additional information are determined by the producer’s terms and conditions.

During normal use, hardened concrete is stable and inert and does not pose a significant health or environmental hazard.

Fresh, plastic concrete must be managed in accordance with local regulations. Hardened concrete is an inert product and can be recycled subject to local regulations.

This EPD reports the impacts for the concrete components made of in-situ or ready-mixed concrete. The life cycle phases covered are A1 (Raw Material Supply: Upstream Processes), A2 (Transportation from Supplier to Gate of Producer) and A3 (Concrete Production – Core Process). This EPD is based on a cradle-to-gate system boundary deemed appropriate as concrete mixtures are supplied to a variety of products and the function of the final product is not specifically determined. Reference service life is not relevant due to the cradle-to-gate boundary conditions.

Life cycle stages that are not included in this EPD are A4 (Transportation to the Construction Site), A5 (Construction and Installation Process), B1-7 (Use Phase) and C1-4 (End of Life Stage).
Environmental Product Declaration - Ready-mix Concrete 1/17/2020

**Technical Data** (*These characteristics are not relevant for ready-mix concrete)*

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>1,750 – 2,400</td>
<td>kg/m³</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>*</td>
<td>W/(mK)</td>
</tr>
<tr>
<td>Water vapor diffusion resistance factor</td>
<td>*</td>
<td>-</td>
</tr>
<tr>
<td>Sound absorption coefficient</td>
<td>*</td>
<td>%</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>17 - 110</td>
<td>N/mm²</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>*</td>
<td>N/mm²</td>
</tr>
<tr>
<td>Flexural strength</td>
<td>*</td>
<td>N/mm²</td>
</tr>
<tr>
<td>Modulus of elasticity</td>
<td>*</td>
<td>N/mm²</td>
</tr>
<tr>
<td>Equilibrium moisture content</td>
<td>*</td>
<td>%</td>
</tr>
</tbody>
</table>

**Product Components**

The ready-mix concrete and its upstream materials covered by this Environmental Product Declaration conform to the appropriate ASTM standards as described in NSF International PCR for Concrete, UNSPSC code 30111500, CSI Specification Section 03 30 00 or the requirements of European standard EN 206:2013, BS 8500-1:2015 and BS 8500-2:2015 based on the IBU PCR. Ready-mix concrete is generally batched at a plant, centrally mixed and then discharged into a truck mixer for delivery (central mixed) or dry-batched into the truck for mixing in the production yard, in transit or at the job site (truck mixed). Ready-mix concrete does not require packaging. The base material ranges for the defined ready-mix concrete are:

<table>
<thead>
<tr>
<th>Material</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binders</td>
<td>10 – 25 %</td>
</tr>
<tr>
<td>Sands</td>
<td>20 – 35 %</td>
</tr>
<tr>
<td>Aggregates</td>
<td>30 - 50 %</td>
</tr>
<tr>
<td>Admixtures</td>
<td>&lt; 1 %</td>
</tr>
<tr>
<td>Water</td>
<td>1 - 15 %</td>
</tr>
</tbody>
</table>

The product does not contain materials that are listed in the REACH “Candidate List of Substances of Very High Concern for Authorization”.

EPD Program Operator
NSF Certification, LLC
789 N. Dixboro Road  Ann Arbor, MI 48105
www.nsf.org

Date of Issue: January 17, 2020
Period of Validity: 5 years
Declaration: EPD10319
Production

Health and safety measures with potential impact to human health during manufacturing are to be consistently adhered to per regional regulatory requirements. Initiatives must be undertaken to minimize or eliminate potential impacts to the environment based on the use of best practices including engineered controls. Fresh, plastic concrete must be managed in accordance with local regulations. Hardened concrete is an inert product and can be recycled subject to local regulations. If disposed under the European waste catalogue, the waste code 17-01-01 for non-hazardous concrete and 17-01-06 for concrete containing hazardous substances is applicable. Any substances with hazardous and toxic properties that may be of concern to human health and/or the environment are provided in corresponding SDS documents based on regulatory requirements.

Declared Unit

The declared unit is 1 m³ of Holliday Rock concrete produced for commercial applications with a specified compressive strength of 2,500 psi (17.2 MPa) at 28 days.

