Bundesverband der Gipsindustrie e.V.
Forschungsvereinigung der Gipsindustrie e.V.

GIPS
schafft Freiräume.

Gypsum-based products

ENVIRONMENTAL PRODUCT DECLARATION

HOLDER OF THE DECLARATION

Forschungsvereinigung der Gipsindustrie e. V.

HOLDER OF DATA

- PE International GmbH, Leinfelden-Echterdingen
- Fraunhofer – Institut für Bauphysik, Holzkirchen, Prof. Dr. K. Sedlbauer
- WECOBIS Ökologisches Baustoffinformationssystem, Bundesministerium für Verkehr, Bau und Städteplanung und Bayerische Architektenkammer
- Bundesamt für Strahlenschutz
- European Commission; Joint Research Centre; European Platform on Life Cycle Assessment

DECLARATION NUMBER

2009-en- 1st edition

DECLARED PRODUCTS

Gypsum plasterboards
Gypsum plasterboards impregnated
Gypsum plasterboards – fire-retardant boards
Gypsum plasterboards – perforated boards
Gypsum plasterboards – pre-cast screed

Gypsum fibre boards
Gypsum fibre boards – pre-cast screed

Gypsum blocks

Filling compounds, adhesive binders, and adhesives made from gypsum

Gypsum plaster
Gypsum lime building plaster
Stucco

VALIDITY AND CONTENT

This declaration is an environmental product declaration following ISO 14025 and the drafts of CEN/TC 59 Building Construction SC 17 Sustainability in building construction and describes the environmental performances of the mentioned products. Aim is to support the development of environmentally sound and non-hazardous construction. This declaration reveals all relevant environmental data.

This declaration is valid for all member companies of the Bundesverband der Gipsindustrie e.V. for the mentioned products in accordance with the latest version on the web portal **http://www.gips.de**

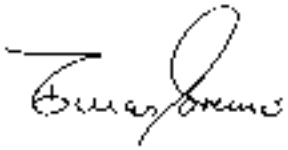
CONTENT OF THE DECLARATION

This declaration is complete and contains in detail:
- Product definition
- Information on raw materials and substance origin
- Description of production processes
- Instructions on product applications
- Information on the use-phase, exceptional impacts and end-of-life phase
- Results of the life cycle assessment
- Tests and analysis

DATE OF ISSUE

09.06.2009

SIGNATURE



Thomas Bremer
Chairman of the board of the
Forschungsvereinigung der Gipsindustrie e.V.

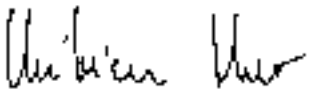
COMPILATION OF THE DECLARATION

The data gathering for the declaration was done by the following institutions, independent from the Bundesverband der Gipsindustrie:

- Life Cycle Assessment Data:
  PE International GmbH, Leinfelden-Echterdingen
- Data regarding indoor air emissions:
  Fraunhofer-Institut für Bauphysik, Holzkirchen
- Data regarding radioactivity:
  Bundesamt für Strahlenschutz, Berlin

SIGNATURES

Johannes Kreißig
PE International GmbH



Dipl.-Chem. Christian Scherer
Fraunhofer-Institut für Bauphysik

PRODUCT DESCRIPTIONS AND APPLICATIONS

- **Raw materials and gypsum binders**
  Raw materials and binding agents are described in the chapter "gypsum – raw materials, preparation, and calcination" of the gypsum data book.
- **Boards**
  Boards are described in the chapters "gypsum plasterboards", "gypsum fibre boards", and "gypsum blocks" of the gypsum data book.
- **Plasters and adhesives**
  Plasters and adhesives are described in the chapter "gypsum dry mortar: gypsum, plasters, fillers and adhesives" of the gypsum data book.

The gypsum data book can be downloaded from **http://www.gips.de** or can be requested as printed version.

On the internet pages of the Bundesverband further extensive fact sheets containing instructions for the use of construction products made from gypsum can be found.

SCOPE OF THE LIFE CYCLE ASSESSMENT

The life cycle assessment has been carried out in compliance with DIN ISO 14040 et seq. The basis for data are specific data from the member companies of the Bundesverband der Gipsindustrie e.V. as well as data from the database GaBI 4 from PE International GmbH. The life cycle assessment comprises raw material extraction and energy consumption, raw material transport and the actual production in Germany (cradle to gate). The life cycle assessment is complemented by a disposal module for gypsum waste (recycling).

RESULTS OF THE LIFE CYCLE ASSESSMENT

Beside this declaration parts of results have been published by the following sources for data:

European Platform on LCA
http://lct.jrc.ec.europa.eu/eplca

WECOBIS
http://www.nachhaltigesbauen.de/baustoff-und-gebaeudedaten/

RESULTS OF THE LIFE CYCLE ASSESSMENT Evaluation values in unit per kg

Gypsum plasterboards	
Primary energy, non-renewable (MJ)	3.29
Primary energy, renewable (MJ)	0.13
Global warming potential (GWP) (kg CO_2-eq.)	0.202
Ozone depletion potential (ODP) (kg R11-eq.)	6.73E-09
Acidification potential (AP) (kg SO_2-eq.)	0.30E-03
Eutrophication potential (EP) (kg PO_4-eq.)	7.58E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	2.74E-05

Gypsum plasterboards impregnated	
Primary energy, non-renewable (MJ)	3.44
Primary energy, renewable (MJ)	0.18
Global warming potential (GWP 100) (kg CO_2-eq.)	0.209
Ozone depletion potential (ODP) (kg R11-eq.)	7.67E-09
Acidification potential (AP) (kg SO_2-eq.)	0.33E-03
Eutrophication potential (EP) (kg PO_4-eq.)	7.85E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	2.98E-05

Gypsum plasterboards – fire-retardant boards	
Primary energy, non-renewable (MJ)	3.35
Primary energy, renewable (MJ)	0.13
Global warming potential (GWP 100) (kg CO_2-eq.)	0.213
Ozone depletion potential (ODP) (kg R11-eq.)	6.92E-09
Acidification potential (AP) (kg SO_2-eq.)	0.34E-03
Eutrophication potential (EP) (kg PO_4-eq.)	8.05E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	3.87E-05

Gypsum plasterboards – perforated boards	
Primary energy, non-renewable (MJ)	3.57
Primary energy, renewable (MJ)	0.13
Global warming potential (GWP 100) (kg CO_2-eq.)	0.226
Ozone depletion potential (ODP) (kg R11-eq.)	7.08E-09
Acidification potential (AP) (kg SO_2-eq.)	0.35E-03
Eutrophication potential (EP) (kg PO_4-eq.)	8.21E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	4.01E-05

