Environmental Product Declaration

as per ISO 14025 an EN 15804

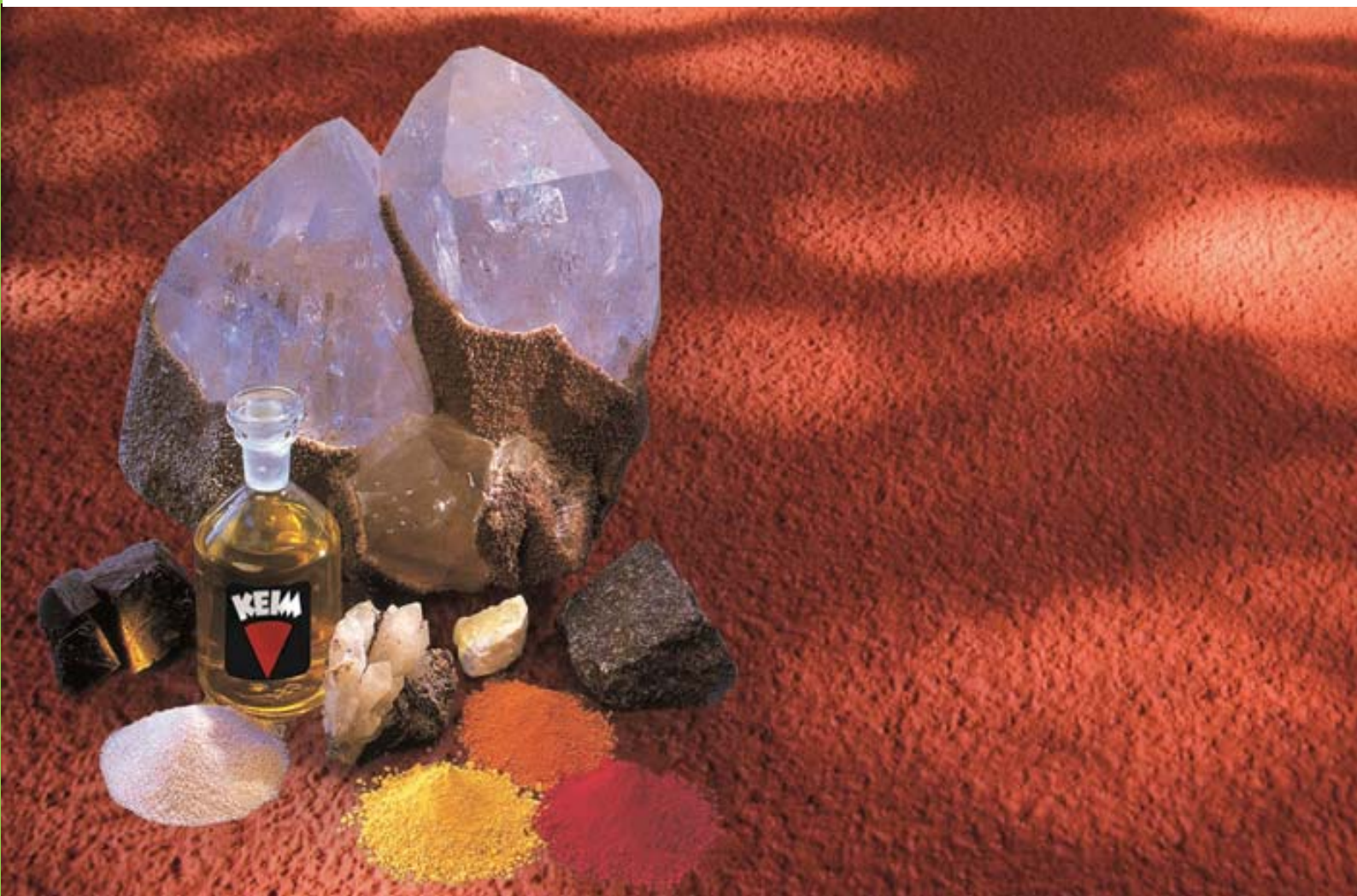
Owner of the Declaration	**KEIM**FARBEN GmbH
Programme holder	Institut Bauen und Umwelt (IBU)
Publisher	Institut Bauen und Umwelt (IBU)
Declaration number	EPD-KEI-2012211-E
Issue date	30.11.2012
Valid to	29.11.2017

Silicate External Paint Systems

KEIMFARBEN GmbH

www.bau-umwelt.com

Institut Bauen und Umwelt e.V.



