ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	**Hilti AG**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-HIL-20200023-IAA1-EN
Issue date	02.06.2021
Valid to	01.06.2026

Hilti HIT-CT 1

Hilti AG

Institut Bauen und Umwelt e.V.

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ECO PLATFORM EPD EN 15804 VERIFIED

SAFEset

1. General Information

Hilti AG

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

Declaration number
EPD-HIL-20200023-IAA1-EN

This declaration is based on the product category rules:
Reaction resin products, 07.2014
(PCR checked and approved by the SVR)

Issue date
02.06.2021

Valid to
01.06.2026

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

Dr. Alexander Röder
(Head of Board IBU)

Hilti HIT-CT 1

Owner of the declaration
Hilti AG
Feldkircher Str. 100
FL-9494 Schaan
Liechtenstein

Declared product / declared unit
The declared product is a HILTI injection mortar HIT-CT 1. The declared unit is one kilogram of reaction resin product in the mixing ratio of the two components necessary for processing. The packaging is also included in the calculation. The declared unit is stated in [kg].

Scope:
This document refers to the injection mortar HIT-CT 1 with its packaging. For the compilation of the life cycle assessment, specific data were collected from the factory Kaufering, in Germany, of the HILTI AG. Data from the year 2018 are used, which correspond to the annual average.

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

Patricia Wolf
(Independent verifier appointed by SVR)

2. Product

2.1 Product description / Product definition

Hilti HIT-CT 1 involves a dual-component injection system. The resin component comprises a vinyl ester resin mixture as well as mineral and cement-like fillers. The curing agent component comprises an aqueous dibenzoyl peroxide dispersion and mineral fillers. Combining the resin and curing agant components in a static mixer causes curing. The hybrid system formed during cement and resin curing results in a product of particular long-term stability.

For the placing of the product on the market in the European Union *European Free Trade Association* EU/EFTA) (with the exception of Switzerland) the Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration the European Technical Approvals *ETA-11/0354* and *ETA-11/0390* and the CE-marking. For the application and use the respective national provisions apply.

2.2 Application

Hilti HIT-CT 1 serves for safely securing threaded rods and post-installed rebar connections in dry and damp concrete. Is it approved alos for anchoring in uncracked and cracked concrate situations.

Rebar connections of up to 25 mm can be carried out. For anchoring sizes up to 24 mm can be used.

Hilti HIT-CT 1 is a component of the Hilti SAFEset concept. Hilti SAFEset is a combination of wall plug system components which improve the robustness of fastenings and reduce the possibilities of error during installation.

HIT-CT1 is a high-performance injectable mortar for rebar applications and anchoring fastenings in concrete, it is formulated to minimize health hazards.

2.3 Technical Data

Bautechnische Daten

Name	Value	Unit
Density according to DIN 51757 for mixing both components	1840	kg/m³
Compressive strength according to ISO 604	70	N/mm²
Elastic modules (pressure) according to ASTM D695	1520	N/mm²
Tensile shear strength according to EN 14293	not relevant	N/mm²
Tensile bond strength according to EN 14293	not relevant	N/mm²

Hilti HIT-CT 1 displays the following characteristics:

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to
ETA-11/0354
ETA-11/0390 (European Technical Approvals)

Shelf life of 9 months:
Container temperature during use:
+5 to +40 °C
Substrate temperature during installation:
-5 to +40 °C (internal method)

Open time:

-5 to 0 °C	60 min
+1 to +5 °C	40 min
+6 to +10 °C	25 min
+11 to +20 °C	10 min
+21 to +30 °C	4 min
+31 to +40 °C	2 min

(internal method)

Cure time:

-5 to 0 °C	6 h
+1 to +5 °C	3 h
+6 to +10 °C	2 h
+11 to +20 °C	90 min
+21 to +30 °C	75 min
+31 to +40 °C	60 min

(internal method)

Hilti HIT-CT 1 is stable in terms of a variety of chemical environmental factors (internal method).

2.4 Delivery status

The product Hilti HIT-CT 1 is available in foil-packages with a total of 330 ml and 500 ml injectable mortar in the corresponding mixing ratio.