Gypsum plasterboards – pre-cast screed	
Primary energy, non-renewable (MJ)	3.44
Primary energy, renewable (MJ)	0.13
Global warming potential (GWP 100) (kg CO_2-eq.)	0.208
Ozone depletion potential (ODP) (kg R11-eq.)	6.81E-09
Acidification potential (AP) (kg SO_2-eq.)	0.31E-03
Eutrophication potential (EP) (kg PO_4-eq.)	7.66E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	3.07E-05

Gypsum fibre boards	
Primary energy, non-renewable (MJ)	4.90
Primary energy, renewable (MJ)	0.06
Global warming potential (GWP 100) (kg CO_2-eq.)	0.308
Ozone depletion potential (ODP) (kg R11-eq.)	12.4E-09
Acidification potential (AP) (kg SO_2-eq.)	0.39E-03
Eutrophication potential (EP) (kg PO_4-eq.)	6.55E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	3.70E-05

Gypsum fibre board flooring elements	
Primary energy, non-renewable (MJ)	4.89
Primary energy, renewable (MJ)	0.06
Global warming potential (GWP 100) (kg CO_2-eq.)	0.303
Ozone depletion potential (ODP) (kg R11-eq.)	12.4E-09
Acidification potential (AP) (kg SO_2-eq.)	0.38E-03
Eutrophication potential (EP) (kg PO_4-eq.)	6.33E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	3.76E-05

Gypsum blocks	
Primary energy, non-renewable (MJ)	3.93
Primary energy, renewable (MJ)	0.02
Global warming potential (GWP 100) (kg CO_2-eq.)	0.244
Ozone depletion potential (ODP) (kg R11-eq.)	4.30E-09
Acidification potential (AP) (kg SO_2-eq.)	0.25E-03
Eutrophication potential (EP) (kg PO_4-eq.)	3.09E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	2.70E-05

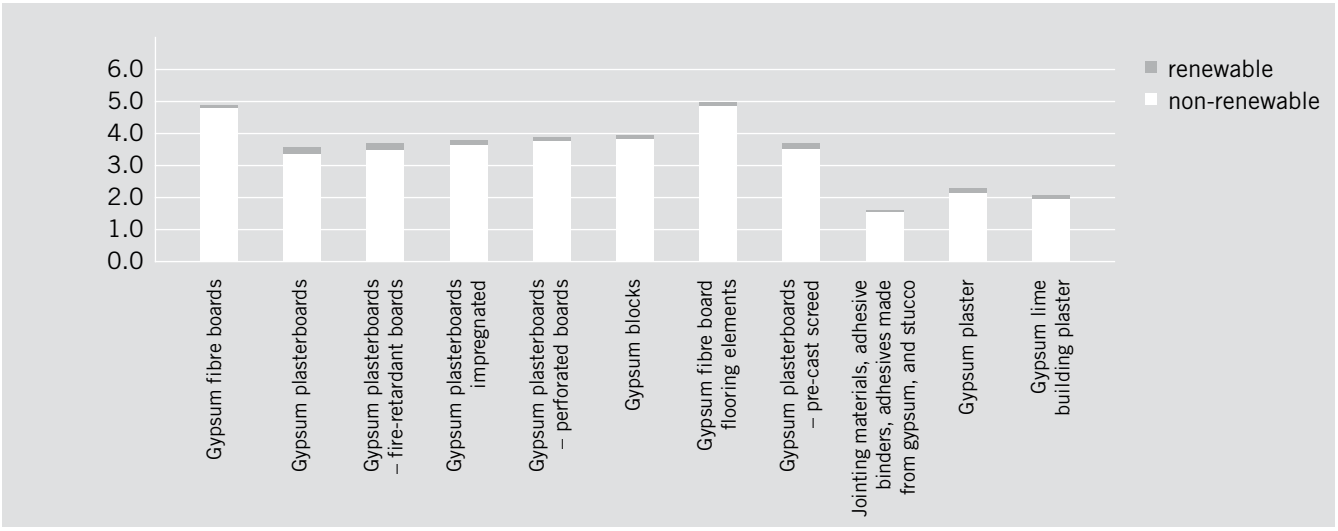
Jointing materials, adhesive binders, and adhesives made from gypsum	
Primärenergie, nicht erneuerbar (MJ)	1.62
Primary energy, renewable (MJ)	0.02
Global warming potential (GWP 100) (kg CO_2-eq.)	0.108
Ozone depletion potential (ODP) (kg R11-eq.)	3.49E-09
Acidification potential (AP) (kg SO_2-eq..)	0.14E-03
Eutrophication potential (EP) (kg PO_4-eq.)	1.55E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	1.33E-05

Gypsum plaster	
Primary energy, non-renewable (MJ)	2.12
Primary energy, renewable (MJ)	0.05
Global warming potential (GWP 100) (kg CO_2-eq.)	0.140
Ozone depletion potential (ODP) (kg R11-eq.)	7.34E-09
Acidification potential (AP) (kg SO_2-eq.)	0.19E-03
Eutrophication potential (EP) (kg PO_4-eq.)	2.16E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	1.82E-05

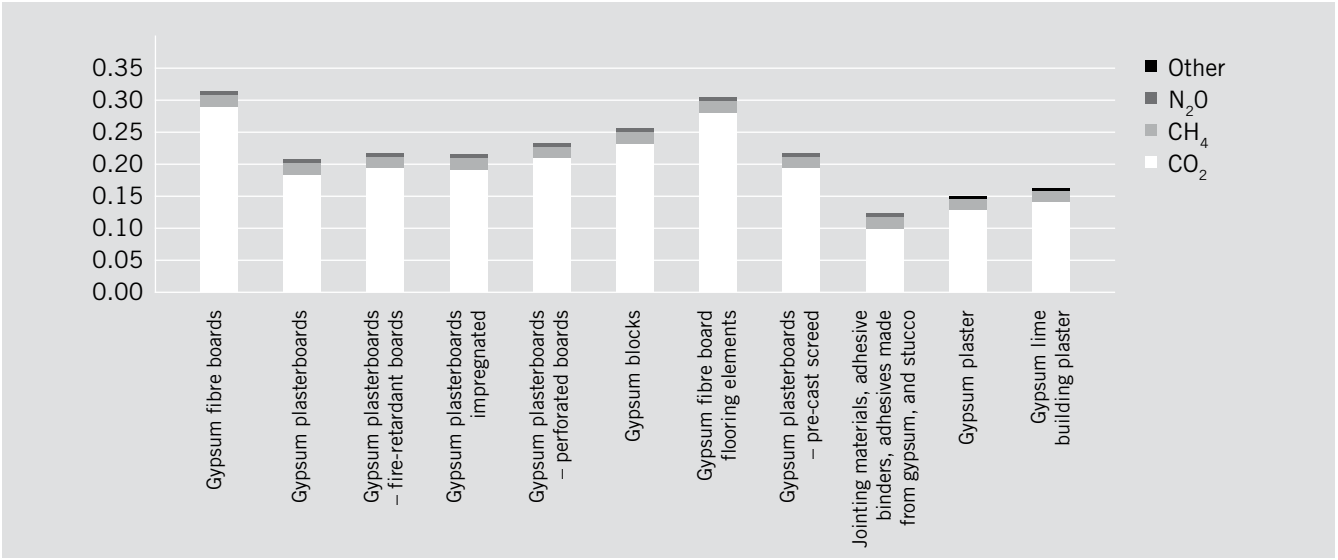
Gypsum lime building plaster	
Primary energy, non-renewable (MJ)	2.05
Primary energy, renewable (MJ)	0.04
Global warming potential (GWP 100) (kg CO_2-eq.)	0.149
Ozone depletion potential (ODP) (kg R11-eq.)	7.07E-09
Acidification potential (AP) (kg SO_2-eq.)	0.19E-03
Eutrophication potential (EP) (kg PO_4-eq.)	2.15E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	1.79E-05

