ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025 and EN 15804

Declaration holder	DORMA GmbH + Co. KG
Publisher	Institute Construction and Environment e.V. (IBU)
Programme holder	Institute Construction and Environment e.V. (IBU)
Declaration number	EPD-DOR-2013121-E
Issue date	12.04.2013
Validity	11.04.2018

TS 93 slide rail door closer system
DORMA GmbH + Co. KG

Institut Bauen
und Umwelt e.V.

www.bau-umwelt.com

1 General information

DORMA GmbH + Co. KG	TS 93 slide rail door closer system
Programme holder IBU - Institut Bauen und Umwelt e.V. Rheinufer 108 D-53639 Königswinter	**Holder of the Declaration** DORMA GmbH + Co. KG Dorma Platz 1 58256 Ennepetal GERMANY
Declaration number EPD-DOR-2013121-E	**Declared product/unit** The declared unit involves one (1) average slide rail door closer in the TS93 range of models comprising: - a closer - a slide rail and - the respective packaging materials.
This Declaration is based on the Product Category Rules: Requirements on the EPD for locks and fittings, 10-2012 (PCR examined and approved by the independent Expert Committee (SVA)) **Issue date** 12.04.2013 **Valid until** 11.04.2018	**Area of applicability:** This EPD is based on the entire life cycle of an average TS93 door closer manufactured by DORMA. The various technical features are outlined in section 2.3. The product is manufactured at the DORMA production facility in Ennepetal, Germany. The Declaration holder is liable for the details and documentation upon which the evaluation is based.
Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)	**Verification** The CEN EN 15804 standard serves as the core PCR. Verification of the EPD by an independent third party in accordance with ISO 14025 ☐ internal x ☐ external
Prof. Dr.-Ing. Hans-Wolf Reinhardt (Chairman of the Expert Committee (SVA))	Dr. Wolfram Trinius (Independent verifier appointed by the SVA)

2 Product

2.1 Product description

The TS 93 slide rail door closer system is a modular and multifunctional system comprising only a few door closer models and various slide rails which complies with practically any functional requirement. It makes it possible to equip doors optimally for a wide variety of applications and in various designs. Featuring a linear drive and a heart-shaped cam disc, the DORMA TS 93 system door closers are distinguished by the fact that the resistance to be overcome when opening the door is immediately greatly reduced thereby complying with all of the requirements on barrier-free construction. Thanks to the standard back check [BC], the swing of a door opened forcefully or caught by the wind is largely absorbed, thereby protecting both the wall and door from damage. Furthermore, the door closers in the TS 93 system also avail of standard delayed closing [DC] or 2 independent closing zones. These functions can be adjusted individually for optimum co-ordination of the closing features for any possible designated purpose.
Within the framework of this EPD, an average slide rail door closer system TS93 is declared from the

- EN 2-5
- EN 1-5
- EN 5-7
- ANSI 1-5

averages.

Averaging depended on the volumes sold (reference: fiscal 2011/2012).
Unless specifically stated otherwise, the statements made in the EPD report apply for all types of door closers.

2.2 Application

The door closers in the DORMA TS 93 system can be used universally. Depending on the accessories, they can be used on single-panel or double-panel fire and smoke protection doors. It goes without saying that they can also be used on standard doors.

2.3 Technical data

Data and features			TS 93 B/G	
Variable closing force	Spring strength		EN 2-5	EN 5-7
Standard doors	≤ 1250 mm		●	–
	≤ 1600 mm		–	●
External doors, outward opening	≤ 1250 mm		●	–
	≤ 1600 mm		–	●
For fire and smoke check doors	≤ 1250 mm		●	–
	≤ 1600 mm		–	●
Non-handed			●	●
Arm assembly type	Slide channel		●	●
Closing force variable by means of adjustment screw			●	●
Closing speed adjustable by valve			●	●
Latching speed adjustable by valve			●	●
Backcheck (BC/ÖD)	adjustable at valve		●	●
Delayed action (DC/SV)	adjustable at valve		●	●
Hold-open			○	○
Weight in kg			3.5	5.2
Dimensions in mm	Length	(L)	275	285
	Overall depth	(B)	53	62
	Height	(H)	60	71
Door closer tested to EN 1154			●	●
Hold-open devices tested to EN 1155			●	●
Hold-open devices tested to EN 1155			●	●
CE-mark for building products			●	●