2.5 Base materials / Ancillary materials

Hilti HIT-CT 1 is supplied in the form of a dual-component film-wrapped pack comprising a resin component and a curing agent component at a volume ration of 3:1. The mixing ratio of resin and curing agent components is automatically set during the squeezing process. Product curing commences directly after the components are mixed.
The product reviewed contains the following component volumes:

Resin component:

Vinyl ester resin mixture:	30 to 40% by weight
Mineral fillers:	40 to 50% by weight
Cement:	10 to 20% by weight
Other:	< 5% by weight

Curing agent component:

Mineral fillers:	40 to 60% by weight
Aluminium oxide:	15 to 25% by weight
Water:	15 to 25% by weight
Dibenzoyl peroxide:	< 1% by weight
Other:	< 5% by weight

This product article contains substances listed in the ECHA candidate list (date: 28.01.2021) exceeding 0.1 percentage by mass: no

This product contains other CMR 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 (EU) Ordinance on Biocide Products No. 528/2012): no

2.6 Manufacture

All raw materials are sourced from Europe. The transport is exclusively by truck. Certain materials go through the required production steps at the supplier, before the final production of the injection mortar in Kaufering.
Chemical mortars are usually two-component systems consisting of a binder and a hardener. The production of chemical mortars consists of a mixing process and a filling process of the respective single components (binder and hardener) and their subsequent union to a two-component system (container). During the mixing process control technology is used to weigh and mix solid and liquid compounds according to specification. In the next step both well-mixed components run through an automized filling line in which each of the processed masses is filled into a tubular foil bag. Finally the single components are united in one container. The two-pack foil bags are packed into cardboard boxes and then finally shippd.
The manufacturing plant of HIT-CT 1, Hilti GmbH Industriegesellschaft für Befestigungstechnik, Hiltistr. 6, 86916 Kaufering, Germany, is certified according to *ISO 9001*. The guideline defines international standards for quality and process management.
The following flowcharts illustrate the underlying information modules.

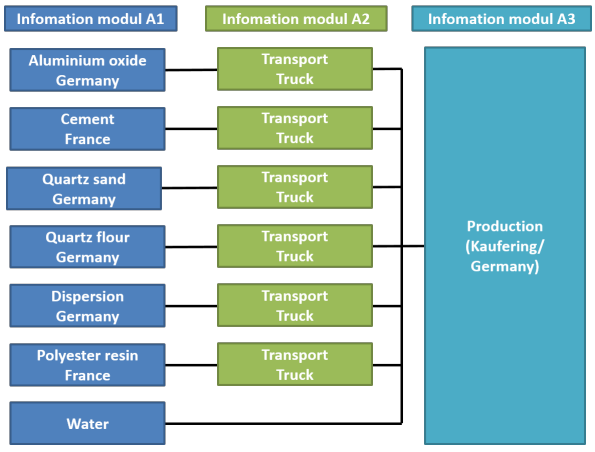

Illustration: Information moduls of the reaction resin mixture

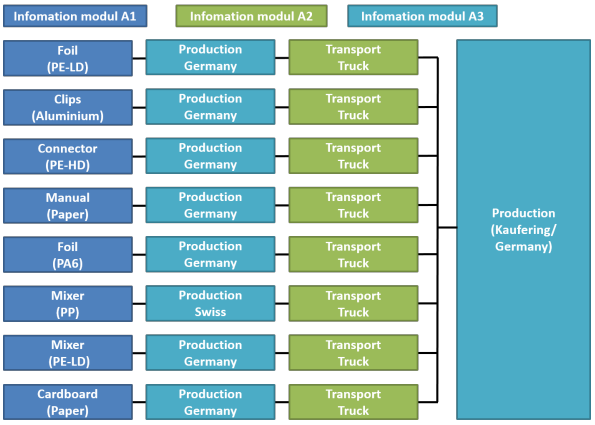

Illustration: Information modulsof the packaging

2.7 Environment and health during manufacturing

The manufacturing plant of HIT-CT 1, Hilti GmbH Industriegesellschaft für Befestigungstechnik, Hiltistr. 6, 86916 Kaufering, Germany, is certified according to *ISO 14001*. The two guidelines define international standards for quality and process management as well as for sustainable environmental management. The production site is also certified in accordance with *DIN EN ISO 50001* Energy Management Systems.

2.8 Product processing/Installation

The product is delivered with instructions for use explaining the basic steps for installation:

1) For safe handling the precautionary measures described in the safety data sheet (SDS) (e.g. hand and eye protection) must be adhered to
2) Insert the cartridge into the black cassette
3) Screw on the mixing nozzle
4) Put the cassette into the dispenser system
5) Discard the first trigger pulls
6) Fill 2/3 of the borehole with mortar
7) Set the fixing element

After mixing the components and squeezing the mortar into the borehole the fixing element has to be set within the working time mentioned in the instructions for use. After the curing time, described as well in the instructions for use, the mortar is ready to take up loads.