Stucco	
Primary energy, non-renewable (MJ)	1.62
Primary energy, renewable (MJ)	0.02
Global warming potential (GWP 100) (kg CO_2-eq.)	0.108
Ozone depletion potential (ODP) (kg R11-eq.)	3.49E-09
Acidification potential (AP) (kg SO_2-eq..)	0.14E-03
Eutrophication potential (EP) (kg PO_4-eq.)	1.55E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	1.33E-05

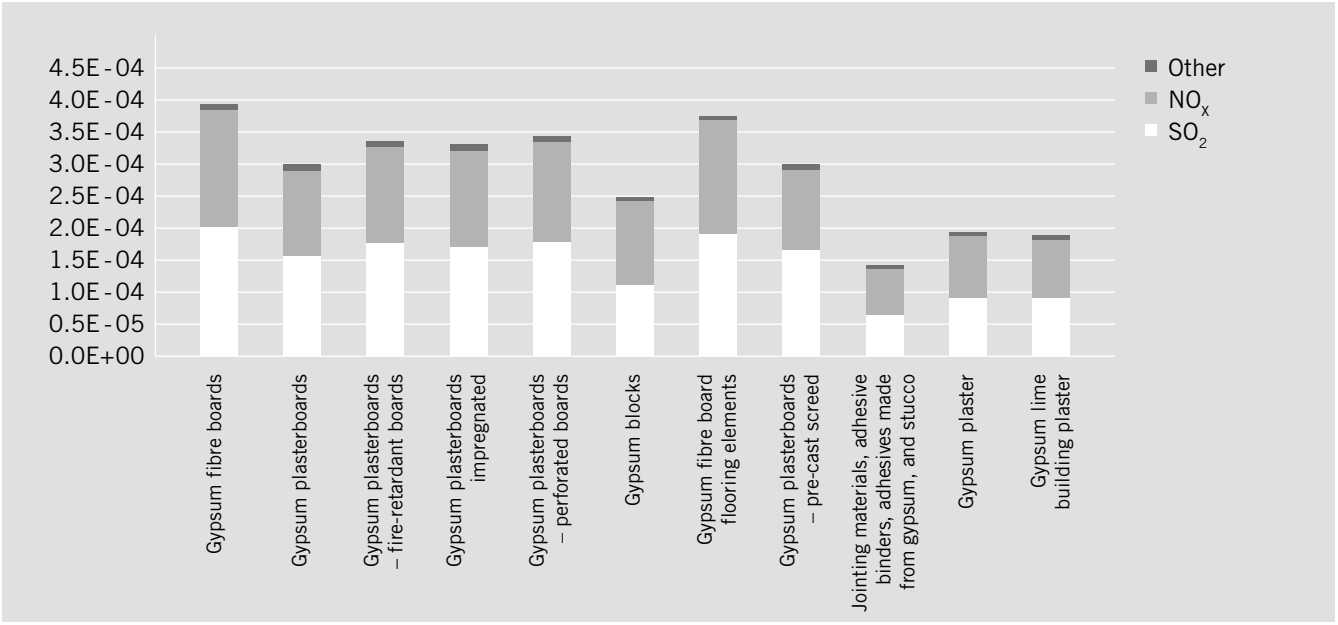
PRIMARY ENERGY CONSUMPTION PE [MJ/kg]



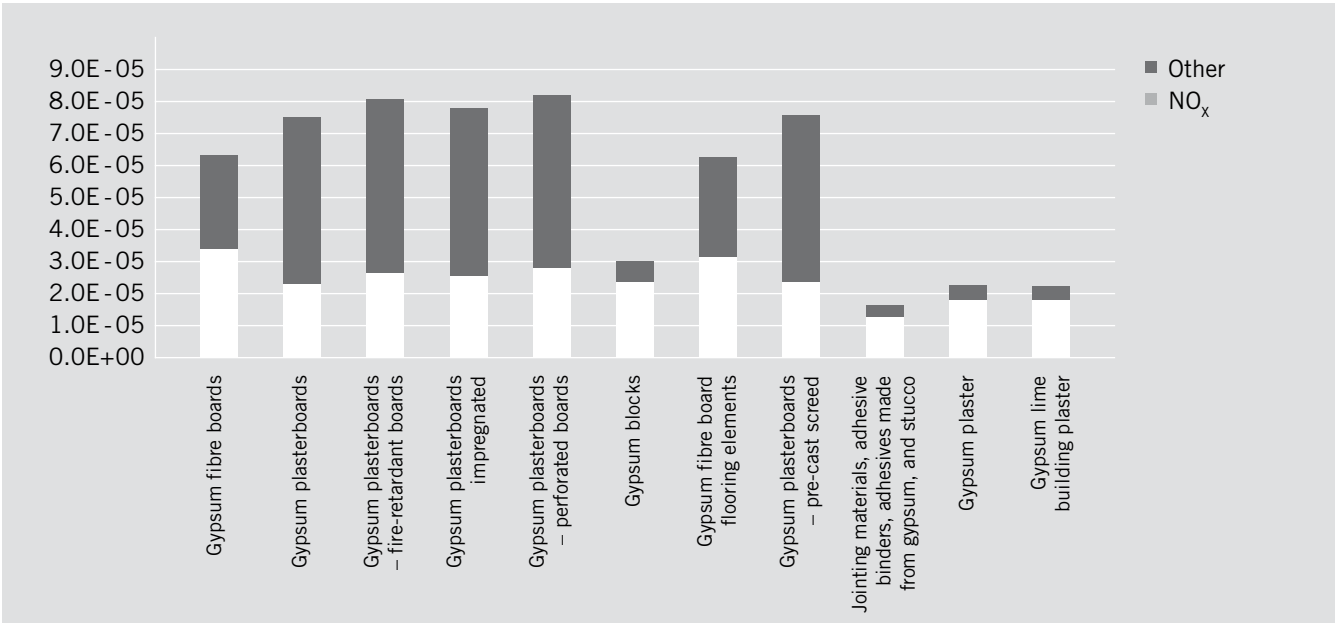
GLOBAL WARMING POTENTIAL GWP [kg CO_2-equivalents/kg]



