

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	DORMA Hüppe Raumtrennsysteme GmbH + Co. KG
Programme Holder	Institut Bauen und Umwelt (IBU)
Publisher	Institut Bauen und Umwelt (IBU)
Declaration Number	EPD-DHR-2012311-E
Issue Date	26.10.2012
Valid to	25.10.2017

MOVEO Partition System

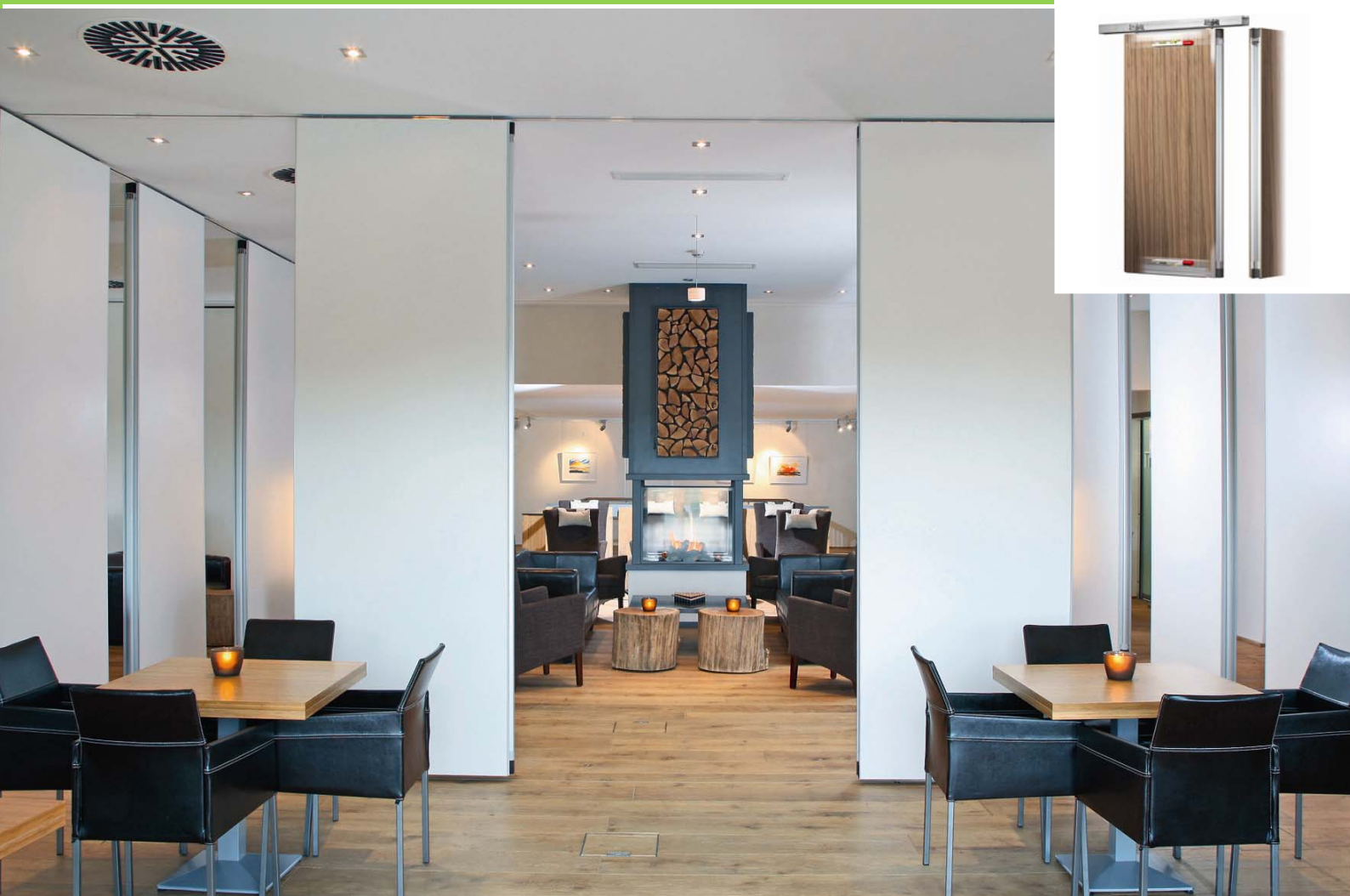
Fullwall Element

DORMA Hüppe Raumtrennsysteme GmbH + Co. KG

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Institut Bauen
und Umwelt e.V.



