ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	Bundesverband der Gipsindustrie e.V.
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-BVG-20180025-IBG1-EN
Issue date	28/06/2018
Valid to	27/06/2023

READY-MIXED COMPOUNDS

Bundesverband der Gipsindustrie e.V.

Institut Bauen und Umwelt e.V.

www.ibu-epd.com / https://epd-online.com

1. General Information

Bundesverband der Gipsindustrie e.V.

Programme holder
IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number
EPD-BVG-20180025-IBG1-EN

This declaration is based on the product category rules:
Coatings with organic binders, 09.2017
(PCR checked and approved by the SVR)

Issue date
28/06/2018

Valid to
27/06/2023

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

Dipl. Ing. Hans Peters
(Head of Board IBU)

READY-MIXED COMPOUNDS

Owner of the declaration
Bundesverband der Gipsindustrie e.V.
Kochstraße 6-7
10969 Berlin

Declared product / declared unit
1 kg ready-mixed compounds

Scope:
This EPD applies for ready-mixed compounds manufactured in Germany by the following member companies of the Bundesverband der Gipsindustrie e.V.: CASEA GmbH, Danogips GmbH & Co. KG, Knauf Gips KG, Saint-Gobain Rigips GmbH and VG Orth GmbH & Co. KG. All of the companies referred to were involved in creation of the LCA for this association EPD. In terms of transferability, a worst-case scenario approach was applied for transport to the building site and the disposal of waste. The data based on the declared unit is the result of an average product from several plants using equally-weighted individual production data supplied by the respective manufacturers.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Verification

The standard /EN 15804/ serves as the core PCR
Independent verification of the declaration and data according to /ISO 14025:2010/
☐ internally ☒ externally

Christina Bocher
(Independent verifier appointed by SVR)

2. Product

2.1 Product description / Product definition

Ready-mixed compounds are ready-to-use filling and fine filling compounds for manual and possibly mechanical application in accordance with /DIN EN 13963/ and/or renovation fillers in accordance with /DIN EN15824/ for interior applications (excluding areas subject to increased humidity and splash-water). They can be used as a joint and surface finish on gypsum plasterboards, gypsum fibreboards, plaster, partitions made of gypsum plasterboards and mineral substrates as well as other substrates indicated by the manufacturer. The filling compounds are air-drying.

Directive (EU) No. 305/2011 /CPR/ applies for placing the product on the market in the EU/EFTA (with the exception of Switzerland). The product requires a Declaration of Performance taking consideration of the /DIN EN 13963/ or /DIN EN 15824/ standards, and CE marking. Use is governed by the respective national regulations.

2.2 Application

In terms of use for gypsum plasterboard surfaces and joints, the information provided by the manufacturers must be observed depending on the edge design of the gypsum plasterboards, as well as any possible recommendation on using reinforcing strips and the respective quality level desired.
Ready-mixed compounds should only be processed at temperatures of min. +5 °C.

2.3 Technical Data

Ready-mixed compounds require a CE marking and a Declaration of Performance in accordance with Directive (EU) No. 305/2011 (/CPR/). The product's performance values are declared in accordance with the Declaration of Performance in terms of its essential properties in accordance with /DIN EN 13963/ or /DIN EN 15824/.

2.4 Delivery status

The products are available in buckets or bags or various sizes and volumes. The respective delivery forms available are indicated in the information supplied by the manufacturers.

For the purpose of estimating impacts by the packaging material in the EPD, the data was calculated using a 20-litre bucket as packaging. This is the unit most often used. The impacts of smaller packaging units and bags are overestimated using this calculation. The impacts incurred by manufacturing larger packaging units (up to 25 litres) are slightly underestimated using this calculation.

2.5 Base materials / Ancillary materials

Ready-mixed compounds comprise >95% mineral components as well as water and <5% organic auxiliaries / dispersion powder. Exact material compositions are indicated in the manufacturers' safety data sheets.

In-can preservatives can also be used as auxiliaries. Where these are used, the products bear the following warning in accordance with the /CLP Directive/:
EUH208 contains (name of substance).
May produce an allergic reaction.

The ready-mixed compounds do not contain any substances of very high concern (SVHC) in concentrations exceeding 0.1% by weight /ECHA Candidate List/.

2.6 Manufacture

Manufacture involves mechanical blending and homogenisation of the mixture components using the plant formulas.

