ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Knauf Gips KG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-KNA-20230563-IBA1-EN
Issue date	29.01.2024
Valid to	28.01.2029

Knauf Uniflott

Knauf Gips KG

Institut Bauen und Umwelt e.V.

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

ECO PLATFORM EPD VERIFIED



1. General Information

Knauf Gips KG

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-KNA-20230563-IBA1-EN

This declaration is based on the product category rules:

Mineral factory-made mortar, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

29.01.2024

Valid to

28.01.2029



Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)



Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Knauf Uniflott

Owner of the declaration

Knauf Gips KG
Am Bahnhof 7
97346 Iphofen
Germany

Declared product / declared unit

1 kg of Knauf Uniflott with a density of 2,7 g/cm³

Scope:

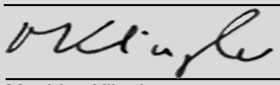
This EPD covers 100 % of manufacture of the gypsum filler Knauf Uniflott. This gypsum filler is manufactured in Germany. The life cycle assessment is based on production data from 2022.

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.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally



Matthias Klingler,
(Independent verifier)

2. Product

2.1 Product description/Product definition

This declaration refers to Knauf Uniflott jointing compound type 4B according to *EN 13963*.
The primary binding agent is represented by bindable calcium sulfate (alpha hemihydrate) blended with aggregates (limestone) and additives. The declaration applies to Knauf Uniflott in 25 kg bags. For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) *Regulation (EU) No. 305/2011 (CPR)* applies. The product needs a declaration of performance taking into consideration *EN 13963:2014* Jointing materials for gypsum boards and the CE-marking.

For the application and use the respective national provisions apply.

2.2 Application

Knauf Uniflott is a special gypsum-based synthetically enhanced filler for hand filling joints of drywall systems. Knauf Uniflott can be applied on:

- Gypsum boards or composite boards
- Perforated gypsum boards e.g., Knauf Cleaneo acoustic boards
- Gypsum fibre panels, e. g., Knauf Brio, Knauf GIFAboard and Knauf GIFAfloor panels Knauf Vidiwall, and Knauf Vidifloor

2.3 Technical Data

The technical datasheets can be downloaded from the website https://www.knauf.de

Constructional data

Name	Value	Unit
Density	2,7	g/cm³

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 13963:2014* Jointing materials for gypsum boards.

2.4 Delivery status

Knauf Uniflott is delivered in 5 or 25 kg bags on wooden pallets.

2.5 Base materials/Ancillary materials

Knauf Uniflott consists of approx. > 95 % gypsum binder and limestone and < 3 % additives.

This product at least one partial article contains substances listed in *the candidate list* (date: 2023-06-14, ECHA 2023) exceeding 0.1 percentage by mass: no

This product/article/at least one partial article contains other carcinogenic, mutagenic, reprotoxic substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the *Regulation (EU) No 528/2012)*: no

2.6 Manufacture

To produce Knauf Uniflott, flue gas desulphurization (FGD gypsum is calcined and then ground and mixed with limestone and additives.

The manufacturing plant is certified according to *ISO 9001*.

2.7 Environment and health during manufacturing

The manufacturing plant is certified according to *ISO 45001* and *ISO 50001* and meets the standard of the *Federal Immission Control Act (BImSchG)*.

Gypsum from the flue-gas desulphurization plants of coal-fired power stations is used. Production waste is recycled internally and fed back into the production of gypsum plaster.

2.8 Product processing/Installation

At the building site, Knauf Uniflott is mixed with clean, cold water without any further additives to a creamy consistency. This filler is usually applied in two operations, depending on the required surface quality. Pre-conditioning (cleaning, de-dusting, priming) of the substrate surface prior to the application may be required.

2.9 Packaging

The product is packed in paper sacks with a plastic lining. Sacks are stacked on wooden pallets which are then wrapped and sealed in plastic film.

Recycling / Reuse of used packing material:
Unsoiled polyethylene (PE) wrapping film (not mixed with other plastic material) and sacks are recycled externally. The reusable wooden pallets are recycled within the construction industry.