1 General information

KEIMFARBEN GmbH

Programme holder
IBU - Institut Bauen und Umwelt e.V.
Rheinufer 108
D-53639 Königswinter

Declaration number
EPD-KEI-2012211-E

This Declaration is based on the Product Category Rules:
IBU PCR part A and PCR part B Rules for the creation of an EPD for coatings with organic binders, 7-2012
(PCR tested and approved by the independent expert committee SVA)

Issue date
30.11.2012

Valid to
29.11.2017

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of the Institute Construction and Environment)

Prof. Dr.-Ing. Hans-Wolf Reinhardt
(Chairman of the SVA)

Silicate External Paint Systems

Owner of the Declaration
KEIMFARBEN GmbH
Keimstraße 16
86420 Diedorf

Declared product / Declared unit
1 m² external paint

Scope:
This declaration refers to the product Soldalit produced in the plant in Diedorf of the **KEIM**FARBEN GmbH. The declaration of Soldalit is reprentative for the silicate external paints systems of the **KEIM**FARBEN GmbH Granital, Concretal-W, Concretal-Lasur, Restauro-Lasur , Design-Lasur and Unikristalat,.

Verification

The CEN standard DIN EN 15804 serves as the core PCR
Verification of the EPD by an independent third party as per ISO 14025
☐ internally ☒ externally

Dr. Eva Schmincke
(Independent verifier appointed by the SVA)

2 Product

2.1 Product description

The specified KEIM external paint systems within this declaration comply with the DIN EN 1062-1:2004 and fulfill the requirements of the DIN 18363:2010-4, para.2.4.1. The external paint systems are mineral binders, based on the silicate technology - a silification of the binder potassium water glass and silica sol with the underlying substrate in which a chemical reaction with the mineral fraction takes place. KEIM Soldalit has been chosen as the representative product of external paint systems of the **KEIM**FARBEN GmbH. KEIM Soldalit represents the other KEIM external paints Granital, Concretal-W, Concretal-Lasur, Restauro-Lasur, Design-Lasur and Unikristalat.

2.2 Application

The declared products are used as external paints.

2.3 Technical data

	Density [g/cm³]
Granital	1.4
Concretal-W	1.6
Soldalit	1.6
Concretal-Lasur	1.2
Restauro-Lasur	1.2
Design-Lasur	1.2
Unikristalat	1.5

- The solid content is between 40 % and 65 %.
- The pH-value of all external paints is approx. 11.
- The water-vapour diffusion current density of all external paints is >2000 g/m²d.(DIN EN ISO 7783-2:1999)
- The water permeability rate (24h) is <0.1 resp. >1kg/m²$h^{0.5}$. (DIN EN 1062-3:2008)
- The gloss level is between 1 and 1.5 (DIN EN ISO 2813:1999)
- Color resistance according to BFS-Nr. 26: A1, approved to all external paints (Federal Committee for Paints and the Protection of Objects)
- External paint systems and outdoor weathering: Granital and Soldalit: perfect adhesion and color resistance approved; (Test certificate ILF Research- and Development Company Coatings and Paints ltd. Magdeburg). Results can be transfered to all external paints due to similar chemical composition.

2.4 Placing on the market / Application rules

Provisions of VOB (Construction Contract Procedures) following ATV (General Technical Conditions of Contract) DIN 18363:2010-4 for painting and varnishing works – coatings, as well as DIN EN 1062:2004.