The plants maintain a quality management system in accordance with /DIN EN ISO 9000ff./.

Product efficiency is evaluated and examined using the system for assessment and verification of constancy of performance (AVCP: System 4 – Manufacturer's declaration) via in-plant production controls.

2.7 Environment and health during manufacturing

Manufacturing takes place in production facilities approved in accordance with the Federal Immission Control Act /BImSchG/. Valid hazard analyses are available for the facilities. Employees are regularly trained in handling materials and machinery.

2.8 Product processing/Installation

The filling compound consumption volumes are provided by the manufacturers and are dependent on the quality of the substrate as well as the desired surface quality to be achieved.

Where indicated by the manufacturer, trowels, airless tools for spraying or mixing pumps can be used for mechanical application on the construction site.

Joint filling involves consumption volumes ranging between 0.1 kg/m² and 0.5 kg/m².

Between 1.1 kg/m² per mm thickness and 1.8 kg/m² per mm layer thickness are required in the manufacture of surface fillings.

Surface preparation: Sealing of larger cavities, joints and imperfections using suitable dry mortar, e.g. gypsum-based mortar. Allow fillings to dry/harden completely. Any filling residue from surface preparation must be removed or grinded beforehand. The filling compound is applied, then levelled and, if necessary, grinded.

Do not process at (permanent) ambient and board temperatures of below +5 °C. Clean tools and remove contamination with water.

The design type and quality (quality levels) on mineral substrates can be described considering /DIN 18550-2/ and IGB data sheet 3 /BV Gypsum/ as well as for dry construction systems considering IGG data sheets 2 and 2.1 /BV gypsum/, data sheet 12 of the Bundesausschuss Farbe- und Sachwertschutz /Farbe-BFS/ and the guidelines of the board manufacturers.

Data sheet no. 16 "Technische Richtlinien für Tapezier- und Klebearbeiten" (technical guidelines for wallpapering and adhesive work) (2002), published by the Bundesausschuss Farbe- und Sachwertschutz /Farbe-BFS/ and data sheet 6 of the Bundesverband der Gipsindustrie e.V., gypsum plasterboard industrial group (last revised: June 2007) "Vorbehandlung von Trockenbauflächen aus Gipsplatten zur weitergehenden Oberflächenbeschichtung bzw. -bekleidung" (preparing dry construction areas made of gypsum boards for more extensive surface coating and/or panelling) /BV Gypsum/ must be observed for wallpapering on levelled areas

2.9 Packaging

Packaging is in plastic buckets with lids or in bags. Packaging can be recycled when empty, i.e. directed to thermal or material recycling.

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2.10 Condition of use

Products harden by evaporation of the water contained in the delivery status. The remaining material composition does not change during the use phase.

2.11 Environment and health during use

Ready-mixed compounds are not subject to classification in accordance with the /CLP Directive/. The requirements on interior emissions are observed (see 7.1).

During use, there are no material or energy inputs for the product and the product is not subject to any maintenance or repair measures with the result that there are no influences on the environment or health.

2.12 Reference service life

The reference service lives depend on the respective applications of the wall building materials. During use, the actual compound layer does not have any contact with the atmosphere and is therefore not subject to any weathering influences. Accordingly, its permanence is extensive and is above all associated with the durability of the entire construction system.

The Reference Service Lives result, e.g. from the application areas in accordance with the BSSR table "Nutzungsdauern von Bauteilen für Lebenszyklusanalysen nach dem Bewertungssystem Nachhaltiges Bauen (BNB) (Useful life of components for the LCA according to the Sustainable Building assessment system)", last revised 24.02.2017 /BBSR Service Life/.

For filling compounds in stud wall systems (code 342.411) or partitions made of gypsum plasterboards (code 342.511): ≥ 50 years.

In line with the state of the art, the filling compounds are not subject to any influences of ageing during use.

In accordance with ISO 15686, it has an unlimited service life (RSL) as the filling compound is not subject to any external influences or ageing.

2.13 Extraordinary effects

Fire
The ready-mixed compounds are allocated to building material classes in accordance with /DIN EN 13501-1/, whereby the product complies with classes A2-s1,d0 or A2-s1,d1, depending on the manufacturer's specifications.