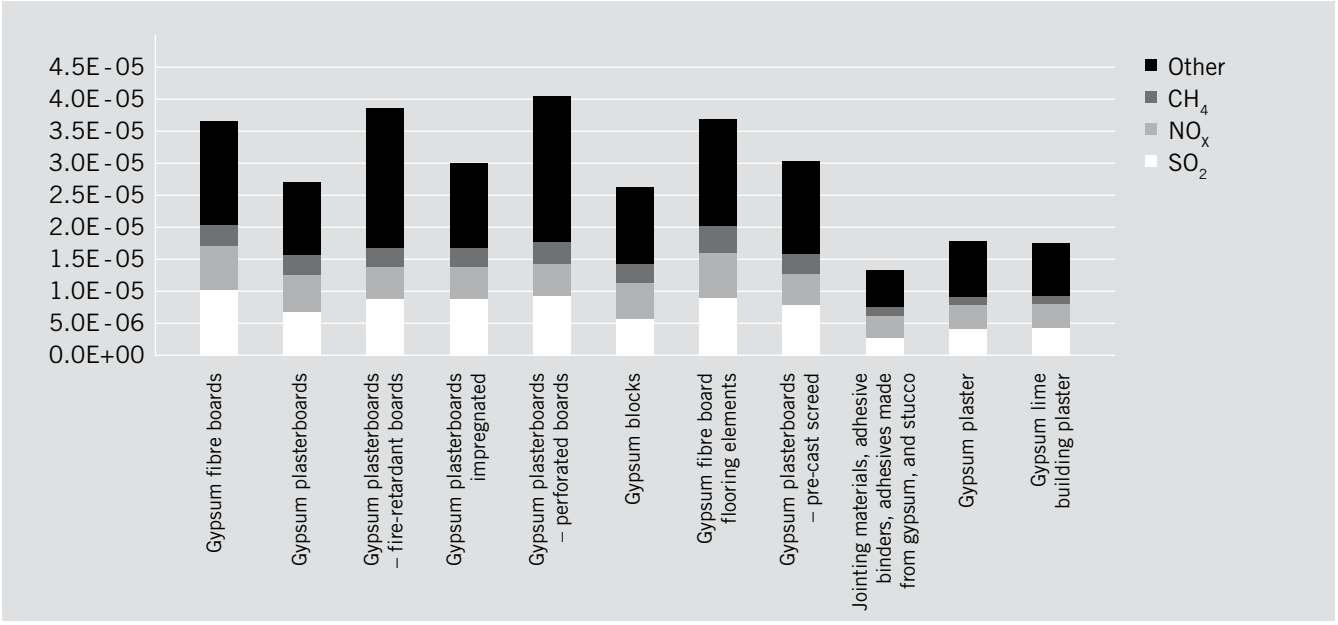
ACIDIFICATION POTENTIAL AP [kg SO_2-equivalents/kg]



EUTROPHICATION POTENTIAL EP [kg PO_4-equivalents/kg]



PHOTOCHEMICAL OZONE CREATION POTENTIAL POCP [kg Ethen-equivalents/kg]



TESTS AND ANALYSES

In addition to core criteria according to ISO 14025, the following tests and analyses are outlined in the environmental product declaration.

RADIOACTIVITY

Bundesamt für Strahlenschutz
The regulations have been carried out on exemplary samples of construction products (gypsum plasterboards as well as gypsum dry mortar) based on natural gypsum from 3 different geological deposits (G1-G3) and FGD gypsum (gypsum from flue gas desulphurization plants) from hard coal- and lignite-fired power stations (RG1-RG2).

MEASURED VALUES OF SPECIFIC RADIOACTIVITY

Measured values of specific activity for gypsum-based products

Sample	Number of samples	Ra-226 Bq/kg	Th-228 Bq/kg	K-40 Bq/kg
Existing data BFS 1976 – 82	44	1 – 15 (MW: 4)	1 – 11 (MW: 3)	7 – 134 (MW: 12)
G 1	1	12 ± 2	1.7 ± 0.3	< 20
G 2	1	13 ± 3	5.8 ± 1.2	120 ± 20
G 3	1	10 ± 2	5.5 ± 1.2	95 ± 15
RG 1	1	4.2 ± 0.9	1.9 ± 0.5	< 20
RG 2	1	3.8 ± 0.8	1.9 ± 0.5	< 20

MEASURED VALUES OF RADON EXHALATION

Radon exhalation of gypsum-based products

Sample	Emanation coefficient	Exhalation [Bq/m²h]	Radon concentration [Bq/m³]
G 1	0.17	0.21	1
G 2	0.14	0.19	1
G 3	0.06	0.06	< 1
RG 1	0.18	0.08	< 1
RG 2	0.21	0.08	< 1

according to the following scenario:

Model room according to EU-recommendation “Radiation Protection 112”, but

- Installation thickness	3 cm	Diffusion coefficient	$1 \cdot 10^{-7}$ m²/s
- Density	900 kg/m³	Air exchange rate	0.5 h^{-1}

CALCULATION OF DOSE CONTRIBUTION

Dose contribution of gypsum-based products

- Index calculation acc. to RP112 for external exposure: **0.03 – 0.11 (correlation to dose in mSv/a)**
- Radon concentration as contribution from gypsum conversion in dose acc. to UNSCEAR 2000 (40Bq/m³ ≈ 1mSv/a): **max. 0.02 mSv/a**
- Addition of dose contributions from both pathways to total dose: **max. 0.05 – 0.13 mSv/a**
- Evaluation according to RP112: applicable without restriction, as clearly **< 0.3 mSv/a**

EMISSION TESTS IN COMPLIANCE WITH DIN EN ISO 16000-9/-11

Fraunhofer-Institut für Bauphysik

The detections of volatile organic compounds and additionally formaldehyde have been carried out in an emission test chamber by applying realistic surface-specific air exchange rates on representative samples after 3, 7, 28 and 35 days. The assessments of VOC concentrations of detected individual substances have been evaluated following the NIK-concept of the AgBB (NIK = lowest interesting concentration) after 3 and 28 days. The sum parameters have been calculated according to the AgBB scheme (edition March 2008).