● yes – no ○ optional

Data and features			TS 93 B/G	
Variable closing force	Spring strength		EN 1-5	ANSI 1-5
Standard doors	≤ 1250 mm		●	●
External doors, outward opening	≤ 1250 mm		●	●
For fire and smoke check doors	≤ 1250 mm		●	●
Non-handed			●	●
Arm assembly type	Slide channel		●	●
Closing force variable by means of adjustment screw			●	●
Closing speed adjustable by valve			●	●
Latching speed adjustable by valve			●	●
Backcheck (BC/ÖD)	adjustable at valve		●	●
Delayed action (DC/SV)	adjustable at valve		●	●
Hold-open			○	○
Weight in kg			3.5	5.2
Dimensions in mm	Length	(L)	275	285
	Overall depth	(B)	53	62
	Height	(H)	60	71
Door closer tested to EN 1154			●	●
Hold-open devices tested to EN 1155			●	●
Hold-open devices tested to EN 1155			●	●
CE-mark for building products			●	●

● yes – no ○ optional

Data and features			TS 93 B/G 2S
Variable closing force	Spring strength		EN 2-5
Standard doors	≤ 1250 mm		●
External doors, outward opening	≤ 1250 mm		●
For fire and smoke check doors	≤ 1250 mm		●
Non-handed			●
Arm assembly type	Slide channel		●
Closing force variable by means of adjustment screw			●
Closing speed adjustable at two valves	180° – 15°		●
	15° – 0°		●
Latching speed			–
Backcheck (BC/ÖD)	adjustable at valve		●
Delayed action (DC/SV)			●
Hold-open			○
Weight in kg			3.5
Dimensions in mm	Length	(L)	275
	Overall depth	(B)	53
	Height	(H)	60
Door closer tested to EN 1154			●
Hold-open devices tested to EN 1155			●
Hold-open devices tested to EN 1155			●
CE-mark for building products			●

● yes – no ○ optional

2.4 Placing on the market / Application rules

The applicable standards are EN 1154 for the door closer and EN 1155 and EN 1158 for

accessories. ANSI versions are subject to the ANSI 156.4.

2.5 Delivery status

The following dimensions can be provided on delivery for the declared unit - TS 93 door closer system with 4.49 kg (see also section 3.1 and dimensions of individual variants in section 2.3):

Dimensions (mm)	Closer	Packaging	Slide rail	Packaging
Length	275.49	286.69	417.00	470.00
Width	53.45	94.45	31.00	46.00
Height	60.54	107.05	21.50	32.00

2.6 Base materials / Auxiliaries

The following material shares of various base materials are incurred for the door closer system and individual variants declared in kg:

Components:	EN 2-5 / EN 1-5	EN5-7	ANSI1-5	Declared unit	Mass percentage
Grey cast iron	1,605	2,491	2,491	1,649	36.74%
Steel	1,636	2,303	2,109	1,665	37.09%
Aluminium	0,684	0,801	0,801	0,689	15.36%
Brass	0,010	0,010	0,010	0,010	0.24%
Zinc die-cast	0,072	0,072	0,072	0,072	1.62%
Plastic	0,033	0,041	0,041	0,034	0.76%
Oil	0,096	0,138	0,138	0,098	2.18%
Paper / Cardboard	0,266	0,314	0,314	0,269	6.00%

2.7 Production

A. Closer

After delivery of the unmachined housing, an initial machining process is performed in the DORMA plant in Ennepetal (milling, drilling, cutting, washing, degreasing, checking the finished blank part). This is followed by assembly of the housing components (axle, axle bearing, pressure spring, pistons, valves, oil). After inspecting the assembled housing components, the closer is painted, stippled and printed.

B. Slide rail

Delivery of the slide rail profile in Ennepetal, sawing and assembly of the slide rail components (slider, fixing pieces, screws)

C. Slide rail lever

Delivery of the slide rail "eye" in Ennepetal is followed by degreasing, punching, perforating, embossing, polishing, welding, galvanising and painting the finished slide rail lever.