2.10 Condition of use

Knauf Uniflott is a special gypsum-based synthetically enhanced filler for hand filling joints of drywall systems. There is no change in the chemical composition during use.

2.11 Environment and health during use

During installation dust formation, contact with skin and eyes should be avoided. There are no dangerous reactions with other substances known under normal conditions of use.

2.12 Reference service life

There was no reference service life determined according to *ISO 15686-1*. However, a reference service life of 50 years can be considered for gypsum joint compounds according to the *Guideline for Sustainable Building BBSR2017* code number 345.211. There are no influences on the ageing of joint compound Knauf Uniflott during use following the established engineering practice.

2.13 Extraordinary effects

Fire

The reaction to fire Knauf Uniflott is classified as follows according to *EN 13501:1*

Fire protection

Name	Value
Building material class	A1

A1 = non-combustible, no contribution to fire (degree of flammability)

Water

The product is intended for indoor use only. A permanent moisture penetration must be avoided. A temporary moisture penetration will lead to lower structural strength, which will recover after drying. Therefore Knauf Uniflott can be used in domestic wet rooms (bath and kitchen).

Mechanical destruction
There is no mechanical strain during the service life of the building. Due to indoor use, there are no consequences for the environment because of unforeseen mechanical destruction.

2.14 Re-use phase
Since Knauf Uniflott cannot be removed from the substrate without damage it is not suited for re-use.

2.15 Disposal
Knauf Uniflott must be disposed of in compliance with the following waste codes of the *European Waste Catalogue EWC*.

10 01 06 – calcium-based reaction wastes from flue-gas desulphurization in solid form
17 08 02 – gypsum-based construction materials other than this mentioned in 17 08 01

Both are non-hazardous wastes.

Due to low layer thicknesses, the separation from the substrate may be difficult. Therefore, the waste code for the substrate is defined and has to be chosen. The material itself is qualified for disposal in landfills with the German landfill class DK 1 according to the *Landfill Ordinance*. However, national regulations for disposal have to be observed.

2.16 Further information
Further information about jointing compound Knauf Uniflott, e.g., technical datasheets or material safety data sheets are available at www.knauf.de

3. LCA: Calculation rules

3.1 Declared Unit
The declared unit is 1 kg Knauf Uniflott (powder product not mixed with water) with a gross density of 2,7 g/cm³. This applies to modules A1-A3 (+A4).
Since there are 0,1153 kg water of crystallization added in module A5, the EPD applies to 1,1153 kg hydrated material in modules A5-C4.

Declared unit and mass reference

Name	Value	Unit
Declared unit	1	kg
Gross density	≥ 2700	kg/m^3

3.2 System boundary
Type of the EPD: cradle to gate – with options, modules C1 – C4, and module D (A1-A3 + C + D, additional modules A4, A5)
This Environmental Product Declaration according to EN 15804 contains:

- Provision of raw materials and transport to plant, production of gypsum binders and mixing of the product (A1 - A3) including thermal energy for calcination and drying, as well as electricity (geographic scope DE)
- Transport to building site (A4)
- Installation at building site (A5) including the incineration of transport packaging.
- Disassembly (C1)
- Transport to recycling facility or landfill site (C2) Landfilling at end of life (C4)
- Credits in D from incineration of packaging material in A5

3.3 Estimates and assumptions
For modelling the life cycle of Knauf Uniflott, the residual electricity mix for Germany has been chosen.

Some raw materials were not available in the used LCA calculator. Some of them have been substituted with chemically similar substances. Few additives have been allocated to missing auxiliaries for worst-case assumption (<0,05 % w/w). Transport to the building site (module A4) as well as transport from the building site to landfill (module C2) is calculated with a standard distance of 100 km. This way, the user of the Environmental Product Declaration can convert the distances of modules A4 and C2 to the specific distance by extrapolation.

3.4 Cut-off criteria
All raw materials for the manufacturing of joint filler Knauf Uniflott, the required energy, water and the resulting emissions are considered in the life cycle assessment. That way, recipe components with a share even smaller than 1 % are included. Cut-off rules as required by *EN 15804+A2* are respected. The environmental impacts imposed by these cut-offs are considered neglectable. All neglected processes contribute less than 5 % to the total mass or less than 5 % to the total energy consumption.