1 General Information

DORMA Hüppe Raumtrennsysteme GmbH + Co. KG

Programme holder

IBU - Institut Bauen und Umwelt e.V.
Rheinufer 108
D-53639 Königswinter / Germany

Declaration Number

EPD-DHR-2012311-E

This declaration is based on the Product Category Rules

Room partition systems, 07-2012
(PCR tested and approved by the Independent Advisory Board (SVA))

Issue date

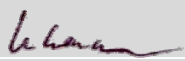
26.10.2012

Valid to

25.10.2017



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



Prof. Dr.-Ing. Hnas-Wolf Reinhardt
(Chairman of SVA)

MOVEO Fullwall Element

Owner of the Declaration

DORMA Hüppe Raumtrennsysteme GmbH + Co. KG
Industriestr. 5
26655 Westerstede/Ocholt
Germany

Declared Product / Declared Unit

The declared unit is 1 m² of the fullwall element of the MOVEO partition system (movable wall), excluding the associated fixing components and sealants at the interfaces with the stationary wall, floor and ceiling. The basic system is a fullwall element with direct coating on a MDF board.

Scope

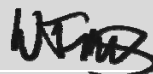
The life cycle assessment (LCA) is based on data acquired for the 2011-2012 financial year (June 30 to June 30) at the production site in Westerstede/Ocholt, Germany.

Verification

The CEN standard EN 15804 serves as the core PCR
Independent verification of the declaration and data
according to ISO 14025

internal

external



Dr. Wolfram Trinius
(Independent tester appointed by SVA)

2 Product

2.1 Product description

The MOVEO is a horizontally operable sound-insulating partition system of closed composite construction comprised of independently moving individual elements with the following characteristics:

- High stability with low weights per unit area
- Easy operability of the movable walls
- ComforTronic for maximum ease of use and enhanced safety and security
- ComfortDrive – the fully automatic version
- Designed for intercompatibility: All the product versions and models of the MOVEO system family can be readily combined

2.2 Application

The separate, independently operable elements are moved into the required position on ceiling-mounted tracks. The elements are controlled by a ComforTronic actuator which uses an electric motor to automatically retract and extend the sealing strips, in the latter case ensuring maximum sound insulation and stability of the partition. The power is transmitted from element to element via end face

contacts. All the partition functions are microprocessor-monitored.

The partition system offers flexible space utilisation thanks to multifunctional and open room configuration possibilities:

- Movable MOVEO walls serve to separate areas and rooms
- Room sizes can be adapted to group size
- High level of sound insulation means different events can be held simultaneously in adjacent rooms
- Areas and rooms can be more efficiently utilised

Areas of application include: Offices, hotels, conference centres, fairs and exhibitions, schools, religious amenities and studios

2.3 Technical data

- Sound insulation index R in [dB] = 38 dB to 55 dB per DIN EN ISO 140-3:2005
- Heat transfer coefficient (U value) in [W/(m²K)] = 0.42 to 0.46 – calculated in accordance with ISO 6946
- Load arising from the partition weight in [kN/m²] = 0.16 to 0.40

2.4 Placing on the market / Application rules

- 89/106/EWG/EEC/CEE Building Products
- 2006/42/EC Machinery Directive
- 2006/95/EC Low Voltage Directive
- 2004/108/CEElectromagnetic Compatibility
- Ball Impact Test to DIN 18032 Part 3
- TÜV Type Test