Water
In the event of unforeseen impact by water, it can be assumed that the filling compound will burst, e.g. on account of the change in volume of the damaged construction material.
A leaflet /Flooding Leaflet/ is available from the Bundesverband der Gipsindustrie e.V. on how to repair damage caused by flooding.

Mechanical destruction
Mechanical stress does not occur during the service life of the building. As the product is used for interior applications, there are no negative consequences for the environment in the event of unforeseen mechanical destruction.

2.14 Re-use phase

The filling compound is reused depending on the surface to which it is applied. When applied to gypsum plasterboards, gypsum fibreboards or gypsum wall partitioning boards, the filling compound is directed to gypsum recycling along with the wall construction material. The volumes of ready-mixed compound used do not have any negative impacts on the quality of recycled gypsum.
When applying the filling compound to products other than gypsum products (and where so intended by the manufacturer), this claim shall apply analogously for the manufacture of recycled construction materials in building rubble recycling plants.

Packaging can be recycled when empty, i.e. directed to thermal or material recycling.

2.15 Disposal

Waste code in accordance with the German List of Waste /AVV/:

Hardened filling compound:
17 09 04 mixed construction and demolition waste other than that mentioned in 17 09 01, 17 09 02 and 17 09 03

Filling compound in a wall construction with gypsum construction materials which is demolished:
170802 gypsum-based construction materials other than those mentioned in 170801

2.16 Further information

www.gips.de

3. LCA: Calculation rules

3.1 Declared Unit

The Declaration refers to 1 kg of material as ready-mixed compound. The data based on the declared unit is the result of an average product from several plants using equally-weighted individual production data supplied by the respective manufacturers.

Details on declared unit

Name	Value	Unit
Declared unit	1	kg
Conversion factor to 1 kg	1	-

Use as a joint filler involves consumption volumes ranging between 0.1 kg/m² and 0.5 kg/m².

Between 1.1 kg/m² and 1.8 kg/m² per mm layer thickness are required in the manufacture of surfaces.

3.2 System boundary

Within the framework of this EPD, the potential environmental impacts of the EPD type "Cradle to gate, with options" are determined. Accordingly, this EPD considers the manufacturing and construction phase.

In accordance with /DIN EN 15804/, this applies to product phases A1-A5 and D.

A1: Raw material supply and processing and finishing processes for secondary materials serving as input
A2: Transport to manufacturer
A3: Manufacture
A4: Transport to site
A5: Construction installation process
D: Reuse, recovery or recycling potential

3.3 Estimates and assumptions

The infrastructure at the production sites is not considered on account of the high mass flow. Furthermore, only the production-based energy consumption (excluding management and social areas) is considered and the energy consumption averaged over the annual production volume.
All specific transport distances covered by the base materials are inventoried and taken into consideration. A truck with a useful load of 24.7 tonnes and a total

weight of 40 tonnes was assumed for all transport (diesel vehicle). A general capacity utilisation rate of 85% was assumed.
Losses during the manufacturing phase account for less than 1% by mass which means that they fulfil the cut-off criteria. During Phase A5 – Construction phase – a loss of 1% of material (including disposal of packaging) was assumed.

3.4 Cut-off criteria
All material flows accounting for more than 1% of the total mass, energy used or environmental impacts by the system were considered in the LCA. It can be assumed that the total processes not taken into consideration would have contributed less than 5% to the impact categories under evaluation.
The manufacture of machinery, plants and other infrastructure required for production of the products are not accounted for in the LCA.

3.5 Background data
All background data comes from the /GaBi data base 2016/. The life cycle was modelled using the LCA software /OpenLCA/ (version: 1.6). Germany is the geographic area of reference for background data.

3.6 Data quality
It was possible to record all relevant process-specific data in the inventory analysis. The data concerning the manufacturing and construction phase for the ready-mixed compound was provided by the member companies of Bundesverband der Gipsindustrie e.V. All of the companies referred to in the scope of application were involved in creation of the LCA for this association EPD. In terms of transferability, a worst-case scenario approach was applied for transport to the building sites and averaging was applied for the production processes.
Secondary data was taken from the Gabi 2016 data base. The data base is examined on a regular basis and therefore complies with the requirements of the /DIN EN ISO 14040/44/ (background data less than 10 years old). The background data complies with the requirements of the /DIN EN 15804/.