3.5 Background data
For modelling the BV Gips LCA tool provided by *Sphera* Solutions GmbH has been used. Front-End version 6.0.0.5813fbc. Back-End version 6.0.0.925.9dc8212 from 2023-02-01.

3.6 Data quality
The LCA of the jointing compound Knauf Uniflott is modelled by using the BV Gips LCA tool provided by *Sphera*. For materials without a direct match in the tool expert judgements are applied, or the missing additives have been allocated to missing auxiliaries as a worst-case assumption. The total influence of these neglected inputs is expected to be lower than 5 % of energy usage and mass.

With respect to technological, geographic and time representativeness, the overall data quality is evaluated to be 'good'.

3.7 Period under review
The modelling of Knauf Uniflott is based on data from the production year 2022. Different powder materials are produced in the manufacturing plant. The total energy for the year 2022 has been measured and allocated to the production of Knauf Uniflott involving mixing time, production and raw material amounts.

3.8 Geographic Representativeness
Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Global

3.9 Allocation
Allocations in the foreground data have only been applied for energy data which is monitored on an annual basis for the whole manufacturing plant. The energy was allocated by taking production amounts and mixing times into account.

3.10 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. The used background database is GaBi ts (SP40).

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in accompanying packaging	0.0037	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO2.

Transport to the building site (A4)

For transport, a standard distance of 100 km by truck is assumed. This declaration facilitates the extrapolation of the results in A4 to the real distance on building level.

Name	Value	Unit
Transport distance	100	km
Capacity utilisation (including empty runs)	60	%
Gross density of products transported	≥ 2700	kg/m^3

Installation into the building (A5)

Since Knauf Uniflott is only installed by hand, there is no electricity consumption in module A5.
The packaging material, re-usable wooden pallets and PE-film, are incinerated. The credits from this process are reported in module D.

Name	Value	Unit
Water consumption	1.1E-07	m^3
Output substances following waste treatment on site	0.011	kg

Reference service life

Name	Value	Unit
Life Span (according to BBSR)	50	a

End of life (C1-C4)

The disassembly (C1) of Knauf Uniflott from the building is considered to be done 100 % manually. For the transport (C2) from the demolition site to the landfill by truck, a distance of 100 km was assumed in the calculation.

Name	Value	Unit
Collected separately waste type	1.1153	kg
Landfilling	1.1153	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information: Module D contains only credits for exported energy from incineration of packaging material.

5. LCA: Results

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

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	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg Knauf Uniflott

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	1.5E-01	8.84E-03	1.75E-02	0	8.75E-03	0	2.39E-02	-7.53E-03
GWP-fossil	kg CO_2 eq	1.7E-01	8.45E-03	4.37E-03	0	8.36E-03	0	1.52E-02	-7.51E-03
GWP-biogenic	kg CO_2 eq	-2.03E-02	3.91E-04	1.31E-02	0	3.86E-04	0	8.7E-03	-1.76E-05
GWP-luluc	kg CO_2 eq	5.4E-04	2.01E-07	3.34E-07	0	1.99E-07	0	4.37E-05	-5.26E-06
ODP	kg CFC11 eq	6.1E-11	8.92E-19	3.44E-18	0	8.83E-19	0	5.62E-17	-7.84E-17
AP	mol H^+ eq	2.61E-04	8.46E-06	3.46E-06	0	8.37E-06	0	1.09E-04	-1.05E-05
EP-freshwater	kg P eq	1.77E-06	1.81E-09	1.89E-09	0	1.79E-09	0	2.6E-08	-9.69E-09
EP-marine	kg N eq	1.03E-04	2.69E-06	1.15E-06	0	2.66E-06	0	2.8E-05	-2.72E-06
EP-terrestrial	mol N eq	9.14E-04	2.99E-05	1.59E-05	0	2.96E-05	0	3.08E-04	-2.91E-05
POCP	kg NMVOC eq	2.35E-04	7.61E-06	3.1E-06	0	7.53E-06	0	8.48E-05	-7.81E-06
ADPE	kg Sb eq	3.27E-08	2.53E-10	5.32E-11	0	2.51E-10	0	1.36E-09	-1.23E-09
ADPF	MJ	3.02E+00	1.2E-01	5.57E-03	0	1.19E-01	0	1.99E-01	-1.27E-01
WDP	m^3 world eq deprived	2.58E-02	1.66E-05	7.09E-03	0	1.64E-05	0	1.59E-03	-7.79E-04