2.5 Delivery status

The MOVEO partition system is customizable. The model on which this EPD is based has the following technical data:

	Dimensions
Element height	3,000 mm
Element width	1,100 mm
Area	3.3 m²
Product weight	100.95 kg
Packaging	26 kg

2.6 Base materials / Ancillary materials

Excluding production waste and packaging, 1m² of the MOVEO fullwall element is comprised as follows:

Components	Proportion [%]
MDF board	49.6%
Bitumen sheet	22.1%
Anodized alu profiles	15.7%
Glass wool	3.9%
Plastics components	3.3%
Zinc die-cast components	2.5%
Steel components	2.0%
Geared motor (24 V)	0.5%
Cable	0.3%
PCBs (Pb-free)	0.1%
Copper components	< 0.1%
Paper	< 0.1%
TOTAL	100.0%

The surface coating is applied directly to the MDF substrate.

2.7 Manufacture

1. Cutting / Pre-assembly

Aluminium profiles for the rectangular baseframe are sawn to length. Sealing rail extrusions are inserted and fixed in chambers especially provided for this purpose in the horizontal and vertical profiles. The profiles are assembled together to form the frame using plastic angle brackets.

The top and bottom sealing strips are provided by assembling together cut aluminium profiles and PU mouldings.

Coated MDF boards are sawn to size to provide the cover panels both sides. Sawdust, chips, swarf and residues are vacuumed up and collected.

The cover panels are provided with and edge using hotmelt adhesive around their periphery.

2. Final installation

The pre-assembled frames and the prepared cover panels are joined together in a fully automatic hotmelt bonding machine to produce the partition element shells. Mineral wool is introduced into the element cavity.

Electric sealing strip actuators are mounted on the top and bottom profiles. Roller carriers are also bolted to the top load-bearing profile. The prefabricated sealing strips are clipped onto the actuator units.

Contact connectors are bolted on both ends above the vertical profiles with a cable connecting them to the actuator unit.

The completed partition elements are electrically tested (extension and retraction of the top and bottom sealing strips) and then packed on a pallet for shipment.

The offcuts are collected and sent to a disposal company for recycling (see section 2.16).

2.8 Environmental and health during manufacture

The production processes are permanently monitored and continuously improved on the basis of a quality management system certified to DIN EN ISO 9001:2008.

2.9 Product processing / Installation

The following machinery, plant, tools and equipment are used together with the noise protection measures indicated in each case:

- Saws for steel and aluminium, cordless screwdrivers, box column drilling machines
- Acoustic cabins for saws, acoustic partitions in the woodworking area (CNC saw and edge machining)
- Extraction systems installed at all saw locations in the woodworking area
- Bonding robots (fully automatic), no heavy lifting etc.

2.10 Packaging

The MOVEO fullwall element is supplied ex works with the following transportation packaging:

Components	Proportion [%]
Wooden pallet	85%
Polystyrene padding	4%
PU sheeting	8%
Corrugated cardboard	4%
TOTAL	100%

For further information, please consult section 2.16.

2.11 Service condition

The standard ComforTronic extends the horizontal seals (sealing strips) of the individual elements and the closing element under automatic electronic control, as soon as the elements have been pushed together. A line supply by others is required for the socket, with a rating of either 100-120 V or 200-240 V, 50-60Hz, min. 10 A.

No repair, refurbishment or maintenance requirements arise during the reference service lifetime.



2.12 Environmental and health during use

At the current time, there are no known relationships or interactions between the product, the environment and human health. For further information, please refer to section 7.

2.13 Reference service life

According to empirical values acquired by DORMA Hüppe Raumtrennsysteme GmbH + Co. KG, the reference service lifetime is 25 years based on around 50 closing cycles/year. This figure has been calculated on the basis of DORMA's 50 years of business success and accumulated expertise.

2.14 Extraordinary effects

Fire

The product satisfies the test criteria of building material class B2 (normally flammable building material). The construction product does not collapse or drip while burning, as defined in DIN 4102 Part 1. Connection to other building materials can modify its fire behaviour. Visually, the degree of smoke development is minor.