3.7 Period under review
All process-specific data was recorded for 2016. The raw, ancillary and operating materials used as well as the energy consumption were recorded and averaged over the entire year of 2016.

3.8 Allocation
Specific information on allocations within the background data can be found in the documentation on GaBi data sets /GaBi data base 2016/. The allocation of material and energy consumption was carried out by the companies involved in this association EPD. The data supplied involves internal parameters which are not intended for publication. No co-products are produced during the provision of raw materials with the result that no allocation methods were applied in this phase.

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

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The background data base was used for this EPD /GaBi data base 2016/.

4. LCA: Scenarios and additional technical information

Transport to construction site (A4)

Name	Value	Unit
Transport distance	400	km
Capacity utilisation (including empty runs)	85	%
Gross density of products transported	-	kg/m³

Construction installation process (A5)

Name	Value	Unit
Auxiliary	0	kg
Water consumption	0	m³
Other resources	0	kg
Electricity consumption	0	kWh
Other energy carriers	0	MJ
Material loss	0.01	kg
Output substances following waste treatment on site	0.0326	kg
Dust in the air	-	kg
VOC in the air	-	kg

Reference service life

Name	Value	Unit
Life Span Service life of components for Life Cycle Analyses in accordance with the BBSR sustainable building evaluation system (BNB); last revised: 24.02.2017 /BBSR service life/	50	a

Reuse, recovery and recycling potential (D), relevant scenario information
Credits arising through the generation of energy during thermal recycling are indicated in Module D.

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	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	MND	MND	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 kg ready-mixed compound

Parameter	Unit	A1-A3	A4	A5	D
Global warming potential	[kg CO_2-Eq.]	2.03E-1	2.08E-2	4.09E-2	-1.46E-2
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	3.71E-11	1.49E-13	2.83E-13	-4.59E-12
Acidification potential of land and water	[kg SO_2-Eq.]	6.12E-4	9.13E-5	1.75E-5	-2.11E-5
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	4.15E-4	2.24E-5	3.72E-6	-2.66E-6
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	-5.33E-6	-3.25E-5	1.03E-6	-1.97E-6
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	3.42E-7	1.44E-9	6.72E-10	-2.33E-9
Abiotic depletion potential for fossil resources	[MJ]	4.88E+0	2.83E-1	2.07E-2	-2.02E-1

RESULTS OF THE LCA - RESOURCE USE: 1 kg ready-mixed compound

Parameter	Unit	A1-A3	A4	A5	D
Renewable primary energy as energy carrier	[MJ]	2.95E-1	1.63E-2	2.75E-3	-3.16E-2
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	2.95E-1	1.63E-2	2.75E-3	-3.16E-2
Non-renewable primary energy as energy carrier	[MJ]	5.60E+0	3.06E-1	2.56E-2	-2.65E-1
Non-renewable primary energy as material utilization	[MJ]	0.00	0.00	0.00	0.00
Total use of non-renewable primary energy resources	[MJ]	5.60	0.31	0.03	-0.27
Use of secondary material	[kg]	IND	IND	IND	IND
Use of renewable secondary fuels	[MJ]	IND	IND	IND	IND
Use of non-renewable secondary fuels	[MJ]	IND	IND	IND	IND
Use of net fresh water	[m^3]	IND	IND	IND	IND

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 kg ready-mixed compound

Parameter	Unit	A1-A3	A4	A5	D
Hazardous waste disposed	[kg]	1.42E-7	2.13E-8	1.54E-10	-9.65E-11
Non-hazardous waste disposed	[kg]	1.27E-3	2.45E-5	5.09E-3	-8.00E-5
Radioactive waste disposed	[kg]	3.42E-6	1.79E-8	3.63E-8	-4.99E-7
Components for re-use	[kg]	IND	IND	IND	IND
Materials for recycling	[kg]	IND	IND	IND	IND
Materials for energy recovery	[kg]	IND	IND	IND	IND
Exported electrical energy	[MJ]	0.00	0.00	0.30	0.00
Exported thermal energy	[MJ]	0.00	0.00	0.07	0.00

6. LCA: Interpretation

For all parameters, the product stage (A1-A3) is the stage with the greatest influence on the results of the LCA. The influence of the construction process stage (A4-A5) is lower.