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; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg Knauf Uniflott

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	5.15E-01	3.78E-04	1.43E-01	0	3.74E-04	0	2.61E-02	-2.78E-02
PERM	MJ	1.42E-01	0	-1.42E-01	0	0	0	0	0
PERT	MJ	6.57E-01	3.78E-04	1.05E-03	0	3.74E-04	0	2.61E-02	-2.78E-02
PENRE	MJ	2.96E+00	1.2E-01	7.08E-02	0	1.19E-01	0	1.99E-01	-1.27E-01
PENRM	MJ	6.52E-02	0	-6.52E-02	0	0	0	0	0
PENRT	MJ	3.02E+00	1.2E-01	5.57E-03	0	1.19E-01	0	1.99E-01	-1.27E-01
SM	kg	6.32E-01	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	7.9E-04	6.78E-07	1.66E-04	0	6.71E-07	0	5.02E-05	-3.22E-05

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 – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg Knauf Uniflott

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	1.31E-06	1.16E-11	9.49E-12	0	1.15E-11	0	3.03E-09	-5.08E-11
NHWD	kg	1.18E-03	1.23E-05	6.56E-04	0	1.21E-05	0	1E+00	-5.89E-05
RWD	kg	5.57E-05	1.29E-07	2.82E-07	0	1.27E-07	0	2.26E-06	-9.51E-06
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	3.18E-02	0	0	0	0	0
EET	MJ	0	0	5.73E-02	0	0	0	0	0

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 electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 kg Knauf Uniflott

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	6.26E-09	4.45E-11	2.32E-11	0	4.4E-11	0	1.35E-09	-8.93E-11
IR	kBq U235 eq	7.67E-03	1.84E-05	4.24E-05	0	1.82E-05	0	2.32E-04	-1.56E-03
ETP-fw	CTUe	9.42E-01	8.5E-02	3.1E-03	0	8.4E-02	0	1.14E-01	-2.75E-02
HTP-c	CTUh	3.48E-11	1.6E-12	1.75E-13	0	1.58E-12	0	1.68E-11	-1.19E-12
HTP-nc	CTUh	1.66E-09	6.83E-11	1.14E-11	0	6.76E-11	0	1.86E-09	-4.42E-11
SQP	SQP	2.83E+00	3.08E-04	1.46E-03	0	3.05E-04	0	4.15E-02	-2E-02

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

This EPD was created using a software tool.

6. LCA: Interpretation

In general, the highest environmental impacts of Knauf Uniflott result from the product stage A1-A3. An exception is non-hazardous waste disposed, NHWD. For this indicator, module C4 and the disposal of the joint filler at an inert landfill lead to the highest overall contributions.

Regarding modules A1-A3, major contributions result from the provision of raw materials by at least 24 % to the overall life cycle impacts of the product. Exceptions are GWP-total (approx. 27 %) GWP-fossil (approx. 32 %), total use of renewable primary energy resources PERT (approx. 41 %), non-hazardous waste disposed NHWD (approx. <1 %), radioactive waste disposed RWD (approx. 51%) and potential soil quality index SQP (approx. 35 %).

The non-hazardous waste disposed NHWD, is dominated by the disposal C4 with almost 99 %. This was expected since there is no recycling at the end of life but a complete landfilling.

The landfilling in C4 contributes also considerably to the impact categories acidification potential AP (approx. 29 %), eutrophication potential marine EP-marine (approx. 21 %), eutrophication potential terrestrial EP-terrestrial (approx. 24 %) and formation potential of tropospheric ozone photochemical oxidants POCP (approx. 26 %).