2.5 Delivery status

The declared products are transported as liquid, ready for use products in white or various shades of colors in buckets made of Polypropylene (5 kg/5 l or 25 kg/15 l).

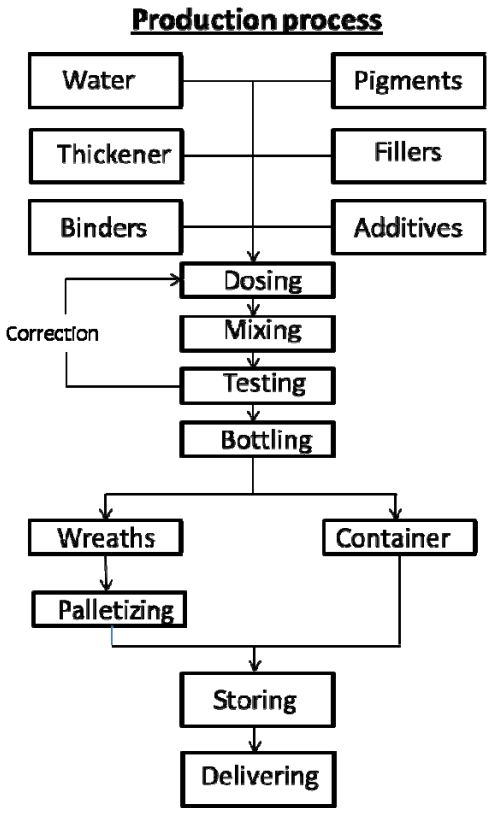
2.6 Base materials / Ancillary materials

Selected, natural raw materials form the basis for the high quality of KEIM silicate paints.

Base materials of all external paints are water, inorganic pigments, thickening agents, fillers, binders and additives. For ancillary materials, special fixatives or dilution are added to particular external paints.

Binders	25 – 45 %
Fillers	15 – 40 %
Water	15 – 35 %
Pigments	5 – 15 %
Other components	1 – 5 %

2.7 Manufacture



The figure shows the following working process during the production of external paint systems: First, the silos and weighting containers are filled, followed by transportation and adjustment of raw material into the mixer for dispersion. After a quality control, the external paints are filled into containers. Then they are loaded and delivered.

KEIMFARBEN GmbH has certified their quality management system according to ISO 9001:2008.

2.8 Environment & Health during manufacturing

KEIMFARBEN GmbH fulfills all required national regulations regarding consumer health and environmental protection. The environmental management system is certified according to ISO 14001:2004.

A risk to environment or negative effects on technical production staff during the production process of external paint does not exist, particularly due to the decision not to use toxic biocides and additional VOC's.

2.9 Product processing / Installation

For application, external paints are processed manually or mechanically by different tools. In this context, the following dilution products are used:

Granital	Spezial-Fixativ
Concretal-W	Concretal-Fixativ
Soldalit	Soldalit-Fixativ
Concretal-Lasur	Concretal-Fixativ
Restauro-Lasur	Restauro-Fixativ
Design-Lasur	Design-Base
Unikristalat	Fixativ

2.10 Packaging

By default, external paint systems are packaged in buckets made of Polypropylene (5 kg/5 l or 25 kg/ 15 l).

2.11 Condition of use

KEIMFARBEN products are durable – this is proven by innumerable buildings worldwide for more than one hundred years. Their longevity is due to their special properties: The binder, potassium silicate, has a high weathering resistance, the mineral fillings are perfectly compatible and the chemical reaction with the underlying substrate (silification) is extremely strong. **KEIM**FARBEN products do not splinter off; the binder does not become brittle because of UV radiation. External paints are perfect for building physics and moreover, absolutely resistant against acid (acid rain) and industrial pollution.
In terms of building physics, the ability of water-vapor diffusion is most important for a good moisture balance. Due to the special structure of water glass KEIM silicate paints shows extremely high diffusion ability to water vapor. Moisture within the building structure can be transmitted easily and fast to the outside.
There is no accumulation of moisture between paint and underlying substrate that could cause damage. In combination with very low water absorption, optimum protection against water and frost damage is provided.
The surface of KEIM external paint systems is minerally matt, antistatic and non-thermoplastic. The mineral pigments and binder used in **KEIM**FARBEN are highly resistant to UV radiation and, in addition, weather-proof. **KEIM**FARBEN do not fade, they remain permanent color stable, light-proof, with an high luminosity and natural appearance.