Water

Unforeseen water contact can be regarded as having no environmental consequences.

Mechanical destruction

Unforeseen mechanical destruction can be regarded as having no environmental consequences.

2.15 Re-use phase

With reference to the composition of materials incorporated in the product system as detailed in section 2.6, the possibilities are as follows:

Re-use

The complete partition system can be re-used within the reference service lifetime. Dismantling is performed for remuneration by DORMA Hüppe Raumtrennsysteme GmbH + Co. KG,

Recycling of materials

The metal fractions can be separated at a cost and recycled as materials.

Energy recovery

The MDF board and plastic fractions can be disposed of via the incineration route for energy recovery, subject to appropriate flue gas cleaning.

Landfill disposal

As the product contains no substances harmful to the environment or human health, the entire system can be safely placed in a landfill site in cases where no waste recycling technologies are available. Disposal of the geared motor is subject in Europe to the WEEE directive.

2.16 Disposal

Cutting waste produced during manufacturing

The offcuts produced during the manufacturing phase are recycled for metallurgical and energy recovery. The offcuts are collected separately and collected by disposal companies.

- EWC 03 01 05 Sawdust, shavings, cuttings, wood, particle board and veneer other than those substances falling under 03 01 04
- EWC 12 01 03 Non-ferrous metal filings and turnings
- EWC 12 01 05 Plastics shavings and turnings

Packaging

The packaging of the components installed in the building are recycled for energy recovery:

- EWC 15 01 01 paper and cardboard packaging
- EWC 15 01 02 plastic packaging
- EWC 15 01 03 wooden packaging

Disposal phase

All materials are returned for energy recovery or metallurgical recycling in accordance with the waste treatment technologies available (see section 2.15):

- EWC 10 11 03 Waste glass-based fibrous materials
- EWC 16 02 14 Discarded equipment other than those mentioned in 16 02 09 to 16 02 13
- EWC 17 02 01 Construction and demolition waste (wood)
- EWC 17 02 03 Plastic
- EWC 17 03 02 Bituminous mixtures
- EWC 17 04 01 Copper, bronze, brass
- EWC 17 04 02 Aluminium
- EWC 17 04 05 Iron and steel
- EWC 17 04 11 Cables other than those mentioned in 17 04 10

2.17 Further information

For further information relating to technical data and further product variants, the contact details are as follows:

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Thomas P. Wagner and Rainer Scholzen

3 LCA: Calculation Rules

3.1 Declared unit

The declared unit is 1 m² of the fullwall element of the MOVEO partition system (movable wall), excluding the associated fixing components and sealants at the interfaces with the stationary wall, floor and ceiling.

3.2 System boundary

EPD type: Cradle to grave (with options)

In accordance with EN 15804, the following modules have been given consideration:

Product stage: A1 – A3

The extraction and processing of the raw materials and biomass production and processing, including all relevant upstream activities, the provision of electricity, steam and heat from primary fuels, and also the extraction, refining and transportation of same, together with the necessary delivery transportation to the factory gate and manufacture of the packaging are incorporated in this module. For further information, please consult section 3.8.

Construction stage: A4 – A5

This module encompasses the distribution channels and the process of energy recovery from the packaging materials.

Use stage: B6

The use stage relates to the operation of the building and encompasses the energy input for operation of the declared product.

End of life stage: C2 – C3

Included in this module are transportation to the recycling facility and the collection, processing and recovery processes applied.

Credits: D

The resultant value streams arising from material recycling and energy recovery for the downstream product system are indicated in this module.

The life cycle assessment was prepared for the reference territory of Germany. This means that, in addition to the production processes performed under these conditions, the upstream stages relevant for Germany, such as electricity generation or fuel provision, have also been taken into account.

