

# ENVIRONMENTAL PRODUCT DECLARATION

according to ISO 14025 and EN 15804

Declaration owner	Saint-Gobain Isover G+H AG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-SGI-2016 0162-CAA1-DE
Date of issue	20/12/2016
Valid until	19/12/2021

## Unlaminated ULTIMATE Plates and Felts Saint-Gobain Isover G+H AG

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## General Information

### Saint-Gobain Isover G+H AG

**Programme holder**

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**Declaration number**

EPD-SGI-2016 0162-CAA1-DE

**This declaration is based on the product category rules:**

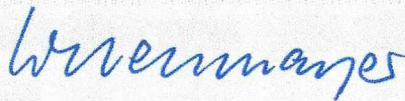
Mineral insulation materials, 07/2014  
(PCR tested and approved by the independent council of experts)

**Date of issue**

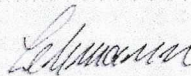
20/12/2016

**Valid until**

19/12/2021



Prof. Dr. Horst J. Boss Mayer  
(President of the Institut Bauen und Umwelt e.V.)



Dr. Burkhardt Lehmann  
(IBU Managing Director)

### Unlaminated ULTIMATE Plates and Felts

**Declaration owner**

Saint-Gobain Isover G+H AG  
Bürgermeister-Grünzweig-Straße 1  
D-67059 Ludwigshafen

**Declared product/declared unit**

1 m<sup>3</sup> unlaminated or uncoated artificial resin-bonded Ultimate insulation material from ISOVER in the bulk density range from 16 to 100 kg/m<sup>3</sup>. In addition, the environmental impacts of 3 laminations are presented in the Annex based on an area of 1 m<sup>2</sup>.

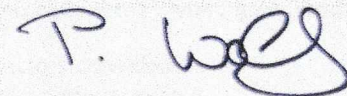
**Scope:**

The ecobalance described in the EPD refers to the life cycle of unlaminated or uncoated resin-bonded Ultimate mineral wool from ISOVER. Since the insulating materials can be supplied with lamination or coating, the Annex to this EPD provides the ecologically balanced parameters for specific calculation of laminated/coated product variants. Ultimate mineral wool is manufactured at the factory in Luebz/Germany, the production data on which the ecobalance is based are from the year 2013. The ecobalance thus represents 100% of the Ultimate mineral wool produced by ISOVER. The owner of the declaration assumes liability for the underlying data and evidence; the IBU assumes no liability of for the manufacturer-provided information, ecobalance data and evidence.

**Verification**

The CEN Standard /EN 15804/ serves as a core PCR Verification of the EPD by an independent third party as per /ISO 14025/

Internal  external



Patricia Wolf,  
Independent Analyst, retained by SVR

## Product

**Product description**

The declared mineral wool material comprises unlaminated Ultimate plates and felts acc. to /EN 13162:2012+A1:2015 Thermal Insulation Materials for Buildings - Factory-Produced Mineral Wool (MW) Products - Specification/.

Ultimate is a mineral wool insulation material comprised chiefly of monofil artificial mineral fibres with a non-crystalline structure obtained from a siliceous melt. The average fibre diameter is 3 - 6 µm. The length of the fibres can reach several centimetres. The definition of mineral wool acc. to /CLP/ is: Artificial mineral fibres with random orientation comprising vitreous (silicate) fibres with a mass content of sodium, potassium, calcium, magnesium and barium oxides exceeding 18%.

**Application**

In principle, mineral wool applications are differentiated as being either in/on buildings (roof, wall, floor or ceiling insulation; interior and exterior) or technical insulation applications. The individual areas of application are listed below:

- Heat, cold, noise and fire protection in building construction, e.g. insulating material for roofs (steep and flat roofs, twin-wall sheet metal roofs), exterior walls (composite thermal insulation systems, twin-wall masonry, ventilated curtain facades, walls between houses, timber frame construction, industrial construction coffered walls, interior walls (light partition walls and wall facings), floors (sound and thermal insulation of floating screeds, top floor ceilings, wooden beam ceilings), ceilings (underground garage

