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-2012111-E
Issue Date	26.10.2012
Valid to	25.10.2017

VARITRANS Partition System
Fullwall Element
DORMA Hüppe Raumtrennsysteme GmbH + Co. KG

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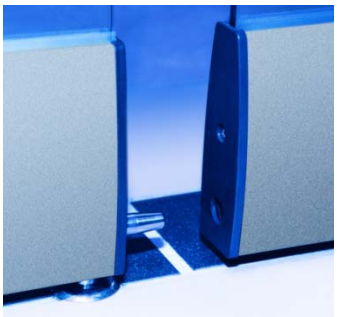

1 General Information

DORMA Hüppe Raumtrennsysteme GmbH + Co. KG	VARITRANS Fullwall Element
Programme holder IBU - Institut Bauen und Umwelt e.V. Rheinufer 108 D-53639 Königswinter / Germany	**Owner of the Declaration** DORMA Hüppe Raumtrennsysteme GmbH + Co. KG Industriestrasse. 5 26655 Westerstede/Ocholt Germany
Declaration Number EPD-DHR-2012111-E	**Declared Product / Declared Unit** The declared unit is 1 m² of the fullwall element of the VARITRANS 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 single-pane safety glass operable partition in the fullwall design.
This declaration is based on the Product Category Regulations Partitioning Systems, 07-2012 (PCR tested and approved by the Independent Advisory Board (SVA))	**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.
Issue date 26.10.2012	
Valid to 25.10.2017	**Verification** The CEN standard EN 15804 serves as the core PCR Independent verification of the declaration and data according to IS0 14025 ☐ internal ☒ external
Prof. Dr.-Ing. Horst J. Bossenmayer (President of IBU – Institut Bauen und Umwelt e.V.)	
Prof. Dr.-Ing. Horst J. Bossenmayer (Chairman of SVA)	Dr. Wolfram Trinius (Independent tester appointed by SVA)

2 Product

2.1 Product description

The VARITRANS is a horizontally operable single-pane safety glass partition system comprised of independently moving individual elements with the following characteristics:

- Openness with intrinsic aesthetic allure
- Elegant design giving an integrated appearance
- Flexible modular system with many equipment and door solution alternatives
- Manual and fully automatic operation

2.2 Application

The independently operable single-pane safety glass elements are moved into the required position on ceiling-mounted tracks. The functional elements are integrated in the hardware.

The partition system offers flexible, transparent room occupancy with multifunctional spatial configuration:

- Areas and rooms can be divided by operable VARITRANS partitions
- The translucent elements ensure that the openness, spacious feel and brightness of the area are retained
- Areas and rooms can be used with greater efficiency

Applications include: Self-service areas in banks, shops, exhibition and presentation rooms and foyers

2.3 Technical data

- Glass thickness 10 and 12 mm TSG
- Load arising from the partition weight in [kN/m²] = 0.25 to 0.34

2.4 Placing on the market / Application rules

- 89/106/EWG/EEC/CEE Building Products
- 2006/42/EC Machinery Directive
- TÜV Type Test

2.5 Delivery status

The VARITRANS 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	1,000 mm
Area	3 m²
Product weight	85.99 kg
Packaging	26 kg

2.6 Base materials / Ancillary materials

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

Components	Proportion [%]
Safety glass	85.5%
Anodized alu profiles	10.6%
Steel components	2.8%
Copper components	0.3%
Zinc die-cast components	0.3%
Plastics components	0.3%
TOTAL	**100.0%**

2.7 Manufacture

The glass pane for the partition element is positioned on an assembly bench. Clamp-type profiles are placed at the top and bottom of the glass using assembly templates and then secured with screw fasteners.

The presized aluminium profiles are placed over these clamp-type profiles on both sides (to perform both a load-bearing and aesthetic function) and then secured with sheet steel retainers.

Prefabricated carrier assemblies with support track rollers are then inserted from the side into the cover profiles on the top of the glass element and secured with clamping screws.

Floor bolts and latching catches are mounted on the bottom of the glass element in the same way. The open sides between the cover profiles are closed with screw-fastened end caps.

Following a functional check, the glass elements are packed with intermediate layers of polystyrene on pallets ready for shipment.