The requirements following the testing scheme of the AgBB-version 2008 regarding all existing test points:

- **$TVOC_3 \leq 10$ mg/m³**
- **Carcinogenic substances$_3$ EU-cat. 1 and 2 ≤ 0.01 mg/m³**
- **$TVOC_{28} < 1.0$ mg/m³, $SVOC_{28} \leq 0.1$ mg/m³**
- **Carcinogenic substances$_{28}$ EU-class 1 and 2 ≤ 0.001 mg/m³**
- **Assessable substances:**
  Observation of all VOC with NIK $R = \Sigma\ C_i/NIK_i \leq 1$
- **Non-assessable substances:**
  Sum of all VOC without NIK $\Sigma\ VOC_{28} \leq 0.1$ mg/m³

are met. All values are significantly lower than the limit values mentioned there. These products have thus no negative effect whatsoever on the indoor air quality.

TVOC FROM GYPSUM PLASTERBOARDS

Sample	TVOC concentration in the test chamber air [µg/m³]			
	3d	7d	28d	35d
E1165-1	11	0	0	–
E1165-2	40	16	6	–
E1165-3	158	33	19	–
E1259-1	74	40	0	–
E1259-2	0	0	0	–

FORMALDEHYDE FROM GYPSUM PLASTERBOARDS

Sample	Formaldehyde concentration in the test chamber air [µg/m³]			
	3d	7d	28d	35d
E1165-1	10	5	3	2
E1165-2	6	1	1	< BG
E1165-3	6	5	3	3
E1259-1	8	10	8	< BG
E1259-2	7	13	12	< BG

TVOC FROM GYPSUM PLASTER

Sample	TVOC concentration in the test chamber air [µg/m³]			
	3d	7d	28d	35d
E1155	19	19	9	9
E1156-1	17	39	32	17
E1156-2	< BG	< BG	< BG	< BG

FORMALDEHYDE OF GYPSUM PLASTER

Sample	Formaldehyde concentration in the test chamber air [µg/m³]			
	3d	7d	28d	35d
E1155	1	1	1	2
E1156-1	3	2	4	3
E1156-2	< BG	< BG	1	< BG

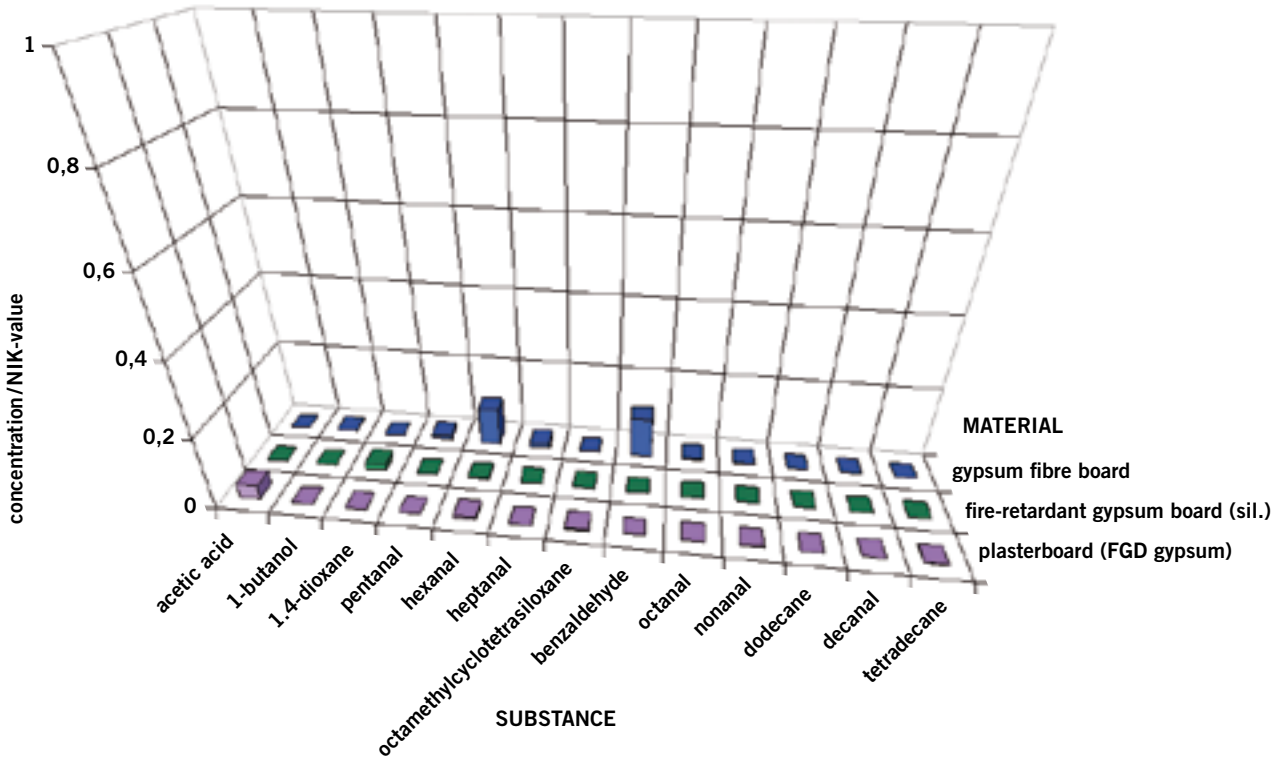
TVOC FROM FILLING COMPOUNDS, ADHESIVE BINDERS, AND ADHESIVES MADE FROM GYPSUM

Sample	TVOC concentration in the test chamber air [µg/m³]			
	3d	7d	28d	35d
E1163-1	8	0	6	13
E1165-4	10	10	8	–
E1165-5	< BG	< BG	< BG	–