- and cellar ceilings, industrial ceilings, sound-absorbing ceilings)
- Building technology (insulation of heating and hot water pipes, cable and pipe ducts, air-conditioning ducts, ventilation ducts)
- Operating technology (insulation of pipelines, district heating pipelines, boilers, tanks and equipment)
- Industrial processing (air conditioning ducts, fire doors, prefabricated house elements and chimney systems, solar systems, automotive applications)
- Fire protection elements (cable insulation and for steel construction elements)

### Technical Data

Designation	ULTIMATE	Unit	Test regulation
Thermal conductivity	31 -39	W/(mK)	/EN 12667/
Rated thermal conductivity	32 - 40	W/(mK)	/DIN 4108-4/
Water vapour diffusion resistance factor	$\mu = 1$	-	/ISO 10456/
Water vapour diffusion equivalent air layer thickness	$\mu \times$ component thickness in [m]	m	-
Sound absorption coefficient	See below	%	/ISO 354/
Bulk density	16 - 100	kg/m <sup>3</sup>	-
Compressive strength	No area of application	kPa	/EN 826/

Sound absorption levels as a function of frequency (e.g.: sound absorption coefficient of Ultimate of approx. 30 kg/m<sup>3</sup> and a thickness of 50 mm:  $\alpha_W=0.90$ ):

Frequency	125	250	500	1000	2000	4000
Absorption coefficient $\alpha_p$	0.25	0.60	1.00	1.00	1.00	1.00

### Raw materials / additives

The main raw materials used in Ultimate production are phonolite (up to approx. 50 wt.-%), lime (up to about 20 wt.-%) and bauxite (approximately 10 wt.-%). Other components, besides internal recycle (up to approx. 10 wt.-%) are dolomite, iron oxide, soda, phosphate, and nepheline (1-5 wt.-% respectively). The networking of the fibres is achieved by using up to 8% binding agent (based on a urea modified phenol formaldehyde resin) in the finished product.

The basic materials/additives of the laminations are:

Lamination	g/m <sup>2</sup> (one side)	Components
Glass fleece	50	Glass fibre
Glass filament textile	420	Water glass
Wire mesh	270	Galvanized steel

### Reference service life

The useful life of ISOVER mineral wool insulating materials is within the order of magnitude of the useful life of the respective component or building.

## LCA: Calculation Rules

### Declared unit

The Declaration refers to production of 1 m<sup>3</sup> of the ISOVER product ULTIMATE (unlaminated). The bulk density of the declared mineral wool products can be between 16 and 100 kg/m<sup>3</sup>. As a result of averaging (annual production volume in t / annual production volume in m<sup>3</sup>), this results in an average density of 30 kg/m<sup>3</sup>, on which basis the following ecobalance results are arrived at. Extrapolation of the results to other bulk densities is possible by means of linear scaling.

### Declared unit

Designation	Value	Unit
Declared unit	1	m <sup>3</sup>
Bulk density	30	kg/m <sup>3</sup>
Conversion factor to 1 kg	0.033	-

In addition, the environmental profiles of 3 laminations, based on the above specifications, are provided in the Annex. The inclusion of the LCA results for the laminations must first on 1 m<sup>3</sup>-related results for the mineral wool on the desired thickness to be converted.

The results for the laminations are then added up for each 1 m<sup>2</sup>. The environmental profiles of the laminations were calculated for one-sided lamination. Any adhesive / mounting medium required in addition is included in the results for the laminations.

### System limit

The selected system limits include production of the product from raw material extraction to finished packaged product at the factory gate (cradle-to-gate).

Details of factors considered:

- Raw material supply
- Energy supply
- Transport of raw materials and semi-finished products
- Production (energy, waste, emissions), incl. product packaging
- Disposal of production wastes

The utilization phase is not included in the calculations because of the wide variety of potential applications and structures. The disposal of the product itself is not sufficiently quantifiable due to its long service life and is therefore not included in the balance.

**Comparability**

In principle, a comparison or evaluation of EPD data is only possible if all data records to be compared have

been created in accordance with /EN 15804/, including consideration of the building context / product-specific performance features.