Cut-off Criteria

All material and energy flows known or suspected to release substances into the air, water or soil in quantities that contribute significantly to any of the indicators in ISO 21930 are included. In cases where there is insufficient input data for a unit process or data gaps, the cut-off criteria used is 1% of renewable primary resources (energy), 1% of non-renewable primary resource (energy) usage, 1% of the total mass input of that unit process and 1% of environmental impacts. The total of neglected input flows per module does not exceed 5%.

Life Cycle Assessment (LCA)

The LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

A summary of the life cycle stages included in the EPD is as follows:

I. Raw Material Supply (upstream processes): Extraction, handling and processing of the raw materials used in production of concrete: cement, supplementary cementitious materials, aggregate (coarse and fine), water, admixtures and other materials or chemicals used in concrete mixtures.

II. Transportation: Transportation of these materials from supplier to the 'gate' of the concrete producer.

III. Manufacturing (core processes): The core processes result from the energy used to store, batch, mix and distribute the concrete and operate the facility (concrete plant).

IV. Water use in mixing and distributing concrete.
The processes excluded from the EPD are as follows:

I. Production, manufacture and construction of buildings, capital goods and infrastructure with an expected lifespan of over 5 years.

II. Production and manufacture of concrete production equipment, concrete delivery vehicles, earth-moving equipment and laboratory equipment with an expected lifespan of over 5 years.

III. Personnel-related activities (travel, furniture, office supplies) as well as energy and water use related to company management and sales activities.

A summary of the limitations of this EPD include:

This EPD does not report all the environmental impacts due to manufacturing of the product, but rather reports the environmental impacts for those categories with established life cycle assessment-based methods to track and report. Unreported environmental impacts include (but are not limited to) factors attributable to human health, land use change and habitat destruction.

This EPD reports the results of an LCA for 'cradle to gate' analysis and is intended for business-to-business communications. Thus, declarations themselves are not comparative assertions, defined as an environmental claim regarding the superiority or equivalence of one product versus a competing product that performs the same function. An EPD does not make any statements that the product covered by the EPD is better or worse than any other product.

To assess the local impacts of product manufacturing, additional analysis is required.

The product category rules for this EPD recognize fly ash, silica fume and slag as recovered materials and thus the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a concrete material input.

Life cycle impact assessment results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Comparability:
EPD of concrete mixtures may not be comparable if they do not comply with this standard and data from this EPD. While an EPD can be used to compare concrete mixtures, the data cannot be used to compare between construction products or concrete mixtures used in different concrete products unless the data is integrated into a comprehensive LCA. For example, precast concrete, concrete masonry units and site cast concrete all have different manufacturing processes whose impacts are attributed to different LCA stages. This precludes direct comparison between mixtures used in these different products unless all life cycle phases are included and a functional unit is used.

Allocation:
During the production of ready-mix concrete, co-products are not introduced into the mixture designs. Source-specific allocations are assigned to supplementary cementitious materials as these are considered secondary materials rather than co-products. For these secondary materials, all processing and transportation required to transform these materials to SCMs are included.
DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

<table>
<thead>
<tr>
<th>PRODUCT STAGE</th>
<th>CONSTRUCTION PROCESS STAGE</th>
<th>USE STAGE</th>
<th>END OF LIFE STAGE</th>
<th>BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw material supply</td>
<td>Transport</td>
<td>Manufacturing</td>
<td>Transport from the gate to the site</td>
<td>Use</td>
</tr>
<tr>
<td>A1</td>
<td>A2</td>
<td>A3</td>
<td>A4</td>
<td>A5</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>MND</td>
<td>MND</td>
</tr>
</tbody>
</table>

LCA: Interpretation and Results

The following tables provide the results of the LCA and the environmental parameters from the LCA for one (1) cubic meter of ready-mix concrete. The environmental impacts are based on the TRACI v2.1 characterization factors and NSF International PCR for Concrete.

This EPD was calculated using industry average cement data. Cement LCA impacts can vary depending upon manufacturing process, efficiency and fuel source by as much as 50% for some environmental impact categories. Cement accounts for as much as 70% of the impacts of the concrete mixes included in this EPD and thus manufacturer specific cement impacts could result in variation of as much as 35%.