The production waste is separately 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
- Special lifting appliances (vacuum attachments) for the glass sheets

2.10 Packaging

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

Components	Proportion [%]
Wooden pallet	85%
Polystyrene padding	4%
PU sheeting	7%
Corrugated cardboard	4%
TOTAL	**100%**

For further information, please consult section 2.16.

2.11 Service condition

No lubricants are required for the maintenance and usage of the partition system. As a rule, repairs and replacements are not required. The cleaning requirement is negligible.

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.

2.13 Reference service life

Based on around 220 closing cycles/year, the reference service life amounts to 15 years. 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 can be regarded as conforming to building material class A2.

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. Removal from the building is performed for remuneration by DORMA Hüppe Raumtrennsysteme GmbH + Co. KG.

Recycling of materials

The safety glass can be melted for use in the manufacture of new glass products and thus made available for re-use at the primary production phase. The metal fractions can be separated at a cost and recycled as materials.

Energy recovery

The plastic fractions can be disposed of via the incineration route, 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.

2.16 Disposal

Cutting waste produced during manufacturing

The aluminium offcuts produced during the manufacturing phase are returned for material recycling. The offcuts are collected separately and collected by disposal companies.

- EWC 12 01 03 Non-ferrous metal filings 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 17 02 02 Glass
- EWC 17 02 03 Plastic
- EWC 17 04 01 Copper, bronze, brass
- EWC 17 04 02 Aluminium
- EWC 17 04 05 Iron and steel

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 m^2 of the fullwall element of the VARITRANS partition system (movable wall) including packaging materials but excluding the associated fixing materials and 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 information modules have been given consideration:

Product stage: A1 – A3

The extraction and processing of the raw materials, 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.

Construction stage: A4 – A5

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

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 (“ecobalance”) 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 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 the ecoinvent 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

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 notification 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 (“ecobalance”) 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 site (A4)

Litre of fuel	GLO: Truck (2006 version) PE
Transportation distance	446.75 km
Capacity utilisation (incl. empty trips)	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 lifetime

Reference service life	15 years (empirical value)

End of life (C2 – C3)

To recycling	28.45 kg/m²
For energy recovery	0.10 kg/m²

An average collection loss of 5% (with Safety glass 10 %) 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 safety glass and metals, and energy recovery from the plastics.

5 LCA: Results

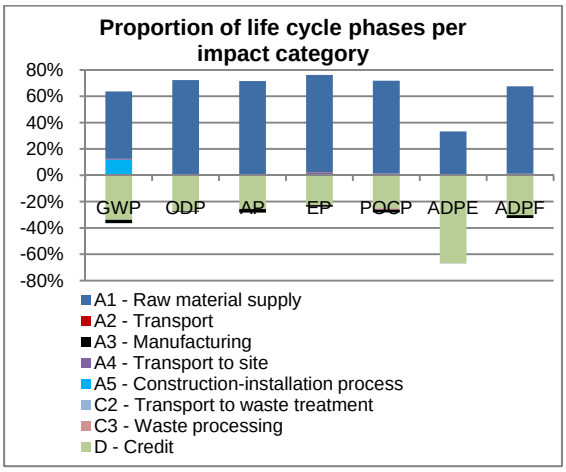
Description OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)																
Product stage			**Construction process stage**		**Use stage**							**End of Life stage**				**Benefits and loads beyond the system boundary**
Raw material supply	Transport	Manu-facturing	Transport	construction-installation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