**LCA: Scenarios and other technical information**

Not relevant for this EPD Type: cradle-to-gate

## LCA: Results

A presentation of the environmental impacts of 1 m<sup>3</sup> of unlined rock wool with an average bulk density of 30 kg/m<sup>3</sup>, manufactured by Saint-Gobain ISOVER GH AG, follows. The following tables show the results for the impact assessment indicators, consumption of resources, wastes and other output flows for 1 m<sup>3</sup> of Ultimate insulating material. The modules marked with an "x" acc. to /EN 15804/ are addressed here. The environmental impacts and material balance sheet indicators for the different laminations are set out in the Annex.

### SPECIFICATION OF SYSTEM LIMITS (X = INCLUDED IN ECOBALANCE; MND = MODULE NOT DECLARED)

Production Stage			Building construction stage		Utilization stage								Disposal stage			Credits and debits outside of system limits
Supply of raw materials	Transport	Production	Transport from manufacturer to point of use	Assembly	Use / Application	Maintenance	Repair	Replacement	Renewal	Energy consumption for operation of the building	Water use for the operation of the building	Deconstruction/ demolition	Transport	Waste treatment	Elimination	Re-use, recovery or 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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

### RESULTS OF ECOBALANCE, ENVIRONMENTAL IMPACTS: 1 m<sup>3</sup> ULTIMATE (density 30 kg/m<sup>3</sup>)

Parameter	Unit	A1-A3
Global warming potential	[kg CO <sub>2</sub> equiv.]	6.75e+1
Stratospheric ozone layer depletion potential	[kg CFC11 equiv.]	1.54E-9
Soil and water acidification potential	[kg SO <sub>2</sub> equiv.]	2.35E-1
Eutrophication potential	[kg (PO <sub>4</sub> ) <sup>3</sup> equiv.]	4.88e-2
Tropospheric ozone formation potential	[kg ethene equiv.]	1.92e-2
Potential for abiotic degradation of non-fossil resources	[kg Sb equiv.]	7.01e-5
Potential for abiotic degradation of fossil fuels	[MJ]	1.10E+3

### RESULTS OF ECOBALANCE, USE OF RESOURCES: 1 m<sup>3</sup> ULTIMATE (density 30 kg/m<sup>3</sup>)

Parameter	Unit	A1-A3
Renewable primary energy as energy carrier	[MJ]	9.73e+1
Renewable primary energy for material use	[MJ]	4.36e+1
Total renewable primary energy	[MJ]	1.41E+2
Non-renewable primary energy as energy carrier	[MJ]	1.04e+3
Non-renewable primary energy for material use	[MJ]	1.30E+2
Total non-renewable primary energy	[MJ]	1.17E+3
Use of secondary materials	[kg]	0.00E+0
Renewable secondary fuels	[MJ]	0.00E+0
Non-renewable secondary fuels	[MJ]	0.00E+0
Use of freshwater resources	[m <sup>3</sup> ]	3.03e-1

### RESULTS OF ECOBALANCE, OUTPUT FLOWS AND WASTE CATEGORIES: 1 m<sup>3</sup> ULTIMATE (density 30 kg/m<sup>3</sup>)

Parameter	Unit	A1-A3
Hazardous waste to landfill	[kg]	4.76e-5
Discarded non-hazardous waste	[kg]	1.27E+0
Radioactive waste disposed of	[kg]	2.83E-2
Components for re-use	[kg]	0.00E+0
Materials for recycling	[kg]	0.00E+0
Materials for energy recovery	[kg]	0.00E+0
Exported electrical energy	[MJ]	0.00E+0
Exported thermal energy	[MJ]	0.00E+0

## Literature references

Institut Bauen und Umwelt e.V., Berlin (Ed.):  
Issue of Environmental Product Declarations (EPDs);

### 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.

### PCR 2014, Part B:

Institut Bauen und Umwelt e.V.,  
Product category rules for construction products, Part B: Requirements applying to EPDs for mineral insulation materials, 2014-07

### CLP

EC Regulation 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures, Comment Q, 2008

**DIN EN ISO 354: 2003-12**

Acoustics - Measurement of Sound Absorption in Hall Rooms (ISO 354:2003); German version EN ISO 354:2003

**DIN EN 826: 1996-05**

Thermal Insulation Materials for the Construction Industry - Determination of Behaviour Under Pressure Stress; German version EN 826:1996.