2.9 Packaging

Hilti HIT-CT 1 is supplied in the form of a 2-foil-pack system and thus leads to very little waste remaining after use on the construction site. After curing, the product can be disposed of with household waste. Full or only partially emptied cartridges must be disposed of as special waste in accordance with official regulations.
The outer packaging consisting of PE foil and cardboard boxes designed according to the product size can be recycled. Packaging contaminated by the product must be disposed in a safe manner in accordance with local/national regulations.

2.10 Condition of use

During the installation the temperature of the base material must be between -5°C and +40°C. The temperature of the product should be between 5 - 25 °C during storage and 5 - 40°C during usage. Hilti literature and official approvals must always be considered. The two components of HIT-CT 1 are only for use in combination with the defined volume ratio and under these conditions mentioned above to build up a cross-linked filled duromer.

2.11 Environment and health during use

Refer to the Safety Data Sheet (SDS) for detailed information on handling, storage as well as first aid, firefighting and accidental release measures and disposal considerations. Following the given instructions helps to minimize the risk for health and environment. Due to its special composition the product permits safe working conditions in most cases.

2.12 Reference service life

Hilti HIT-CT 1 is exposed to a wide variety of environmental factors during the use phase. The anticipated Reference Service Life depends on the specific installation situation and the exposure associated with the product. The main factors influencing the period of use involve weathering as well as mechanical and chemical loads.

Description on the influences on the ageing of the product when applied in accordance with the rules of technology.

2.13 Extraordinary effects

Fire

Even without any special fire safety features the Injection Systems comply with at least the requirements of the *EN 13501-1* standard for fire classes E and Efl. As cross-linked methacrylate resins do not melt or drip, the resins do not contribute towards spreading fire. Apart from the common combustion produces carbon monoxide and carbon dioxide, fire gases can contain traces of methyl methacrylate, esters, alcohol, and hydrocarbons. Due to the quantities used, they only have a subordinate influence on the fire characteristics of a building structure in which they have been installed.

Safety in case of fire

Name	Value
Building material class	E/Efl
Burning droplets	No performance assessed
Smoke gas development	No performance assessed
Reaction to fire	Anchorages satisfy requirements for class A1
Resistance to fire	No performance assessed

Water

The cured product is chemically inert and insoluble in water. HIT-CT 1 is certified for use as an anchoring adhesive in concrete for water treatment applications according to *NSF*.

Mechanical destruction
It is recommended to use dust protection during demolition of the cured chemical anchor.

2.14 Re-use phase
The product cannot be re-used. After usage the product can be removed by demolition.

2.15 Disposal
Uncured Hilti HIT-CT 1 can be disposed according to the *European waste code* 08 04 09* or 20 01 27*. The built-in cured anchor can be disposed as construction waste for which the European waste code 17 01 01 applies.

2.16 Further information
Further information is available on request under anchor.hse@hilti.com and on the Hilti website: www.hilti.group

3. LCA: Calculation rules

3.1 Declared Unit
The declared product is a HILTI injection mortar HIT-CT 1. The declared unit refers to one kilogram of reaction resin product in the required mixing ratio of the two components. The packaging of 0,1169 kg is also included in the calculation. The following table shows the data of the declared unit.

Declared unit

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

3.2 System boundary
Type of EPD is cradle to gate. The following information modules are defined as system boundaries in this study:

A1- A3 product stage:
- A1 Raw material supply,
- A2 Transport to the manufacturer,
- A3 Production.

In order to grasp exactly the indicators and environmental impacts of the declared unit, a total of three information modules are considered. The information modules A1 to A3 describe the material supply, the transport to the production site, as well as the production process of the product itself.

3.3 Estimates and assumptions
The electricity mixes and other background data are calculated country-specifically for the production processes.
For certain datasets, assumptions were made as part of this calculation.

3.4 Cut-off criteria
All information modules considered were included in the calculation in such detail that all requirements of *EN 15804* are met. The material consumption of the Euro pallets used for transport is less than 5% by weight due to their re-use and therefore falls below the cut-off criterion of the total calculation.

3.5 Background data
The following link documents the background data of the *GaBi 9.2 databases* (SP 40), to which this study also refers. *Thinkstep*

3.6 Data quality
For the compilation of the life cycle assessment, specific data were collected from the factory Kaufering, in Germany, of the HILTI AG from the year 2018. The background data from the *GaBi 9.2 database* used is from the year 2018 and thus of high relevance.
The mass of the different components of the reactive resin mixture come from the information to the recipe. The data quality is classified as appropriate.

3.7 Period under review
Data from the year 2018 are used, which correspond to the annual average.

3.8 Allocation
Allocation of co-products takes place in the information modules A1-A3.
The production waste of the injection-moulded components is thermally recovered. The electrical and thermal energy credits resulting therefrom are completely charged in module A3.