The raw material supply has the highest influence on the overall global warming potential **(GWP)** (A1-A5). Raw material supply accounts for 41% of the entire GWP (A1-A5). The provision of dispersion powder was identified as the most significant parameter of raw material supply. Accounting for 23%, manufacturing has the second-highest influence on GWP. Transport during the product stage contributes approx. 13% to GWP. Due to its relatively high share and transport distance, the transport of powdered limestone has the highest influence on emissions during transport. Accounting for 85%, the ozone depletion potential **(ODP)** is primarily influenced by raw material supply. The provision of dispersion powder was identified as the most significant parameter in this category. At 14%, the manufacturing phase of the product stage has the second-highest influence and is largely attributable to the raw material supply for packaging materials.

Transport during phase A2 accounts for 42% and therefore the greatest influence on acidification potential **(AP)** while the eutrophication potential (EP) results in almost 75% from the manufacturing phase. The photochemical ozone creation potential **(POCP)** has a negative overall value which is attributable to the direct emissions during transport. Ozone is depleted via the reaction with the nitrogen monoxide emissions, generating nitrogen dioxide and oxygen, which has a positive effect on the photochemical ozone creation potential **(POCP)**. The phases A1, A3 and A5 have

negative impacts on the POCP but are outweighed by the influences of transport during phases A2 and A4. Elementary consumption of resources **(ADPe)** is primarily dominated by more than 90% by raw material supply. Consumption of fossil resources is primarily influenced by raw material supply (42%) and manufacture (43%).

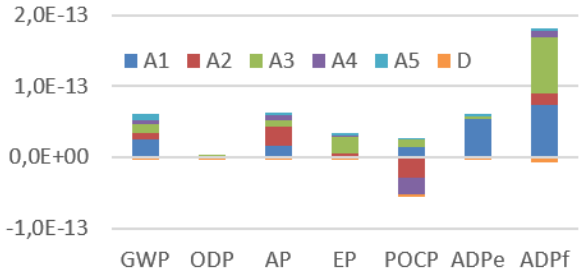

Fig. 1: Standardised results (Europe 25) for the analysis of 1 kg ready-mixed compound (dimensionless)

7. Requisite evidence

7.1 VOC emissions

All aspects of the test chamber method for measurement and evaluation of VOC emissions in accordance with /AgBB scheme/ are complied with by representative ready-mixed compounds.

An overview of AgBB results is given in the following table (the permissible maximum limits of the AgBB scheme after 28 days are declared).

Name	Value	Unit
TVOC (C6 - C16)	<1.000	µg/m³
Sum SVOC (C16 - C22)	<100	µg/m³
R (dimensionless)	<1	-
VOC without NIK	<100	µg/m³
Carcinogenic Substances	<1	µg/m³

7.2 Leaching

Leaching tests are not of relevance during designated use in interior applications.

8. References

/IBU 2016/
IBU (2016): General Programme Instructions for the Preparation of EPDs at the Institut Bauen und Umwelt e.V., Version 1.1 Institut Bauen und Umwelt e.V., Berlin.
www.ibu-epd.de

/ISO 14025/
DIN EN /ISO 14025:2011-10/, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

/EN 15804/
/EN 15804:2012-04+A1 2013/, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

General programme instructions (updated)
For generating EPDs at Institut Bauen und Umwelt e.V. (IBU), V1.6 (2017), www.ibu-epd.com
PCR document, Part A: Calculation rules for the Life Cycle Assessment and requirements on the Background Report (v. 1.6)
PCR document, Part B: Requirements on the EPD for coatings with organic binding agents from the EPD range (version 2017)

/AgBB scheme/
Ausschuss zur gesundheitlichen Bewertung von Bauprodukten (AgBB) – Procedure for health-related evaluation of emissions by volatile organic compounds (VVOC, VOC and SVOC) from construction products, February 2015
https://www.umweltbundesamt.de/sites/default/files/medien/355/dokumente/agbb-bewertungsschema_2015_2.pdf (retrieved on 23.01.2018)

/AVV/
Ordinance on the List of Wastes dated 10 December 2001 (BGBl. I p. 3379), last amended by Article 2 of the Directive dated 17 July 2017 (BGBl. I, p. 2644)

/BBSR service life/
BBSR: Service lives of components for Life Cycle Analyses in accordance with the evaluation system for sustainable building (BNB); Information portal on sustainable building by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
http://www.nachhaltigesbauen.de/baustoff-und-gebaeudedaten/nutzungsdauern-von-bauteilen.html (retrieved on 23.01.2018)