Transports in A4 and C2 cause only minor contributions to the overall life cycle impacts, due to assumed distances of 100 km in both modules.

Some small credits given in module D result from the incineration and recycling of packaging only. The disassembled product is landfilled after disassembly.

7. Requisite evidence

7.1 Leaching (sulfates and heavy metals)
The joint filler Knauf Uniflott shows a leaching behaviour typical for gypsum-based building products *Dre2006*. Thus, sulphates are leached in the saturation region (complexometric titration according to *DIN 38404-5:1985*). That is why disposal is only allowed in landfills from landfill category 1 in Germany *DepV2009*. Heavy metal concentrations were verified (by ICPOES according to *ISO 11885:2007*) significantly below the assignment criteria according to landfill category 1 complying with *DepV2009*. Joint fillers are classified in water hazard class 1 (slightly water hazardous) AwSV.

7.2 Radioactivity
According to Geh2012 and RP 112 dose values and radon concentrations of gypsum-based building products are below 0.3 mSv/a. Thus, they can be used without restrictions.

7.2 VOC emission

According to the emission test from *Eurofins Product Testing A/S*, no hazardous substances are emitted above permissible thresholds during use *Eurofins2021*.

Test after 3 days (limit value)

Name	Value	Unit
TVOC	≤ 10	mg/m³
Total carcinogens	< 0,01	mg/m³

Test after 28 days (limit value)

Name	Value	Unit
TVOC	≤ 1.0	mg/m³
TSVOC	≤ 0.1	mg/m³
R-value (dimensionless)	≤ 1	
Sum of VOC without NIK/LCI	≤ 0.1	mg/m³
Formaldehyde	≤ 0.1	mg/m³
Total carcinogens	≤ 0.001	mg/m³

VOC emission tests showed that Knauf Uniflott significantly undercuts the required thresholds.

8. References

Standards

DIN 18180
DIN 18180:2014-09, Gypsum plasterboards – Types and requirements

EN 520
EN 520:2009-12, Gypsum plasterboards – Definitions, requirements and test methods

EN 13279
EN 13279-1:2008, Gypsum binders and gypsum plasters - Part 1: Definitions, and requirements

EN 13501
EN 13501-1:2018 Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests

EN 13963
EN 13963 :2014, Jointing materials for gypsum boards Definitions, requirements and test methods

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

EN 15804
EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 9001
EN ISO 9001:2015, Quality management systems - Requirements

ISO 15686
ISO 15686-1:2011: Buildings and constructed assets -- Service life planning - Part 1: General principles and framework

ISO 45001
ISO 45001:2018, Occupational health and safety management systems – Requirements with guidance for use

ISO 14025
EN ISO 14025:2006, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

ISO 50001
EN ISO 50001:2018, Energy management systems – Requirements with guidance for use

Further References

AwSV
Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen 1,2 (AwSV) 18.04.2017 vom Bundesministerium der Justiz

BBSR2017
Service life of building components for life cycle analyses acc. to the Sustainable Building Assessment System (BNB) -- Nutzungsdauer von Bauteilen für Lebens-zyklusanalysen nach Bewertungssystem Nachhaltiges Bauen (BNB) 2017-02-24 vom Bundesinstitut für Bau-, Stadt-, Raumforschung (BBSR)

BDSH2013
Bauschäden durch Hochwasser – Tipps für die Sanierung (Flood damage - tips for recovery), instruction sheet, Knauf Gips KG (editor), Iphofen, 2013, www.knauf.de

Bericht BfS
Natürliche Radioaktivität in Baumaterialien und die daraus resultierende Strahlenexposition Fachbereich Strahlenschutz und Umwelt Gehrcke, K.; Hoffmann, B.; Schkade, U.; Schmidt, V.; Wichterey, K; Bundesamt für Strahlenschutz Salzgitter, November 2012 http://nbn-resolving.de/urn:nbn:de:0221-201210099810

BG RCI
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