3.3 Estimates and assumptions

The energy consumption figures were calculated on a production-specific basis. The distribution transport distance was determined with all the distribution countries being included on a proportionate basis. The energy consumption value in the use phase takes into account the reference service lifetime and the total number of closing cycles. The collection loss at the end of life is assumed to be 5% and the distance to the disposal site is assumed to be 75 km.

3.4 Cut-off criteria

All the details from the operating data survey and all the emission measurements available over the period of observation mentioned in section 3.7 have been taken into account. In addition, the data

relating to transport operations was also gathered and modelled for all included inputs.

The infrastructure used in the manufacturing processes (referring particularly to the machines and production facilities) was not incorporated into the life cycle analysis. Transport inputs for the packaging were likewise not taken into consideration. It can be assumed that the total of non-included processes does not exceed 5% of the impact categories and can therefore be regarded as having only minor significance.

3.5 Background data

The life cycle was modelled using the Holistic Assessment software system (German acronym "GaBi"), current version 5. All the background data records used were taken from the current versions of various GaBi databases and theecoinvent database (v2.2). The data records incorporated in the databases are documented online.

German data records were used for Modules A1-3, and corresponding European data records were used for the distribution transport operations and installation of the product in the building (A4-5), the use phase (B modules) and disposal scenarios (C modules).

Due to the lack of data records for waste treatment, various material flows were combined within the data record that appeared best suited from a technical viewpoint.

The secondary and recycling operations can only be taken into account through the application of generic data records.

3.6 Data quality

The data was acquired from analyses of internal production and environmental data, the collection of LCA-relevant information within the supply chain and through calculation of relevant data relating to energy provision. The data provided, arising from operational data acquisition and measurement activities were subjected to a plausibility check. Following a thorough examination, the data can be regarded as being of good representative quality.

The data records used for the assessment are generally not older than 10 years.

3.7 Observation period

The life cycle assessment is based on data acquired for the 2011-2012 financial year (June 30 to June 30) at the production site in Westerstede/Ocholt, Germany.

3.8 Allocation

There are no secondary or by-products. The outcome of the manufacturing process is a single product.

3.9 Comparability

All work carried out for the LCA complied with EN 15804. The identified environmental impacts are therefore comparable with the results of similar product systems likewise assessed to EN 15804, with the building context or product-specific performance features being duly taken into account.

4 LCA: Scenarios and additional technical information

Transport to the building site (A4)

Litres of fuel	GLO: Truck (2006 version) PE
Transport distance	582.90 km
Capacity utilisation (incl. empty runs)	85 % (GaBi)

The transport distance was determined with all the distribution countries being included on a proportionate basis. Transport to site is reflected in the corresponding fuel data records.

Installation into the building (A5)

Output materials as a result of waste treatment on site	
For energy recovery	100 %

Reference service life

Reference service life	25 years (empirical value)
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Operational energy use (B6)

Power consumption over service life	138.19 kWh
Equipment rating	24 V

End of life (C2 – C3)

To recycling	6.25 kg/m ²
For energy recovery	24.34 kg/m ²

An average collection loss of 5% will be considered within the LCA results.

Re-use, recycling and energy recovery potential (D)

Credits are calculated (Module D) based on material recycling of the metals, and energy recovery from the MDF board and plastics.

5 LCA: Results

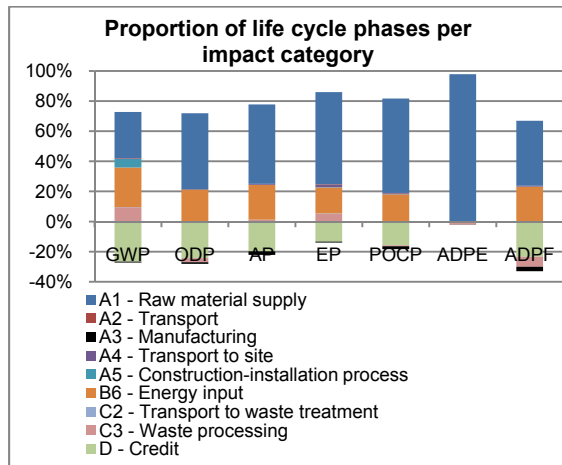
Description OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)																
Product stage			Construction process stage		Use stage							End of Life stage			Benefits and loads beyond the system boundary	
Raw material supply	Transport	Manu- facturing	Transport	construction- installation process	Use	Maintenance	Repair	Replace- ment	Refurbish- ment	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	MND	MND	MND	X	MND	MND	X	X	MND	X