/BImSchG/
Federal Immission Control Act, version announced on 17 May 2013 (BGBl. I p. 1274), last amended by Article 3 of the law dated 18 July 2017 (BGBl. I, p. 2771)

/BV Gypsum/
http://www.gips.de/loesungen/ Publications (retrieved on 23.01.2018)

/CLP Directive/

Directive (EU) No. 1272/2008 of the European Parliament and Council on the classification, marking and packaging of substances and mixtures amending and replacing Guidelines 67/548/EEC and 1999/45/EU, and amending Directive (EU) No. 1907/2006, dated 16 December 2008 (ABl. L 353, p. 1)

/CPR/
Construction Products Regulation: Directive (EU) No. 305/2011 of the European Parliament and Council dated 9 March 2011 establishing harmonised conditions for marketing construction products and replacing Council Guideline 89/106/EEC

/DIN 18550-2/
DIN 18550-2:2018-01, Design, preparation and application of external rendering and internal plastering – Part 2: Supplementary provisions for DIN EN 13914-2:2016-09 for internal plastering

/DIN EN 13501-1/
DIN EN 13501-1:2010-01, Classification of construction products and methods by reaction to fire – Part 1: Classification using data from reaction to fire tests; German version EN 13501-1:2007 + A1:2009

/DIN EN 13963/
DIN EN 13963:2014-09, Jointing materials for gypsum boards – Definitions, requirements and test methods; German version EN 13963:2014

/DIN EN 15804/
DIN EN 15804:2014-07, Sustainability of construction works – Environmental product declarations – Core rules for the construction products product category; German version EN 15804:2012+A1:2013

/DIN EN 15824/
DIN EN 15824:2017-09, Specifications for external renders and internal plasters based on organic binders; German version EN 15824:2017

/DIN EN ISO 9000ff./
DIN EN ISO 9000:2015-11, Quality management systems – General principles and terms (ISO 9000:2015); German and English versions EN ISO 9000:2015
and
DIN EN ISO 9001:2015-11, Quality management systems – Requirements (ISO 9001:2015); German and English versions EN ISO 9001:2015

/DIN EN ISO 14040/44/
DIN EN ISO 14040:2009-11, Environmental management – Life cycle assessment – Basic principles and framework conditions (ISO 14040:2006); German and English versions EN ISO 14040:2006
and
DIN EN ISO 14044:2006-10, Environmental management - Life cycle assessment – Requirements and instructions (ISO 14044:2006); German and English versions EN ISO 14044:2006

/ECHA List of Candidates/
ECHA – European Chemicals Agency, list of substances of very high concern requiring approval (published in accordance with Article 59, paragraph 10 of the REACH Directive), on: https://echa.europa.eu/de/candidate-list-table (retrieved on 23.01.2018)

/Farbe-BFS/
https://www.farbe-bfs.de/merkblaetter/ (retrieved on 23.01.2018)

/GaBi data base 2016/
Publisher: thinkstep AG, Hauptstraße 111-113, 70771 Leinfelden-Echterdingen, Germany
https://www.thinkstep.com/de/software (retrieved on 23.01.2018)

/ISO 15686-1/
ISO:15686-1:2011-05, Buildings and constructed assets – Service life planning – Part 1: General principles and requirements

/ISO 15686-2/
ISO:15686-2:2012-05, Buildings and constructed assets – Service life planning – Part 2: Service life prediction procedures

/ISO 15686-7/
ISO:15686-7:2017-04, Buildings and constructed assets – Service life planning – Part 7: Performance evaluation for feedback of service life data from practice

/ISO 15686-8/
ISO:15686-8:2008-06, Buildings and constructed assets – Service life planning – Part 8: Reference service life and service life estimation

/Flooding Leaflet/
Removing damage caused by flooding to components made of gypsum or gypsum plaster; publisher: Bundesverband der Gipsindustrie e.V.; June 2013 Available online at www.gips.de, Download – Books – Information services “BVG Informationsdienst Nr. 01” (retrieved on 23.01.2018)

/OpenLCA/
Publisher: GreenDelta GmbH, Müllerstraße 135, 13349 Berlin
https://www.openlca.org/ (retrieved on 23.01.2018)

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