FORMALDEHYDE FROM FILLING COMPOUNDS, ADHESIVE BINDERS, AND ADHESIVES MADE FROM GYPSUM

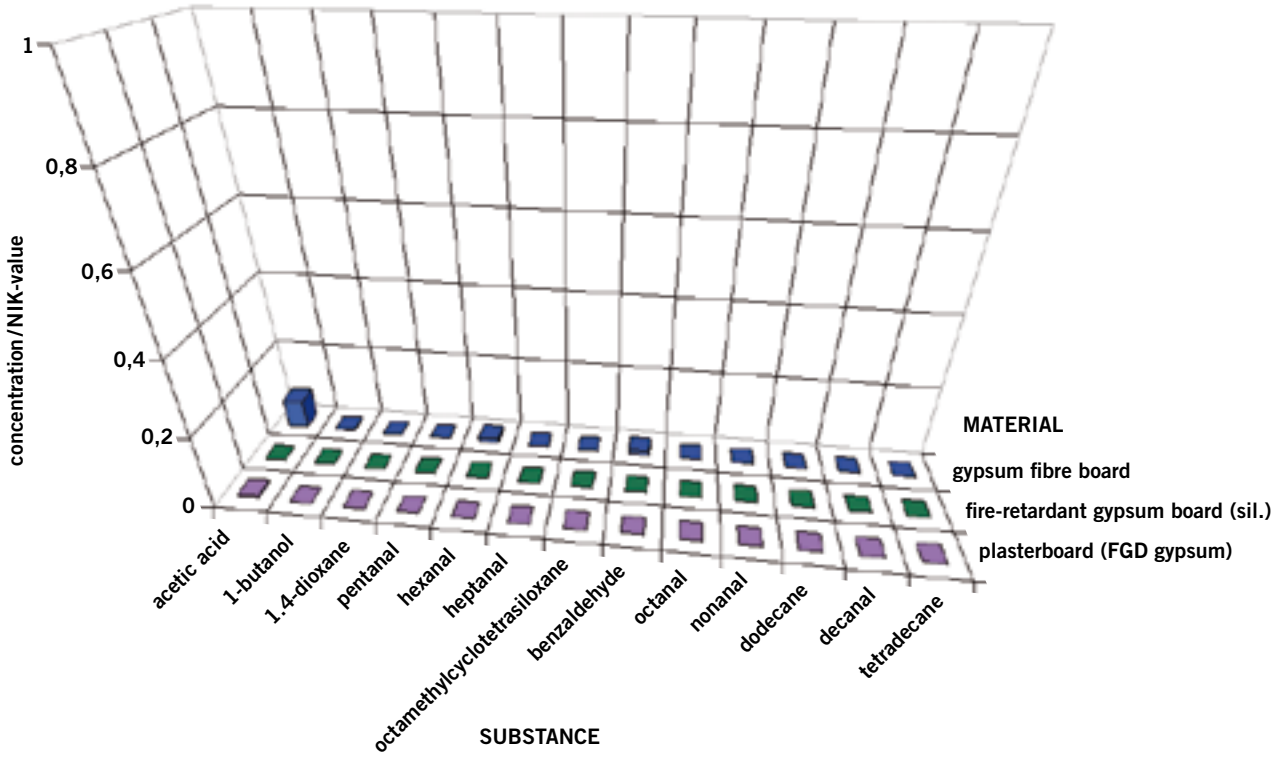
Sample	Formaldehyde concentration in the test chamber air [µg/m³]			
	3d	7d	28d	35d
E1163-1	< BG	< BG	< BG	< BG
E1165-4	< BG	< BG	< BG	< BG
E1165-5	< BG	< BG	< BG	< BG

INDIVIDUAL SUBSTANCES: COMPARISONS TO NIK VALUES AFTER 3 DAYS FOR BOARDS



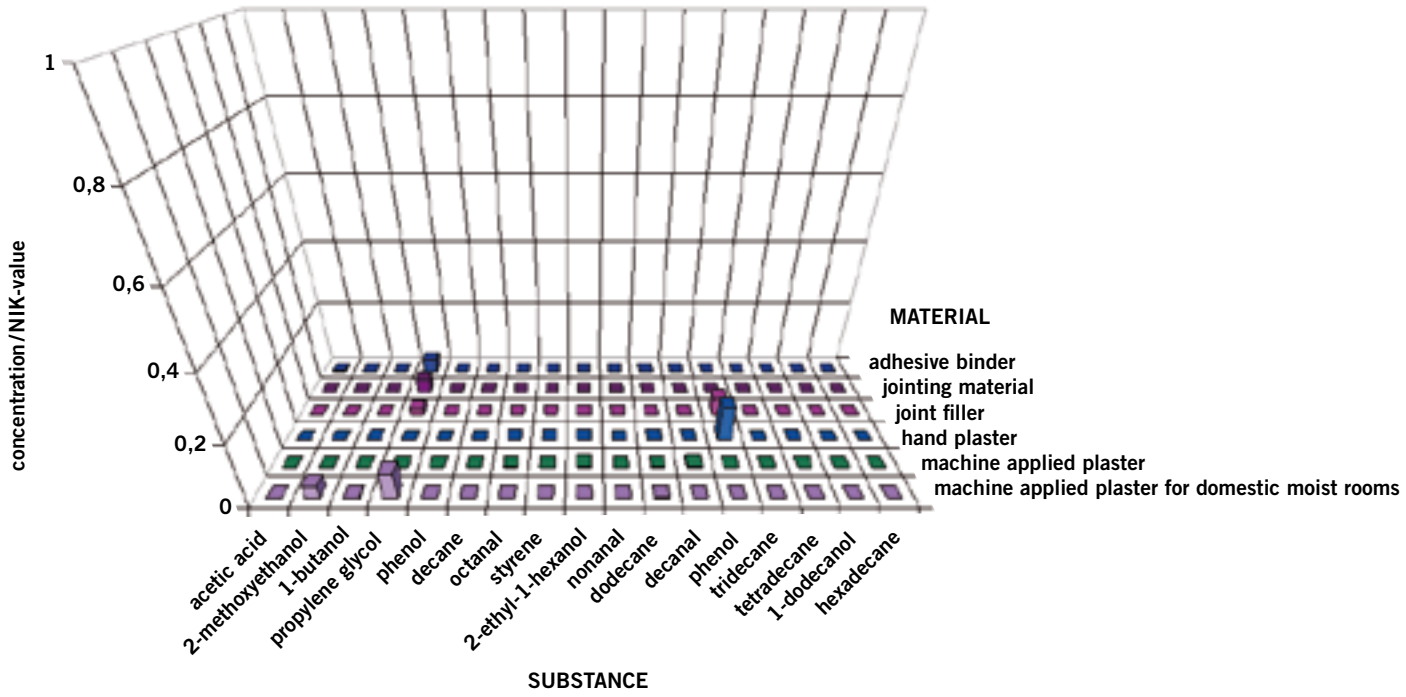
0.1 on the scale means: 10% of the concentration of the NIK value