Parameter	Unit	A1	A2	A3	A4	A5	B6	C2	C3	D
RESULTS OF THE LCA – ENVIRONMENTAL IMPACT: 1 m² MOVEO Fullwall Element										
Global warming potential (GWP)	[kg CO ₂ -Eq.]	7,89E+01	4,22E-01	-1,54E+00	1,16E+00	1,46E+01	6,75E+01	3,01E-01	2,46E+01	-6,88E+01
Depletion potential of the stratospheric ozone layer (ODP)	[kg CFC11-Eq.]	1,05E-05	2,89E-11	-2,06E-07	4,32E-10	-1,24E-08	4,41E-06	1,11E-10	-5,59E-07	-5,04E-06
Acidification potential of land and water (AP)	[kg SO ₂ -Eq.]	6,57E-01	1,94E-03	-2,98E-02	5,57E-03	9,32E-04	2,88E-01	1,52E-03	1,39E-02	-2,46E-01
Eutrophication potential (EP)	[kg PO ₄ ³⁻ -Eq.]	5,52E-02	4,60E-04	-6,03E-04	1,27E-03	2,67E-04	1,55E-02	3,51E-04	4,54E-03	-1,21E-02
Formation potential of tropospheric ozone photochemical oxidants (POCP)	[kg Ethen-Eq.]	6,15E-02	1,94E-04	-1,82E-03	5,69E-04	9,92E-05	1,75E-02	1,66E-04	-6,22E-04	-1,55E-02
Abiotic depletion potential for non-fossil resources (ADPE)	[kg Sb-Eq.]	4,79E-03	1,92E-08	-2,81E-06	4,60E-08	3,57E-07	5,54E-06	1,18E-08	-8,22E-05	-2,13E-05
Abiotic depletion potential for fossil resources (ADPF)	[MJ]	1,45E+03	5,81E+00	-1,02E+02	1,61E+01	2,15E+00	7,70E+02	4,15E+00	-2,21E+02	-7,88E+02
RESULTS OF THE LCA – RESOURCE CONSUMPTION ASSESSMENT: 1 m² MOVEO Fullwall Element										
Renewable primary energy as energy carrier (PERE)	[MJ]	7,07E+02	2,32E-01	-2,43E+01	6,31E-01	1,01E-01	1,72E+02	1,62E-01	-1,68E+00	-2,05E+02
Renewable primary energy resources as material utilization (PERM)	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable primary energy resources (PERT)	[MJ]	7,07E+02	2,32E-01	-2,43E+01	6,31E-01	1,01E-01	1,72E+02	1,62E-01	-1,68E+00	-2,05E+02
Non-renewable primary as energy carrier (PENRE)	[MJ]	1,68E+03	5,83E+00	-1,22E+02	1,62E+01	2,15E+00	1,18E+03	4,16E+00	-2,58E+02	-9,75E+02
Non-renewable primary as material utilization (PENRM)	[MJ]	1,42E-03	0,00E+00	1,24E-09	0,00E+00	1,98E-10	0,00E+00	0,00E+00	9,86E-09	-3,43E-08
Total use of non-renewable primary energy resources (PERT)	[MJ]	1,68E+03	5,83E+00	-1,22E+02	1,62E+01	2,15E+00	1,18E+03	4,16E+00	-2,58E+02	-9,75E+02
Use of secondary material (SM)	[kg]	3,67E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels (RSF)	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels (NRSF)	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water (FW)	[m ³]	6,76E+02	2,16E-02	-3,84E+00	6,08E-02	3,39E-01	2,46E+02	1,56E-02	3,61E-01	-3,20E-01
RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m² MOVEO Fullwall Element										
Hazardous waste disposed (HWD)	[kg]	1,72E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,92E-02	-1,34E-01
Non-hazardous waste disposed (NHWD)	[kg]	2,69E+02	3,03E-02	-1,65E+01	5,69E-02	7,72E-01	2,52E+02	1,46E-02	-2,60E+01	-7,34E+01
Radioactive waste disposed (RWD)	[kg]	7,08E-02	8,23E-06	-6,18E-03	2,25E-05	4,29E-05	1,69E-01	5,79E-06	-7,03E-03	-6,34E-02
Components for re-use (CRU)	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling (MFR)	[kg]	0,00E+00	0,00E+00	5,62E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,25E+00	0,00E+00
Materials for energy recovery (MER)	[kg]	0,00E+00	0,00E+00	4,06E+00	0,00E+00	7,88E+00	0,00E+00	0,00E+00	2,43E+01	0,00E+00
Exported electrical energy	[MJ]	0,00E+00	0,00E+00	1,39E+01	0,00E+00	1,94E+01	0,00E+00	0,00E+00	8,00E+01	0,00E+00
Exported thermal energy	[MJ]	0,00E+00	0,00E+00	4,68E+00	0,00E+00	4,69E+01	0,00E+00	0,00E+00	3,20E+01	0,00E+00