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.

The used background database has to be mentioned. The background data is given by GaBi 9.2 databases (SP 40), to which this study refers. *Thinkstep.*

4. LCA: Scenarios and additional technical information

Since the information modules A1 to A3 are considered in this study, no information is provided on LCA scenarios and other technical information.

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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 kg HIT-CT 1

Parameter	Unit	A1-A3
Global warming potential	[kg CO_2-Eq.]	1.40
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	6.57E-9
Acidification potential of land and water	[kg SO_2-Eq.]	2.27E-3
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	4.38E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	3.61E-4
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.56E-6
Abiotic depletion potential for fossil resources	[MJ]	3.16E+1

RESULTS OF THE LCA - RESOURCE USE: 1 kg HIT-CT 1

Parameter	Unit	A1-A3
Renewable primary energy as energy carrier	[MJ]	2.70
Renewable primary energy resources as material utilization	[MJ]	0.86
Total use of renewable primary energy resources	[MJ]	3.56
Non-renewable primary energy as energy carrier	[MJ]	22.95
Non-renewable primary energy as material utilization	[MJ]	9.64
Total use of non-renewable primary energy resources	[MJ]	32.59
Use of secondary material	[kg]	0.00
Use of renewable secondary fuels	[MJ]	0.00
Use of non-renewable secondary fuels	[MJ]	0.00
Use of net fresh water	[m^3]	6.03

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 kg HIT-CT 1

Parameter	Unit	A1-A3
Hazardous waste disposed	[kg]	8.19E-8
Non-hazardous waste disposed	[kg]	2.82E-2
Radioactive waste disposed	[kg]	4.00E-4
Components for re-use	[kg]	0.00
Materials for recycling	[kg]	0.00
Materials for energy recovery	[kg]	0.00
Exported electrical energy	[MJ]	0.00
Exported thermal energy	[MJ]	0.00

All indicators are collected in accordance with *EN 15804*. The impact assessment of environmental categories is carried out according to *CML 2001 Apr. 2015*. The SM is the use of secondary material in paper production.

6. LCA: Interpretation

The dominance analysis shows that the main causes of environmental impacts and indicators can be found in the information module A1. This shows the global warming potential for the provision of material with about 91%, based on all information modules.

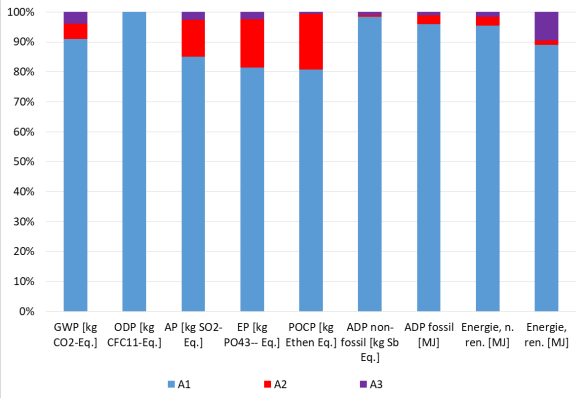

Illustration: Dominance analysis A1- A3

In the information module A1, the material supply of the reaction resin mixture causes about 85% of the global warming potential. Approx. 6% of the greenhouse gas emissions occur with PA6. Despite its low mass, aluminum has a share of about 5% in AP.

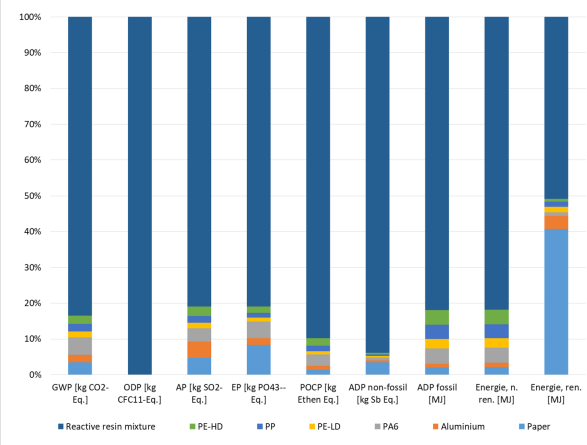

Illustration: Dominance analysis A1

Considering the material supply for the reaction resin mixture in detail, it becomes clear that two raw materials of the reaction resin mixture contribute decisively to the respective environmental effects and indicators. The material supply of the polyester resin generates about 75% of the greenhouse gas emissions. For cement, it is about 11% greenhouse gas emissions. With aluminum oxide, it is particularly striking that almost 100% of the ODP is produced.