The enormous longevity and resistance to weathering of **KEIM**FARBEN provides economic advantages. Buildings painted/renovated with **KEIM**FARBEN cause a very low maintenance.
Due to persistent clean and color stable paintings, intervals between renovations are extended.

2.12 Environment & Health during use

External paints are not subject to labelling. They do not release any polluting emissions, in particular, they are free from any toxic biocides.

2.13 Reference service life

The reference service life for external paint systems of the company **KEIM**FARBEN GmbH has been determined to 30 years. However, the external paint systems can reach a service life of 100 years.

Due to properties of KEIM external paint systems mentioned in point 2.11, a premature ageing is delayed.

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2.14 Extraordinary effects

Fire

Granital	non-flammable
Concretal-W	non-flammable
Soldalit	non-flammable
Unikristalat	non-flammable

The colors are non-flammable. Thus, they fulfill the criteria of class A2 according to DIN 4102-A2:1998 and A2-s1-d0 according to DIN EN 13501-1:2010. It can be assumed that varnishes are not flammable either because of their similar chemical composition.

Even during the strongest exposure to flames, KEIM silicate colors do not ignite. This means in the event of fire: maximum safety and no toxic gases.

Water

No negative effects are expected after the curing of the silicate coating material.

2.15 Re-use phase

KEIMFARBEN can reach the life time of buildings. It is enough to clean the wall with water.

External paint systems do not have a real subsequent use stage. The disposal is carried out in combination with parts of the building. If these are solely construction waste, recycling according to national contexts takes place. Normally, construction waste is crushed and as substitution for fillings, returned to the economic cycle (road construction, concrete).

2.16 Disposal

Disposal of unprocessed external paint, respectively remaining color is handled according to official regulations.

The waste code according to the European waste list is:

08 01 12 valid for all external paint systems and varnishes.

2.17 Further information

Homepage: www.keimfarben.de

On the website technical data sheets, safety data sheets and further information can be downloaded.

3 LCA: Calculation rules

3.1 Declared unit

The declared unit is 1 m².

The conversion to kilogramme is the result of the color's density. The density as well as the painting quantity in kg per m² are shown in the following table.

	Density [g/cm³]	Painting quantity [kg/m²]
Soldalit	1.6	0.45
Granital	1.4	0.35
Concretal-W	1.6	0.35
Concretal-Lasur	1.2	0.30
Restauro-Lasur	1.2	0.17
Design-Lasur	1.2	0.04
Unikristalat	1.5	0.55

3.2 System boundary

Type of EPD: Cradle to grave.

The following modules have been taken into account for the calculation of the life cycle assessment.

A1	Raw material supply
	Packaging and disposal
A2	Transport of raw material
A3	Manufacturing of paintings (incl. energy and water)
	Production of packaging (buckets made of Polypropylene)
A4	Transport to construction site
A5	Installation of colors
	incl. production and transport of ancillary material (e.g. grounding)
	Waste processing of packaging (buckets made of Polypropylene)
B1	Usage of colors, emissions during usage
D	Reuse-, Recovery-, Recyclingpotential

3.3 Estimates and assumptions

For all known production processes, primary data was used wherever possible. Estimations, which means using generic data, were made for composition material, with less than five percent by mass of the total composition and less than one percent by mass for every single one.

Assumptions were made for the modules A4 (Transport to construction site; 350 km and 85 % load), A5 (Installation; for varnishes the lowest dilution was assumed, so that their intensity of color is similar to the intensity of color of the other external paint systems as well as waste processing; 100 % of buckets are incinerated) and B1 (Usage; maximum on labels stated VOC-emissions).