INDIVIDUAL SUBSTANCES: COMPARISONS TO NIK VALUES AFTER 28 DAYS FOR BOARDS



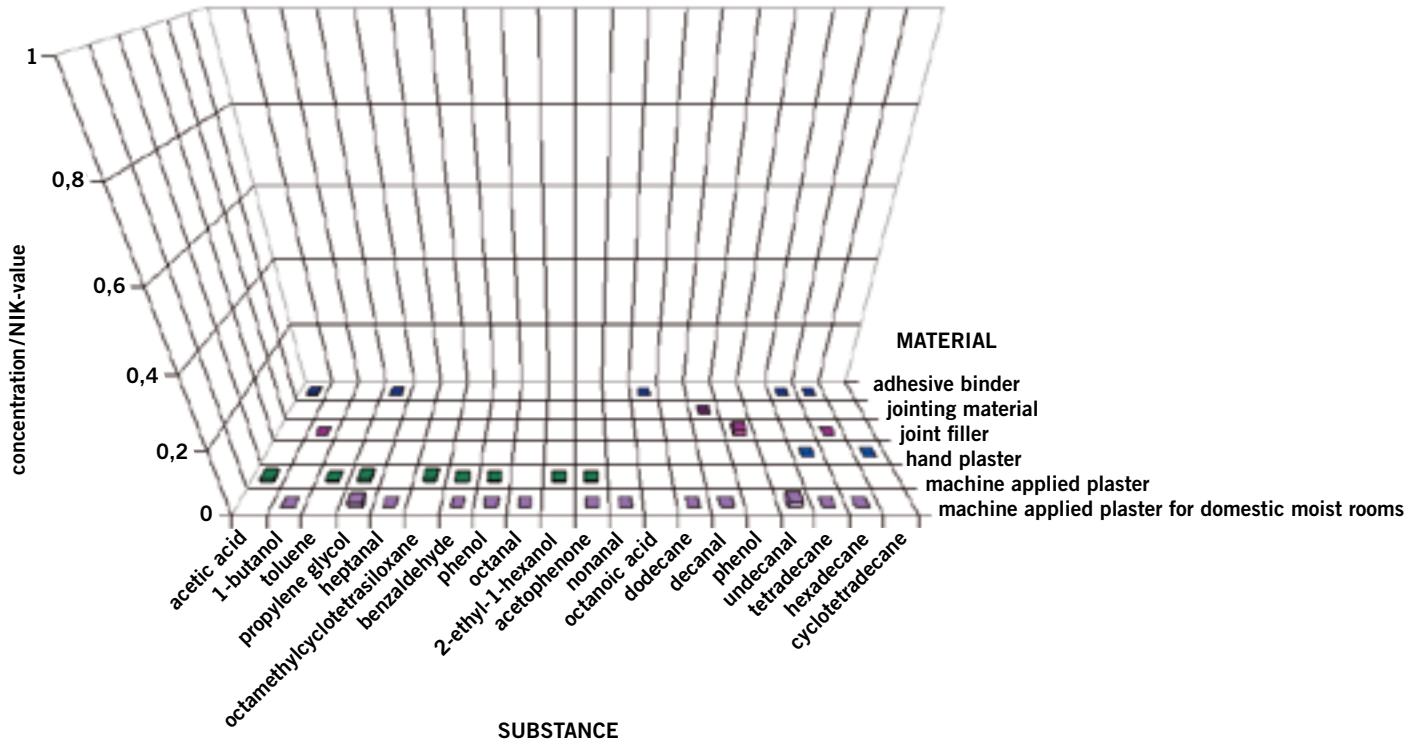
0.1 on the scale means: 10% of the concentration of the NIK value

INDIVIDUAL SUBSTANCES: COMPARISONS TO NIK VALUES AFTER 3 DAYS FOR PLASTERS AND ADHESIVES



0.1 on the scale means: 10 % of the concentration of the NIK value

INDIVIDUAL SUBSTANCES: COMPARISONS TO NIK VALUES AFTER 28 DAYS FOR PLASTERS AND ADHESIVES



0.1 on the scale means: 10 % of the concentration of the NIK value

GYPSUM

Documentation is available from the database WECOBIS:
http://wecobis.iai.fzk.de/cms/content/site/wecobis/lang/de/Gips_GS

Calcium sulphate dihydrate (gypsum) serves as raw material for the production of gypsum-based products and as setting controlling agent for cement. The raw material is extracted as mineral in open-cast as well as underground mines or forms as by-product during the desulphurization of coal-fired power stations (FGD gypsum).

Calcium sulphate β-hemihydrate is calcined from gypsum at approx. 180°C, e.g. in rotary kilns, gypsum kettles or flash calciners. The uses comprise the direct commercialization as product ("stucco"), the further use for the production of gypsum-based boards (gypsum plasterboards, gypsum blocks, gypsum fibre boards, pre-cast screeds, etc.), as component in plaster and mortar as well as filling compounds, adhesives and adhesive binders. In all these building materials, the hemihydrate acts as gypsum binder which, after the addition of water, is gypsum (calcium sulphate dihydrate) and thus the material life cycle is continued in the use-phase without chemical changes to the original raw material.

Calcium sulphate α-hemihydrate forms by hydro-thermal treatment of calcium sulphate dihydrate. The product is used as additive in plasters, adhesives and filling compounds.

In the context of the declaration, balances of gypsum raw materials as generic data providing for the exhaustive use of natural and FGD gypsum for the respective products in Germany have been evaluated in the pre-chain.

Allocations in the power plants are restricted to material and energy flows only necessary for the production of the product FGD gypsum as such (e.g. energy consumption of the belt filter), whereas those always necessary producing energy (desulphurization with lime products in the flue gas scrubber, FGD effluent) are allocated to the "national energy mix".

REGIONAL AND GENERAL AVAILABILITY OF RAW MATERIALS

There is no shortage of resources. For the necessary base substances, sufficient sources of different suppliers are available with respective predictable stock for the long term. Especially for the raw material gypsum, this means a secured supply with calcined gypsum. Furthermore, the supply is secured by regional natural gypsum deposits and raw material depots for FGD gypsum. The proportion of natural gypsum or FGD gypsum to be used can be adjusted according to the availability.

GYPSUM PRODUCTS

Documentation is available from the database WECOBIS:
http://wecobis.iai.fzk.de/cms/content/site/wecobis/Home/

You find further informations on the homepage of the Bundesverband der Gipsindustrie e.V.:
http://www.gips.de/produkte/frame.htm

APPLICATION OF GYPSUM PRODUCTS

Documentation is available from the database WECOBIS:
http://wecobis.iai.fzk.de/cms/content/site/wecobis/Home/

You find further informations on the homepage of the Bundesverband der Gipsindustrie e.V.:
http://www.gips.de/produkte/frame.htm

DURABILITY IN THE USE-PHASE

Gypsum-based products are non-decomposable and resistant to aging when used properly.

All gypsum-based products if not especially foreseen for those purposes by the producer have to be protected from continuous moisture.

Under these technical conditions, the lifetime of gypsum-based products is unlimited.

The lifetime of building materials depends on the particular construction, the use and the maintenance of the building. Guiding principles are available on the database of the IEMB:
http://www.kompetenzzentrum-bauen.de/

EXCEPTIONAL IMPACTS

Removal of damages caused by flooding on building components made from gypsum:
http://www.gips.de/organisat/bvgips/publik/hochwasser/hochwasser.pdf

END-OF-LIFE PHASE

Gypsum building materials can be processed in recycling plants especially designed for this purpose which produce raw gypsum suited for the re-use of the production of gypsum-based products.