**DIN EN 13162: 2015-02**

Thermal Insulation Materials for Buildings - Factory-Produced Mineral Wool (MW) Products - Specification; German version EN 13162:2015.

**DIN EN ISO 10456:2010-05**

Building Materials and Construction Products – Technical Heat and Humidity Properties – Tabulated Rated Values and Procedure for Determination of

Nominal and Measured Values for Thermal Protection (ISO 10456:2007 + Cor. 1:2009); German version EN ISO 10456:2007 + AC:2009

**DIN EN 12667: 2001-05**

Technical Thermal Behaviour of Construction Materials and Products - Determination of Heat Transfer Resistance acc. to Plate Device Method and Heat Flux Plate Meter – Products with High and Average Heat Transfer Resistance, German version EN 12667:2001

**DIN EN 12086: 2012-07**

Thermal Insulation Materials for the Construction Industry - Determination of Water Vapour Permeability

**DIN 4108-4: Draft 2016-07**

Thermal Insulation and Energy Savings in Buildings - Part 4: Rated Technical Thermal and Moisture Values



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## ANNEX

### LCA - Results of laminations

The environmental impacts and material balance sheet indicators of Ultimate laminations are presented below. The environmental profiles are calculated for one-sided lamination including adhesive / mounting.

#### SPECIFICATION OF SYSTEM LIMITS (X = INCLUDED IN ECOBALANCE; MND = MODULE NOT DECLARED)

Production Stage			Building construction stage		Utilization stage								Disposal stage				Credits and debits outside of system limits
Supply of raw materials	Transport	Production	Transport from manufacturer to point of use	Assembly	Use / Application	Maintenance	Repair	Replacement	Renewal	Energy consumption for operation of the building	Water use for the operation of the building	Deconstruction/ demolition	Transport	Waste treatment	Elimination	Re-use, recovery or 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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	

1 m<sup>2</sup> of glass fleece (50 g/m<sup>2</sup>)

#### RESULTS OF THE ECOBALANCE, ENVIRONMENTAL IMPACT:

Parameter	Unit	A1-A3
GWP	[kg CO <sub>2</sub> equiv.]	0.129
ODP	[kg CFC11 equiv.]	3.41E-12
AP	[kg SO <sub>2</sub> equiv.]	0.000643
EP	[kg (PO <sub>4</sub> ) <sup>3</sup> equiv.]	4.69E-05
POCP	[kg ethene equiv.]	5.00E-05
ADPE	[kg Sb equiv.]	4.17E-06
ADPF	[MJ]	2.22

Legend: GWP = global warming potential; ODP = stratospheric ozone layer depletion potential; AP = soil and water acidification potential; EP = eutrophication potential; POCP = tropospheric ozone formation potential; ADPE = potential for abiotic degradation of non-fossil resources; ADPF = potential for abiotic degradation of fossil fuels

#### RESULTS OF THE ECOBALANCE, USE OF RESOURCES:

Parameter	Unit	A1-A3
PERE	[MJ]	0.26
PERM	[MJ]	0.00305
PERT	[MJ]	0.263
PENRE	[MJ]	2.09
PENRM	[MJ]	0.281
PENRT	[MJ]	2.38
SM	[kg]	0
RSF	[MJ]	0
NSRF	[MJ]	0
FW	[m <sup>3</sup> ]	0.000531

Legend: PERE = renewable primary energy as energy carrier; PERM = renewable primary energy for material use; PERT = Total renewable primary energy; PENRE = non-renewable primary energy as an energy carrier; PENRM = non-renewable primary energy for material use; PENRT = total non-renewable primary energy; SM = use of secondary materials; RSF = renewable secondary fuels; NSRF = non-renewable secondary fuels; FW = use of freshwater resources