3.4 Cut-off criteria

The use of cut-off rules for the producer's primary data was avoided. In fact, smaller amounts of input material (in total less than five percent by mass) were calculated as generic data within the life cycle assessment.

3.5 Background data

For the calculation of the life cycle assessment, respectively of the life cycle of external paint systems, the software system „GaBi 4“ (Ganzheitliche Bilanzierung) developed by PE INTERNATIONAL AG has been used. The data set is compiled by PE itself or by ecoinvent.

3.6 Data quality

Data quality can be considered to be high, because every primary product has a corresponding data set, which was either provided by the producer of the particular primary product or generated by using material safety data sheets and information of **KEIM**FARBEN GmbH.

Background data of PE and ecoinvent is in general younger than 10 years.

3.7 Period under review

The selected observation period is the year 2010. All in-house data was collected for this period.

3.8 Allocation

The input energy, ancillary and operating materials, as well as packaging material of ingredients were physically allocated to the paintings, considering the amounts produced in 2010 (A1).

In addition, benefits were calculated both for the recycling of packaging material and for the thermal and energetic utilization of the packaging material. This has been declared in module D and relates to the packaging of raw materials (module A1) and the packaging of the finished paintings (module D).

3.9 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were developed according to EN 15804 and the context of construction, respectively the product-specific characteristics of performance, are taken into account.

4 LCA: Scenarios and additional technical information

Following technical information are basis for the declared modules or can be used for the development of specific scenarios in the context of an evaluation of a building, if modules are not declared (MND).

Transport to construction site (A4)

Transport distance	350 km
Load (including empty truck movements)	85 %

Installation in the building (A5)

Paint	Ancillary material	Amount [kg/m²]
Soldalit	Soldalit-Fixativ	0.05
Granital	Spezial-Fixativ	0.07
Concretal-W	Concretal-Fixativ	0.04
Concretal-Lasur	Concretal-Fixativ	0.05
Restauro-Lasur	Restauro-Fixativ	0.16
Design-Lasur	Design-Base	0.19
Unikristalat	Fixativ	0.13

Material loss of all external paint systems /ancillary materials: 0 %

Assumption: application of paint twice, with the maximum amount of paint according to the technical data sheet.

Paint buckets - Return as municipal or commercial waste - 100% used for incineration with energy recovery.

Use (B1)

See chapter 2.12 Usage

Further use stages (B2, B3, B4, B5, B6, B7)

none

Reuse-, Recovery- and Recycling potential (D)

All packaging material (of raw materials and paint) is disposed in accordance with national conditions (considered area: Germany).

The main components of steel and cardboard, as well as about 40 % of plastics (packaging of raw materials) will be recycled. Inert waste is assumed to end up at landfills and the remaining waste is used for incineration with energy recovery.

5 LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED; MND = MODULE NOT DECLARED)																
PRODUCT STAGE			CONSTRUC-TION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1m² KEIM Soldalit

Parameter	Unit	A1	A2	A3	A4	A5	B1	D
GWP	[kg CO_2-eq.]	3.48E-01	2.69E-02	7.84E-02	7.79E-03	4,83E-02	4.08E-03	-3.16E-02
ODP	[kg CFC11-eq.]	6.68E-08	4.34E-09	4.32E-09	1.37E-11	7,00E-10	0.00E+00	-2.60E-09
AP	[kg SO_2-eq.]	1.93E-03	1.46E-04	2.56E-04	3.43E-05	3,69E-05	0.00E+00	-3.74E-05
EP	[kg PO_4^{3-}-eq.]	8.91E-02	4.47E-05	2.34E-05	7.85E-06	1,49E-02	0.00E+00	-4.06E-06
POCP	[kg Ethen eq.]	1.77E-04	2.26E-05	2.45E-05	3.44E-06	5,41E-06	1.44E-04	-3.81E-06
ADPE	[kg Sb eq.]	3.02E-06	6.83E-08	-1.80E-08	2.62E-10	9,79E-09	0.00E+00	-2.74E-09
ADPF	[MJ]	5.91E+00	4.01E-01	1.43E+00	1.07E-01	1,96E-01	0.00E+00	-3.97E-01
Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources							