6 LCA: Interpretation

In order to perform the dominance analysis, the LCA was evaluated with relative values and the lower threshold set at 10%.

Environmental impacts



In the production phase, particularly the aluminium components (anodised and in some cases powder-coated with polyester resin) and the material with the highest mass fraction – the MDF board – can be regarded as predominant in terms of their environmental impacts.

Electric power is required for the daily operation of the partition system. Here it should be noted that, due to the preponderance of European distribution countries, power consumption has been modelled on the basis of an average EU27 electricity supply mix.

Credits arise as a result of the material recycling and energy recovery potential related to the offcuts produced during manufacturing, disposal of the packaging and the disposal phase of the product.

Use of resources

The use of non-renewable energy resources in the production phase is due to the manufacture of the aluminium and bitumen sheet. The MDF board makes the biggest contribution on the renewable energy resources side. The use of water is the result particularly of the use of hydroelectricity and the upstream processes involved in aluminium production.

The power requirement in the use phase has an effect on the consumption of non-renewable resources and fresh water arising from the average EU27 electricity supply mix.

Credits arise as a result of recycling and the generation of thermal and electrical energy due to recovery of the offcuts produced during manufacturing, disposal of the packaging and the disposal phase of the product.

Output flows and waste categories

Nuclear and special category wastes arise primarily due to the extraction and production of aluminium, albeit that offsetting credits can be earned for the material recycling of the offcuts and of the product in the disposal phase.

Slags and ashes arise predominantly due to the incineration of the waste fraction used in this energy recovery process.

7 Requisite evidence

7.1 VOC emissions

The MOVEO partition system is covered by Test Report No. 18317-2 of 16.04.2008. The test body was eco-Institut GmbH, Cologne.

Summary of results of tests prescribed by the Committee for Health-related Evaluation of Building products (AgBB) (28 days [$\mu\text{g}/\text{m}^3$]):

- TVOC (C6-C16) = 128 $\mu\text{g}/\text{m}^3$
- Σ -SVOC (C16-C22) = 3 SERa [$\mu\text{g}/\text{m}^3\text{h}$]
- Carcinogenic substances = CMR-VOC were not detectable 3 days after placement in the test chamber.

8 References

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Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. 2011-07.

Part B: Requirements on the EPD for Room partition systems. 2011-06.

www.bau-umwelt.de

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DIN EN ISO 9001:2008-12, Quality management systems – Requirements (ISO 9001:2008); Trilingual version EN ISO 9001:2008.

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