#### RESULTS OF ECOBALANCE, OUTPUT FLOWS AND WASTE CATEGORIES:

Parameters	Unit	A1-A3
HWD	[kg]	5.71E-08
NHWD	[kg]	0.00983
RWD	[kg]	6.25E-05
CRU	[kg]	0
MFR	[kg]	0
MER	[kg]	0
EEE	[MJ]	0
EET	[MJ]	0

Legend: HWD = hazardous waste to landfill; NHWD = discarded non-hazardous waste to landfill; RWD = discarded radioactive waste; CRU = components for re-use; MFR = materials for recycling; MER = materials for energy recovery; EEE = exported electrical energy; EET = exported thermal energy



**SPECIFICATION OF SYSTEM LIMITS (X = INCLUDED IN ECOBALANCE, MND = MODULE NOT DECLARED)**

Production Stage			Building construction stage		Utilization stage								Disposal stage				Credits and debits outside of system limits
Supply of raw materials	Transport	Production	Transport from manufacturer to point of use	Assembly	Use / Application	Maintenance	Repair	Replacement	Renewal	Energy consumption for operation of the building	Water use for the operation of the building	Deconstruction/ demolition	Transport	Waste treatment	Elimination	Re-use, recovery or 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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	

**1 m<sup>2</sup> wire mesh (270 g/m<sup>2</sup>)**

**RESULTS OF THE ECOBALANCE, ENVIRONMENTAL IMPACT:**

Parameters	Unit	A1-A3
GWP	[kg CO <sub>2</sub> equiv.]	0.779
ODP	[kg CFC11 equiv.]	1.55E-11
AP	[kg SO <sub>2</sub> equiv.]	0.00254
EP	[kg (PO <sub>4</sub> ) <sup>3</sup> equiv.]	0.00 0225
POCP	[kg ethene equiv.]	0.00 0347
ADPE	[kg Sb equiv.]	5.77E-05
ADPF	[MJ]	8.9

Legend GWP = global warming potential; ODP = stratospheric ozone layer depletion potential; AP = soil and water acidification potential; EP = eutrophication potential; POCP = tropospheric ozone formation potential; ADPE = potential for abiotic degradation of non-fossil resources; ADPF = potential for abiotic degradation of fossil fuels

**RESULTS OF THE ECOBALANCE, USE OF RESOURCES:**

Parameters	Unit	A1-A3
PERE	[MJ]	0.634
PERM	[MJ]	0
PERT	[MJ]	0.634
PENRE	[MJ]	9.29
PENRM	[MJ]	0
PENRT	[MJ]	9.29
SM	[kg]	0.0324
RSF	[MJ]	0
NSRF	[MJ]	0
FW	[m <sup>3</sup> ]	0.00385

Legend PERE = renewable primary energy as energy carrier; PERM = renewable primary energy for material use; PERT = Total renewable primary energy; PENRE = non-renewable primary energy as an energy carrier; PENRM = non-renewable primary energy for material use; PENRT = total non-renewable primary energy; SM = use of secondary materials; RSF = renewable secondary fuels; NSRF = non-renewable secondary fuels; FW = use of freshwater resources

**RESULTS OF THE ECOBALANCE, OUTPUT FLOWS AND WASTE CATEGORIES:**

Parameters	Unit	A1-A3
HWD	[kg]	1.35E-08
NHWD	[kg]	Subtract 0.0117
RWD	[kg]	0.00 0154
CRU	[kg]	0
MFR	[kg]	0
MER	[kg]	0
EEE	[MJ]	0
EET	[MJ]	0

Legend HWD = hazardous waste to landfill; NHWD = discarded non-hazardous waste to landfill; RWD = discarded radioactive waste; CRU = components for re-use; MFR = materials for recycling; MER = materials for energy recovery; EEE = exported electrical energy; EET = exported thermal energy