RESULTS OF THE LCA - RESOURCE USE: 1m² KEIM Soldalit

Parameter	Unit	A1	A2	A3	A4	A5	B1	D
PERE	[MJ]	3.57E-01			1.18E-04	3,79E-03	0.00E+00	-9.35E-03
PERM	[MJ]	0.00E+00			0.00E+00	0,00E+00	0.00E+00	-1.92E-03
PERT	[MJ]	3.11E-01	5.63E-03	3.96E-02	1.18E-04	3,79E-03	0.00E+00	-1.13E-02
PENRE	[MJ]	8.73E+00			1.09E-01	1,62E-01	0.00E+00	-1.70E-01
PENRM	[MJ]	7.63E-01			0.00E+00	7,86E-02	0.00E+00	-3.84E-01
PENRT	[MJ]	7.24E+00	4.26E-01	1.83E+00	1.09E-01	2,40E-01	0.00E+00	-5.54E-01
SM	[kg]	-	-	0.00E+00	-	0,00E+00	-	-
RSF	[MJ]	-	-	0.00E+00	-	0,00E+00	-	-
NRSF	[MJ]	-	-	0.00E+00	-	0,00E+00	-	-
FW	[m³]	1.75E-02	2.10E-04	7.83E-04	4.13E-07	1,99E-04	0.00E+00	-3.20E-05
Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials; PENRM = Use of non renewable primary energy resources used as raw materials; PENRT = Total use of non renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non renewable secondary fuels; FW = Use of net fresh water							

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1m² KEIM Soldalit

Parameter	Unit	A1	A2	A3	A4	A5	B1	D
HWD	[kg]	4.53E-04	0.00E+00	4.01E-05	0.00E+00	7,77E-05	0.00E+00	1.71E-06
NHWD	[kg]	7.91E-02	0.00E+00	1.37E-01	5.36E-04	1,75E-02	0.00E+00	8.34E-02
RWD	[kg]	3.10E-05	0.00E+00	5.42E-05	1.71E-07	6,89E-06	0.00E+00	3.26E-05
CRU	[kg]	-	-	0.00E+00	-	-	-	-
MFR	[kg]	-	-	5.01E-03	-	-	-	-
MER	[kg]	-	-	3.00E-03	-	-	-	-
EEE	[MJ]	-	-	5.85E-03	-	-	-	6.86E-02
EET	[MJ]	-	-	1.78E-02	-	-	-	2.24E-01
Caption	HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported energy electrical; EET = Exported energy thermal							

6 LCA: Interpretation

For the interpretation of the results of the life cycle assessment both the aggregated indicators of the inventory and the impact assessment are presented and analyzed in a dominance analysis.

Basically, it can be stated that Soldalit has the greatest environmental impact compared to the other external paints throughout the entire life cycle. Thus, the representative external paint, Soldalit, describes the worst case from a life cycle assessment point of view. The entire presentation of results can be regarded as conservative.

A similar pattern is found for energy consumption, as well as for every other impact category. The results are dominated by the environmental impacts of the raw material, respectively by the related primary energy demand. Only 4 % of the total energy is consumed by **KEIM**FARBEN GmbH itself, whereas about 70 % of primary energy is demanded by raw materials.

Determining for this performance are titanium dioxide (used as a pigment), in particular its production, the organic binders, as well as the packaging material of the raw material.

The elementary abiotic resource depletion potential for non-fossil resources (ADPE) is influenced by raw materials with more than 90 %. Most decisive for this category is the application of mineral products within the color compositions. But in total, absolute values are small.

Regarding the fossil abiotic resource depletion, 70 % are related to raw materials, compared to 20 % caused by the production within **KEIM**FARBEN itself. This is mainly because of fossil fuels, used for the power generation in Germany. Together, the transport of raw materials and paintings accounts for almost 10 %.