Note: emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in these categories.

- Renewable primary energy resources as energy (fuel) (PERE)
- Renewable primary resources as material (PERM)
- Non-renewable primary resources as energy (fuel) (PENRE)
- Non-renewable primary resources as material (PENRM)
- Secondary Materials (SM)
- Renewable secondary fuels (RSF)
- Non-renewable secondary fuels (NRSF)
- Recovered energy (RE)
- Abiotic depletion potential for non-fossil mineral resources (ADPelements)
- Land use related impacts, for example on biodiversity and/or soilfertility
- Toxicological aspects
- Emissions from land use change [GWP 100 (land-use change)]
- Hazardous waste disposed
- Non-hazardous waste disposed
- High-level radioactive waste
- Intermediate and low-level radioactive waste
- Components for reuse
- Materials for recycling
- Materials for energy recovery
- Recovered energy exported from the product system.

Additional note: not all LCA datasets for upstream materials include these impact categories and thus results maybe incomplete. Use caution when interpreting data in these categories.

EPD Program Operator
NSF Certification, LLC
789 N. Dixboro Road Ann Arbor, MI 48105
www.nsf.org

Date of Issue: January 17, 2020
Period of Validity: 5 years
Declaration: EPD10319
# Environmental Product Declaration - Ready-mix Concrete 1/17/2020

LCA Results for one m³ of ready-mix concrete

<table>
<thead>
<tr>
<th>Mixture #</th>
<th>GWP</th>
<th>GWP</th>
<th>AP</th>
<th>EP</th>
<th>POCF</th>
<th>AEP</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

## Indicators describing environmental impacts - mandatory and optional for 1 m³ of ready-mix concrete - TRACI 2.1

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Mixture #</th>
<th>RPRe</th>
<th>MPRe</th>
<th>MPRRe</th>
<th>MPRReB</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

## LCA Results for one m³ of ready-mix concrete

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Mixture #</th>
<th>RPRe</th>
<th>MPRe</th>
<th>MPRRe</th>
<th>MPRReB</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Key
- GWP: Global warming potential
- DDP: Deposition potential of the stratospheric ozone layer
- AP: Acidification potential
- EP: Eutrophication potential
- POCF: Formation potential of tropospheric ozone
- AEP: Abiotic depletion potential
- NMPRe: Non-renewable primary resources as material
- RPRe: Renewable primary resources as material
- NSPRe: Non-renewable secondary resources as material
- NSPRe: Non-renewable secondary resources as material
- SM: Soil
- RSF: Renewable secondary funds
- NRSF: Non-renewable secondary funds
- RE: Recovered energy
- HVD: Hazardous waste
- NI: Non-hazardous waste disposed
- HLF: Heavy level radioactive waste
- LLF: Intermediate level radioactive waste

Note: Components for waste, materials and energy recovery and recovered energy reported from the product system do not have reportable quantities for these products.
For the specific system boundaries identified for this EPD, the raw material supply (phase A1) is the primary driver for all environmental impact categories with this phase accounting for over 80% of the total results for GWP, ODP, AP, EP and POCP.

This is generally the result of the cement content in the concrete mixture as cement production requires high levels of energy for the calcining process while at the same time emitting CO₂ as part of the reaction from converting limestone (CaCO₃) to lime (CaO). Transportation may have a larger percentage of the total impact when raw materials are transported from long distances such as trans-oceanic locations.

**Data Quality and Variability**

The requirements for data quality and background data correspond with the requirements of the NSF International PCR for Concrete. The calculated data in this report is based on actual ready-mix concrete compositions. Manufacturer specific data is based on average data from the past 12 months.

The period over which inputs to and outputs from the system are accounted for is 100 year from the year for which the data is deemed representative.

The technology coverage reflects the physical reality for the declared ready-mix concrete product. Used datasets are complete according to the system boundary within the limits set by the criteria for the exclusion of inputs and outputs.

To calculate the life cycle of the declared ready-mix concrete products, the software solution GaBi ts 8.5.0.79 from thinkstep AG was used. Background datasets were extracted from the GaBi database. The last revision of the GaBi data is less than 3 years ago according to thinkstep AG. Altogether, the data quality is considered high.