**SPECIFICATION OF SYSTEM LIMITS (X = INCLUDED IN ECOBALANCE; MND = MODULE NOT DECLARED)**

Production Stage			Building construction stage		Utilization stage								Disposal stage				Credits and debits outside of system limits
Supply of raw materials	Transport	Production	Transport from manufacturer to point of use	Assembly	Use / Application	Maintenance	Repair	Replacement	Renewal	Energy consumption for operation of the building	Water use for the operation of the building	Deconstruction/ demolition	Transport	Waste treatment	Elimination	Re-use, recovery or 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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	

**1 m<sup>2</sup> of glass filament textile (420 g/m<sup>2</sup>)**

**RESULTS OF THE ECOBALANCE, ENVIRONMENTAL IMPACT:**

Parameters	Unit	A1-A3
GWP	[kg CO <sub>2</sub> equiv.]	0.756
ODP	[kg CFC11 equiv.]	2.05E-11
AP	[kg SO <sub>2</sub> equiv.]	0,00502
EP	[kg (PO <sub>4</sub> ) <sup>3</sup> equiv.]	0.00 0278
POCP	[kg ethene equiv.]	0.00 0295
ADPE	[kg Sb equiv.]	3.83E-05
ADPF	[MJ]	9,87

Legend: GWP = global warming potential; ODP = stratospheric ozone layer depletion potential; AP = soil and water acidification potential; EP = eutrophication potential; POCP = tropospheric ozone formation potential; ADPE = potential for abiotic degradation of non-fossil resources; ADPF = potential for abiotic degradation of fossil fuels

**RESULTS OF THE ECOBALANCE, USE OF RESOURCES:**

Parameters	Unit	A1-A3
PERE	[MJ]	1.72
PERM	[MJ]	0
PERT	[MJ]	1.72
PENRE	[MJ]	10.5
PENRM	[MJ]	0.418
PENRT	[MJ]	10.9
SM	[kg]	0
RSF	[MJ]	0
NSRF	[MJ]	0
FW	[m <sup>3</sup> ]	0.0028

Legend: PERE = renewable primary energy as energy carrier; PERM = renewable primary energy for material use; PERT = Total renewable primary energy; PENRE = non-renewable primary energy as an energy carrier; PENRM = non-renewable primary energy for material use; PENRT = total non-renewable primary energy; SM = use of secondary materials; RSF = renewable secondary fuels; NSRF = non-renewable secondary fuels; FW = use of freshwater resources

**RESULTS OF THE ECOBALANCE, OUTPUT FLOWS AND WASTE CATEGORIES:**

Parameters	Unit	A1-A3
HWD	[kg]	7.10E-08
NHWD	[kg]	0.0862
RWD	[kg]	0.00 0408
CRU	[kg]	0
MFR	[kg]	0
MER	[kg]	0
EEE	[MJ]	0
EET	[MJ]	0

Legend: HWD = hazardous waste to landfill; NHWD = discarded non-hazardous waste to landfill; RWD = discarded radioactive waste; CRU = components for re-use; MFR = materials for recycling; MER = materials for energy recovery; EEE = exported electrical energy; EET = exported thermal energy

# LIFE SCIENCES TRANSLATIONS

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## BEGLAUBIGUNGSVERMERK für eine DOKUMENTENÜBERSETZUNG

### CERTIFICATION OF A DOCUMENT TRANSLATION

*Hiermit bescheinige ich die Richtigkeit und Vollständigkeit der beigehefteten Übersetzung. Der Ausgangstext ist auch beigeheftet. Die Vollständigkeit bezieht sich gegebenenfalls auf zutreffende bzw. relevante Angaben.*

I hereby certify the correctness and completeness of the attached translation. The source text is also attached. Completeness may refer to applicable or relevant information only.

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*Original / original;*  
*beglaubigte Abschrift / certified copy;*  
*Kopie / copy*)

\_\_\_10\_\_\_ Seiten / pages (*Übersetzung / translation*)

*Übersetzung aus der deutschen in die englische Sprache.*  
English translation from the German.

**Ermächtigungsnr. für Beglaubigungen, OLG Schleswig /**  
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**Court, Schleswig:                      3162 E - 291**

Kleve, 04.03.2018  
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