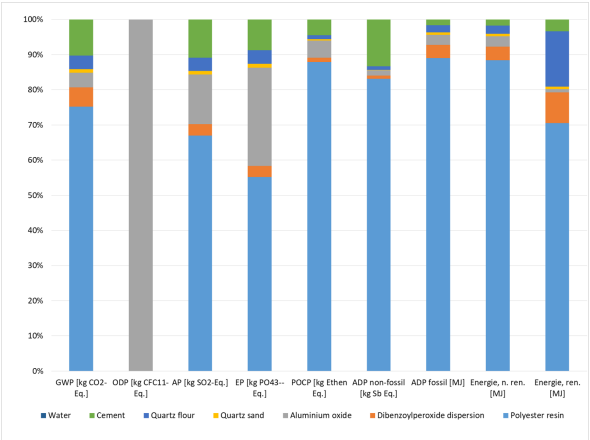

Illustration: Dominance analysis A1, reaction resin mixture

The mass of the individual components of the reaction resin mixture come from the recipe information provided by the manufacturer. According to the manufacturer, this information can be assumed to be highly accurate.

The relevant datasets used to calculate the material availability of the product are highly topical (DE: polyester resin: Thinkstep, year: 2018, EU-28: cement: source: Thinkstep, year: 2018).

Since these datasets strongly influence the results, as shown by the dominance analysis, so does the overall computation.

7. Requisite evidence

Hilti HIT-CT 1 complies with the requirements of

- *DIBt (2010)* in combination with the NIK values from *AgBB (2015)* for applications in interior areas,

- emission class A+ outlined in the *French VOC Directives* in accordance with the *Eurofins attestation*,

both in accordance with the *Eurofins test report*, *No. 392-2016-00125701.*

DIBt/AgBB overview of results (28 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16)	< 1000	µg/m³
Sum SVOC (C16 - C22)	< 100	µg/m³
R (dimensionless)	< 1	-
VOC without NIK	< 100	µg/m³
Carcinogenic Substances	< 1	µg/m³

DIBt/AgBB overview of results (3 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16)	< 10000	µg/m³
Carcinogenic Substances	< 10	µg/m³

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

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

AgBB (2015)
Vorgehensweise bei der gesundheitlichen Bewertung der Emissionen von flüchtigen organischen Verbindungen (VVOC, VOC und SVOC) aus Bauprodukten (Februar 2015)

ASTM D695
ASTM D695: 2015-00: Standard Test Method for Compressive Properties of Rigid Plastics

CML 2001 Apr. 2015
https://www.universiteitleiden.nl/
(05.09.2019)

DIBt (2010)
Grundsätze zur gesundheitlichen Bewertung von Bauprodukten in Innenräumen (Oktober 2010)

DIN EN 13501-1
Klassifizierung von Bauprodukten und Bauarten zu ihrem Brandverhalten

DIN EN 14293
Klebstoffe - Klebstoffe für das Kleben von Parkett auf einen Untergrund - Prüfverfahren und Mindestanforderungen

DIN 51757
DIN 51757:2011-01: Testing of mineral oils and related materials – Determination of density

DIN EN ISO 50001
DIN EN ISO 50001: 2018 Energy management systems - Requirements with guidance for use

ETA-11/0354
European Technical Approval Hilti HIT-CT 1

ETA-11/0390
European Technical Approval Hilti HIT-CT 1

Eurofins test report, No. 392-2016-00125701
VOC test report for verification of compliance with DIBt(2010)/AgBB(2015) and the French VOC directive from May 2011

European Waste code
in accordance with the European Waste Catalogue (EWC) (EWC 2014/955/EU) Commission Decision amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council

French VOC Directives
Décret no 2011-321 du 23 mars 2011 relatif à l'étiquetage des produits de construction ou de revêtement de mur ou de sol et des peintures et vernis sur leurs émissions de polluants volatils

Arrêté du 19 avril 2011 relatif à l'étiquetage des produits de construction ou de revêtement de mur ou de sol et des peintures et vernis sur leurs émissions de polluants volatils

GaBi 9.2 Software Ganzheitliche Bilanzierung
http://www.gabi-software.com/deutsch/index/
(15.06.2020)

ISO 604/
DIN EN ISO 604:2003-12: Determination of compressive properties

ISO 9001
ISO 9001:2015 Quality management systems - Requirements

ISO 14001
ISO 14001:2015 Environmental management systems - Requirements with guidance for use

NSF
NSF/ANSI/CAN 61 Drinking Water System Components - Health Effects

Product Category Rules, Part B
Reaction resin products, 07.2014

Thinkstep
http://www.gabi-software.com/deutsch/index/
(15.062020)

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