This EPD was created using the default data noted in appendix A of the NSF International PCR for concrete.

The following table summarizes the overall quality assessments for the main inputs for ready-mix concrete.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Data Quality</th>
<th>Technology</th>
<th>Time</th>
<th>Geography</th>
<th>Completeness</th>
<th>Reliability</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cement (CEM I)</td>
<td>good</td>
<td>2018</td>
<td>Europe</td>
<td>good</td>
<td>good</td>
<td>Gabi 8.5</td>
<td></td>
</tr>
<tr>
<td>Portland cement</td>
<td>good</td>
<td>2016</td>
<td>US</td>
<td>good</td>
<td>good</td>
<td>Gabi 8.5/PCA</td>
<td></td>
</tr>
<tr>
<td>Fly ash</td>
<td>good</td>
<td>2018</td>
<td>Regional</td>
<td>good</td>
<td>good</td>
<td>Gabi 8.5</td>
<td></td>
</tr>
<tr>
<td>Blast furnace slag</td>
<td>good</td>
<td>2018</td>
<td>Germany</td>
<td>fair</td>
<td>good</td>
<td>Gabi 8.5/ASTM</td>
<td></td>
</tr>
<tr>
<td>Granite</td>
<td>good</td>
<td>2016</td>
<td>US</td>
<td>good</td>
<td>good</td>
<td>Gabi 8.5</td>
<td></td>
</tr>
<tr>
<td>Limestone</td>
<td>good</td>
<td>2017</td>
<td>Europe</td>
<td>good</td>
<td>good</td>
<td>Gabi 8.5</td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td>good</td>
<td>2016</td>
<td>Europe</td>
<td>good</td>
<td>good</td>
<td>Gabi 8.5</td>
<td></td>
</tr>
<tr>
<td>Natural pozzolan</td>
<td>good</td>
<td>2016</td>
<td>Global</td>
<td>good</td>
<td>good</td>
<td>Gabi 8.5</td>
<td></td>
</tr>
<tr>
<td>Lime</td>
<td>good</td>
<td>2016</td>
<td>US</td>
<td>good</td>
<td>good</td>
<td>Gabi 8.5</td>
<td></td>
</tr>
</tbody>
</table>
### Environmental Product Declaration - Ready-mix Concrete 1/17/2020

**Kaolin**
good 2016 Germany good good Gabi 8.5

**Silica fume**
good 2017 US fair good Gabi 8.5

**Titanium dioxide**
good 2016 US good good Gabi 8.5

**Iron oxide**
good 2018 Germany good good Gabi 8.5

**Rice husk ash**
fair 2017 US fair good Gabi 8.5

### Sands

**Natural sand**
good 2016 Europe good good Gabi 8.5/Ecoinvent

**Natural sand, washed**
good 2016 Europe good good Gabi 8.5

**Manufactured sand**
good 2016 China good good Gabi 8.5

**Limestone powder**
good 2017 Europe good good Gabi 8.5

**River dredge sand**
fair 2016 Global fair good Gabi 8.5

### Aggregates

**Natural aggregate**
good 2016 China good good Gabi 8.5/Ecoinvent

**Recycled aggregate**
good 2016 US good good Gabi 8.5

**Recycled glass**
fair 2016 Europe fair good Gabi 8.5

**Lightweight aggregate/expanded clay**
good 2016 Europe good good Gabi 8.5/Ecoinvent

**Recycled concrete**
good 2016 US good good Gabi 8.5

**Recycled tires**
fair 2018 US fair good Gabi 8.5

**Limestone**
good 2017 Europe good good Gabi 8.5

### Admixtures

**MasterPozzolith (WR)**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterPozzolith (MWR)**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterPolyheed**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterPolyheed (non-chloride)**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterRheobuild**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterGlenium**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterSet AC (non-chloride)**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterSet AC**
good 2018 US/Europe good good GaBi 8.5/BASF

**Master X-Seed**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterSet (Retarder)**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterSet DELVO**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterLife 300D**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterMatrix VMA**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterLife SRA**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterAir**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterSure Z 60**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterColor**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterKure ER**
good 2018 US/Europe good good GaBi 8.5/BASF