Parameter	Unit	A1	A2	A3	A4	A5	C2	C3	D
RESULTS OF THE LCA – ENVIRONMENTAL IMPACT: 1 m² VARITRANS Fullwall Element									
Global warming potential (GWP)	[kg CO_2-Eq.]	7,02E+01	1,13E-01	-3,50E+00	8,61E-01	1,53E+01	1,50E-01	7,70E-01	-4,63E+01
Depletion potential of the stratospheric ozone layer (ODP)	[kg CFC11-Eq.]	7,52E-06	6,51E-12	-4,32E-08	4,63E-11	-1,37E-08	7,40E-09	7,38E-08	-2,86E-06
Acidification potential of land and water (AP)	[kg SO_2-Eq.]	5,39E-01	5,15E-04	-2,05E-02	3,93E-03	8,24E-04	7,76E-04	-1,13E-03	-1,94E-01
Eutrophication potential (EP)	[kg PO_4^{3-}-Eq.]	5,63E-02	1,23E-04	-9,26E-04	9,36E-04	2,78E-04	1,98E-04	1,03E-04	-1,72E-02
Formation potential of tropospheric ozone photochemical oxidants (POCP)	[kg Ethene-Eq.]	3,53E-02	5,13E-05	-1,10E-03	3,91E-04	9,77E-05	9,62E-05	-4,44E-04	-1,26E-02
Abiotic depletion potential for non-fossil resources (ADPE)	[kg Sb-Eq.]	1,37E-03	5,14E-09	-1,12E-06	3,94E-08	2,73E-07	1,20E-07	6,41E-07	-2,74E-03
Abiotic depletion potential for fossil resources (ADPF)	[MJ]	1,07E+03	1,55E+00	-3,51E+01	1,19E+01	1,96E+00	2,12E+00	2,26E+00	-4,87E+02
RESULTS OF THE LCA – RESOURCE CONSUMPTION ASSESSMENT: 1 m² VARITRANS Fullwall Element									
Renewable primary energy as energy carrier (PERE)	[MJ]	3,93E+02	6,18E-02	-1,45E+01	4,73E-01	7,84E-02	6,61E-02	1,02E+00	-1,26E+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
Total use of renewable primary energy resources (PERT)	[MJ]	3,93E+02	6,18E-02	-1,45E+01	4,73E-01	7,84E-02	6,61E-02	1,02E+00	-1,26E+02
Non-renewable primary as energy carrier (PENRE)	[MJ]	1,19E+03	1,56E+00	-4,17E+01	1,19E+01	1,90E+00	2,17E+00	7,15E+00	-6,10E+02
Non-renewable primary as material utilization (PENRM)	[MJ]	7,41E-04	0,00E+00	0,00E+00	0,00E+00	2,18E-10	3,56E-06	2,30E-03	-1,23E-06
Total use of non-renewable primary energy resources (PERT)	[MJ]	1,19E+03	1,56E+00	-4,17E+01	1,19E+01	1,90E+00	2,17E+00	7,15E+00	-6,10E+02
Use of secondary material (SM)	[kg]	2,46E+01	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
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
Use of net fresh water (FW)	[m³]	5,58E+02	5,76E-03	-1,54E+01	4,41E-02	3,39E-01	6,11E-02	6,82E-01	-9,18E-01
RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m² VARITRANS Fullwall Element									
Hazardous waste disposed (HWD)	[kg]	1,23E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,54E-02	-7,48E-02
Non-hazardous waste disposed (NHWD)	[kg]	1,40E+02	8,18E-03	-7,50E+00	6,29E-02	6,45E-01	5,10E-03	-7,52E+00	-1,09E+02
Radioactive waste disposed (RWD)	[kg]	4,14E-02	2,20E-06	-2,72E-03	1,68E-05	2,53E-05	2,02E-06	1,16E-03	-4,29E-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
Materials for recycling (MFR)	[kg]	0,00E+00	0,00E+00	3,45E-01	0,00E+00	0,00E+00	0,00E+00	2,85E+01	0,00E+00
Materials for energy recovery (MER)	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,67E+00	0,00E+00	1,01E-01	0,00E+00
Exported electrical energy	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,98E+01	0,00E+00	7,16E-01	0,00E+00
Exported thermal energy	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,77E+01	0,00E+00	5,70E-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 anodised aluminium components and the material with the highest mass fraction – the safety glass – can be regarded as predominant in terms of their environmental impacts.

Due to the low relevance of the fuels in the use phase, no environmental impacts are shown for this category.

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 end of life phase.

Use of resources

The use of non-renewable energy resources in the production phase is due to the manufacture of the safety glass and the aluminium. The wooden pallet (packaging material) 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.

Due to the low relevance of the fuels in the use phase, no resources are needed for the declared product.

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 end of life phase.

Output flows and waste categories

Raw material extraction dominates the category of non-hazardous waste due to the resultant spoil. Non-hazardous wastes are responsible for the majority of the output flows.

The small amounts of nuclear and special category wastes arise primarily due to the upstream processes involved in aluminium production, 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 and the waste fraction used in this energy recovery process.

7 Requisite evidence

7.1 VOC

No emission measurements were performed for the VARITRANS partition system.

8 References

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