The global warming potential (GWP) is caused with more than 60 % by emissions related to raw materials and their production, with 5 % by emissions during manufacture, and with 7 % by emissions due to the incineration of the bucket. The remaining emissions are caused by transport and the emissions during usage, as well as the production of wreaths made of Polypropylene. The prevented emissions due to incineration with energy recovery amount to about 6 %.

Both, the ozone depletion potential (ODP) and the acidification potential (AP) are dominated by the environmental impact of raw materials with about 80 %. However, it has to be considered that in particular ODP shows very small absolute values and thus, it is relatively unimportant. The impact is basically caused by the energy supply.

The eutrophication potential (EP) is caused with 85 % by impacts of the raw material and with 15 % by ancillary materials during installation. Both results are dominated by organic binders.

The impact of photochemical ozone creation potential (POCP) is, overall, very small. The POCP is caused by raw materials with about 50 % and by transport and manufacture with about 10 %. Additionally, approximately 40 % of POCPs are related to the use phase. The VOC-emissions are less than 0.6 g per m².

7 Requisite evidence

7.1 Outdoor weathering

The ILF Research- and Development Company Coatings and Paints ltd. Magdeburg carried out over a period of eight years in the industrial climate of Magdeburg an outdoor weathering study according to DIN 53166 / DIN EN ISO 2810 for the exterior paint systems KEIM Ganital and KEIM Soldalit.

Test report: 1-024/2001, September 2009

Test results: After eight years of outdoor weathering, the examined exterior paint systems still showed resistant adhesion properties and colourfastness..

8 References

Institute Construction and Environment e.V., Königswinter (Ed.):

General Principles for the EPD Programme of the Institute Construction and Environment e.V., 2011-06.

Product Category Rules for Construction Products Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. 2011-07.

Part B: Requirements on the EPD for Coatings with organic binders.

www.bau-umwelt.de

DIN EN ISO 14025:2011-10, Environmental labels and declarations - Type III environmental declarations - Principles and procedures (ISO 14025:2006)

DIN EN 15804:2012-04, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

DIN 4102-1:1998-05, Fire behaviour of building materials and building components - Part 1: Building materials; concepts, requirements and tests

DIN EN 13501-1:2010-01, Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests

DIN EN 1062-1:2004-08, Paints and varnishes - Coating materials and coating systems for exterior masonry and concrete - Part 1: Classification

DIN EN 1062-3:2008, Paints and varnishes - Coating materials and coating systems for exterior masonry and concrete - Part 3: Determination of liquid water permeability

DIN EN ISO 2810:2004-10, Paints and varnishes - Natural weathering of coatings - Exposure and assessment (ISO 2810:2004)

DIN EN ISO 2813:1999-06, Paints and varnishes - Determination of specular gloss of non-metallic

paint films at 20°, 60° und 85° (ISO 2813:1994, including Technical Corrigendum 1:1997)

DIN 52615, Testing of thermal insulating materials; determination of water vapour (moisture) permeability of construction *(Comment: our products are tested due to DIN EN ISO 7783-2:1999)*

DIN 52617, Determination of the water absorption coefficient of construction materials *(due to DIN EN 1062-3:1999)*

DIN 18363:2010-4, German construction contract procedures (VOB) - Part C: General technical specifications in construction contracts (ATV) - Painting and coating work

DIN EN ISO 7783-2:1999, Paints and varnishes - Determination of water-vapour transmission properties - Cup method (ISO 7783:2011)

GaBi 4 2010, LCA software and Life Cycle Databases. LBP, Universität Stuttgart and PE International, 2010.

DIN EN ISO 9001:2008, Quality management systems - Requirements (ISO 9001:2008

DIN EN ISO 14001:2009-11, Environmental management systems - Requirements with guidance for use (ISO 14001:2004 + Cor. 1:2009)

Ecoinvent, Swiss Centre for Life Cycle Inventories, www.ecoinvent.ch

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