**MasterLife CI**
good 2018 US/Europe good good GaBi 8.5/BASF

### Water

**Water**
good 2018 US/Germany good good Gabi 8.5/Ecoinvent

**Desalinated water**
fair 2018 Middle East fair good Gabi 8.5

### Reinforcement

**Steel sections**
good 2016 Global good good Gabi 8.5

**Reinforced steel**
good 2016 Europe good good Gabi 8.5

**Polypropylene**
good 2016 Europe good good Gabi 8.5

**MasterFiber MAC 2200 CB**
good 2018 US good good Gabi 8.5

**Recycled PET**
fair 2016 Europe fair good Gabi 8.5

**Recycled PP**
fair 2016 Europe fair good Gabi 8.5

### Energy

**US Electricity grid mix**
good 2016 US good good Gabi 8.5/US LCI

**EU-27 Electricity grid mix**
good 2016 Europe good good Gabi 8.5

**US Natural gas**
good 2016 US good good Gabi 8.5/US LCI

**EU-27 Natural gas**
good 2016 Europe good good Gabi 8.5

### Packaging

**Pallet**
good 2016 Europe good good Gabi 8.5

**Steel**
good 2016 Global fair good Gabi 8.5

**Plastic**
good 2016 Europe fair good Gabi 8.5

---

EPD Program Operator
NSF Certification, LLC
789 N. Dixboro Road Ann Arbor, MI 48105
www.nsf.org

Date of Issue: January 17, 2020
Period of Validity: 5 years
Declaration: EPD10319
Environmental Product Declaration - Ready-mix Concrete 1/17/2020

<table>
<thead>
<tr>
<th>Transport</th>
<th>good</th>
<th>2016</th>
<th>Global/regional</th>
<th>good</th>
<th>good</th>
<th>Gabi 8.5/US LCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck</td>
<td>good</td>
<td>2016</td>
<td>Global/regional</td>
<td>good</td>
<td>good</td>
<td>Gabi 8.5/US LCI</td>
</tr>
<tr>
<td>Train</td>
<td>good</td>
<td>2018</td>
<td>Global/regional</td>
<td>good</td>
<td>good</td>
<td>Gabi 8.5/US LCI</td>
</tr>
<tr>
<td>Ship - river</td>
<td>good</td>
<td>2016</td>
<td>Global/regional</td>
<td>good</td>
<td>good</td>
<td>Gabi 8.5/US LCI</td>
</tr>
<tr>
<td>Ship - oceanic</td>
<td>good</td>
<td>2016</td>
<td>Global/regional</td>
<td>good</td>
<td>good</td>
<td>Gabi 8.5/US LCI</td>
</tr>
</tbody>
</table>

Ratings: good, fair, poor

References


Product Category Rule for Environmental Product Declarations, PCR for Concrete version 2.0 February 22, 2019.

ISO 21930 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services, second edition 2017-07.


ASTM C94, C94 M Standard Specification for Ready-mixed Concrete

BS 8500-1:2015, Concrete - Complementary British Standards to BS EN 206. Method of specifying and guidance for the specifier.


CSI Specification Section 03 30 00 Cast-in-Place Concrete

DIN EN ISO 14025:2011: Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

EN 15804:2012, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

EN 206:2013, Beton - Festlegung, Eigenschaften, Herstellung und Konformität

GaBi ts 8.5: Software and GaBi database, LBP, University of Stuttgart and thinkstep AG, 2018

Product Category Rules for Building-Related Products and Services Part A - IBU calculation rules for the life cycle assessment and requirements on the project report.

PCR Guidance - Texts for Building-Related Products and Services Part B - IBU requirements on the EPD for Concrete components made of in-situ or ready-mixed concrete, version 1.5, 10.04.2017.


UNSPSC Code 30111500 Concrete and Mortars

EPD Program Operator: NSF Certification, LLC

Date of Issue: January 17, 2020

NSF Certification, LLC

789 N. Dixboro Road Ann Arbor, MI 48105

Period of Validity: 5 years

www.nsf.org

Declaration: EPD10319