The processing includes the separation and disposal of paper (if present) and installation-related or collection-related impurities of collected separated gypsum waste from construction and demolition activities.

This means precisely e.g. cuttings of boards from new building construction, dismantled boards from retrofitting a building or boards from the dismantling of interiour surfaces before the demolition of a building.

Separated gypsum waste is, as far as powdery gypsum-based products are concerned, usually remaining residues in silos or bags that are not used any longer.

The waste code of the European Waste List is 170802 gypsum-based building materials in the category construction and demolition waste.

LIFE CYCLE ASSESSMENT (without transport)

Gypsum waste recycling	
Primary energy, non-renewable (MJ)	0.1025
Primary energy, renewable (MJ)	0.0001
Global warming potential (GWP) (kg CO_2-eq.)	0.007
Ozone depletion potential (ODP) (kg R11-eq.)	0.01E-09
Acidification potential (AP) (kg SO_2-eq.)	0.09E-03
Eutrophication potential (EP) (kg PO_4-eq.)	1.39E-05
Photochemical ozone creation potential (POCP) (kg C_2H_4-eq.)	0.88E-05

LANDFILL

Unless recycling is not possible due to economic or technical reasons, waste can be disposed of in landfill classes I – III.

For organic carbon content, there is a legally fixed derogation in the regulation for the simplification of landfill law dated 27.04.2009 (annex 3, table 2, footnotes 2 and 8).

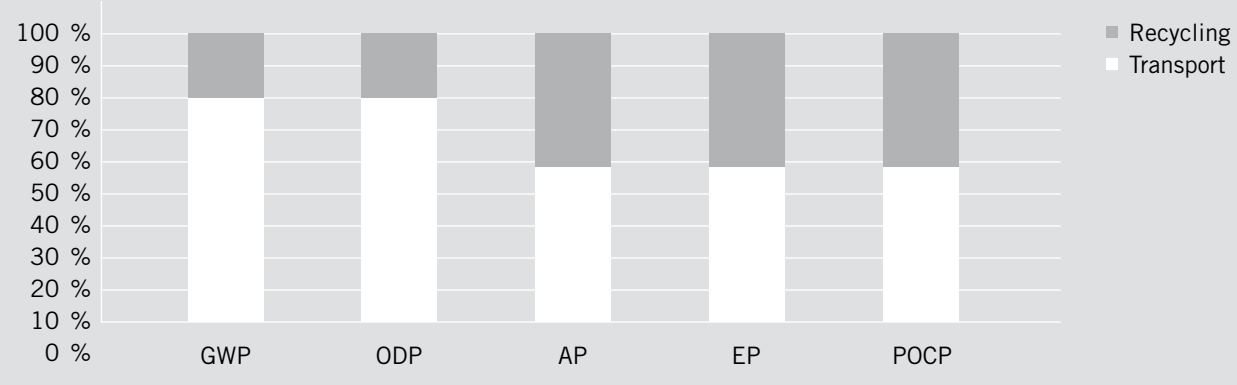
No life cycle assessment of the landfill operations has been performed.

WASTE DISPOSAL

With today's gypsum waste availability recycling plants need transports in a radius of approx. 100 km to work to capacity. An assessment of this results in an over-dimensionally large influence of these transports in all impact categories compared to the recycling process itself.

It is therefore recommended that in ecological assessments the distance to the next landfill site is always regarded as basis for the decision regarding the choice between recycling or landfill of gypsum waste.

Gypsum Recycling – Relation Transport/Recycling



LIFE CYCLE ASSESSMENT – GENERAL CONDITIONS

All available data from plant production have been collected from Bundesverband der Gipsindustrie from its member companies, as well as all available emissions measures have been considered appropriately.

The average transport distances of additives have been considered. Transports to construction sites have not been taken into account.

Delivery, application and disposal of packing material have been neglected as most products are also available in an unpacked form.

It can be assumed that the sum of the neglected processes does not exceed 5 % of the impact categories.

The machines, plants and infrastructure necessary for the production of gypsum products are not subject of this declaration.

Data quality: the last revision of the data used dates back less than 6 years.

Allocation: the allocation for FGD gypsum as by-product of electricity generation is explained in the chapter ‘gypsum’.

Internal factory recycling processes are integrated in the production assessment.

A separately disposal module is available for external recycling options.

PCR-DOCUMENTS

PCR-documents as general guidelines as well as for mineral factory mortar are available by IBU and have also been considered.
http://bau-umwelt.de/hp473/Produktgruppen-Regeln-_PCR.htm

VERIFICATION

The declaration has been verified by the Wissenschaftlicher Beirat der Forschungsvereinigung der Gipsindustrie e.V..

Individual data have been validated by the above mentioned institutions.

The status of the independent verification envisaged in ISO 14025 will be communicated separately by Bundesverband der Gipsindustrie e.V.. As the final procedure for building materials in compliance with the standard series CEN/TC 350 is still being developed an inclusuion into this document is not foreseen.

ABBREVIATIONS

AgBB
Ausschuß zur gesundheitlichen Bewertung von Bauprodukten

BG
detection limit (Bestimmungsgrenze)

IBU
Institut Bauen und Umwelt e.V.

LCA
life cycle assessment (Ökobilanz)

MW
mean value (Mittelwert)

NIK
lowest interesting concentration
(niedrigste interessierende Konzentration)

PCR
product category rules

REA
flue gas desulphurisation plant
(Rauchgasentschwefelungsanlage)

SVOC
semivolatile organic compounds
(mittel bis schwerflüchtige organische Verbindungen)

TVOC
total volatile organic compounds
(Summenkonzentration der flüchtigen organischen Verbindungen)

UNSCEAR
United Nations Scientific Committee
on the Effects of Atomic Radiation

VOC
volatile organic compounds
(flüchtige organische Verbindungen)

LITERATURE AND FURTHER INFORMATION

Gips-Datenbuch
http://www.gips.de

AgBB-Prüfschema für Innenraum-Emissionen
http://www.umweltbundesamt.de/bauprodukte/agbb.htm

Institut Bauen und Umwelt e.V. (IBU)
http://bau-umwelt.de/

IEMB
Kompetenzzentrum „Kostengünstig qualitätsbewusst Bauen“ im Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR) im Bundesamt für Bauwesen und Raumordnung (BBR) http://www.kompetenzzentrum-iemb.de/

BfS
Bundesamt für Stahlenschutz
Natürliche Radionuklide in Baumaterialien
http://www.bfs.de/

PE INTERNATIONAL GMBH
GaBi Software
http://www.gabi-software.com/

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GIPS

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