D. Packaging

• Packing the closer (grey board)

• Packing the slide rail (grey board)

• Packing the screws (PE pouch bag)

The certified Quality Management system in accordance with DIN EN ISO 9001:2008 ensures the high quality standard of DORMA products.

2.8 Environment and health during manufacturing

Owing to the manufacturing conditions, no other health protection measures are required extending beyond the legally specified measures. The MAK values (Germany) are significantly fallen short of at each point of production.

- Air: Waste air generated during production is cleaned in accordance with statutory specifications. Emissions are significantly below the "TA Air".
- Water/Ground: No contamination of water or ground. Production-related waste water is treated internally and redirected to the production process.
- Sound protection analyses have established that all values communicated inside and outside the production facilities are far below the standards applicable in Germany.

The Environment Management system in the DORMA production facilities is certified to DIN EN ISO 14001:2004; industrial safety is certified to OHSAS 18001:2007.

2.9 Product processing / Installation

DORMA deploys its own, specially-trained assembly teams to install the product systems.

2.10 Packaging

Packaging contains the following mass percentages in kg:

Packaging	EN 2-5/ EN 1-5	EN 5-7	ANSI 1-5	Declared unit	Mass per-centage
Corrugated board / Car-ton	0,176	0,223	0,223	0,178	65.59%
Paper	0,090	0,090	0,090	0,090	33.21%
PE plastic	0,003	0,003	0,003	0,003	1.20%

2.11 Condition of use

Product maintenance is not required if used as designated. During installation of a TS 93, the standard safety regulations must be complied with and the provisions of the professional liability associations observed.

2.12 Environment and health during use

There are no impact relations between product, environment and health during use.

2.13 Reference service life (RSL)

The reference service life for the EN variants is 20 years. This corresponds with approx. 50,000 closing cycles per year based on around 1,000,000 closing cycles in accordance with DIN EN 1191 (Test report 251 31090/12). The ANSI variant 1-5 has a reference service life of 25 years. This corresponds with around 1.5 million closing cycles in accordance with ANSI Grade 1.

2.14 Extraordinary effects

Fire

In accordance with EN 1154, Annex A, the upper door closer complies with the requirements on door closing devices to be used on fire and smoke protection doors. Within the framework of an ift testing procedure, evidence was provided that the TS 93 slide rail door closer complies with the requirements on fire protection closure achieving a fire resistance duration of E12 90 in accordance with EN 13501-2 taking consideration of the EN 14600.

Water

Unforeseen water ingress, e.g. caused by activation of a sprinkler system or flooding, does not have any impact on the function and usability or service life of the upper door closer thanks to its metallurgical product features.

Mechanical destruction

No environmental hazard is associated with mechanical destruction.

2.15 Re-use phase

With reference to the material composition of the product system in accordance with section 2.6, the following possibilities arise:

Re-use

During refurbishment or de-construction, door closers can be easily segregated and re-used for the same application. The product characteristics (very long useful life without material fatigue) form a solid basis for this.

Material recycling

The metallurgical materials contained in the materials are suitable for material recycling.

Energy recovery

The plastics contained in the materials are suitable for energetic recovery.

Landfilling

The product can be landfilled without any risk to the environment or health.

2.16 Disposal

Waste during the production phase

Cuttings incurred during the manufacturing phase are directed towards metallurgical recycling and energy recovery. Cuttings are collected separately and collected by a disposal company.

- EWC 07 02 03 Plastic waste
- EWC 12 01 01 Ferrous metal filings and turnings
- EWC 12 01 03 Non-ferrous metal filings and turnings

Packaging

Packaging incurred for installation in the building is directed towards energy recovery.

- EWC 15 01 01 Paper and cardboard packaging
- EWC 15 01 02 Plastic packaging

End of Life

All materials are directed to energy recovery or metallurgical recycling.

- EWC 17 02 03 Plastics
- EWC 17 04 01 Copper, bronze, brass
- EWC 17 04 02 Aluminium
- EWC 17 04 05 Iron and steel

2.17 Further information

More information on DORMA products available from:

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Dorma Platz 1

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Germany

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4 LCA: Calculation rules

4.1 Declared unit

The declared unit involves one (1) average TS93 slide rail door closer comprising:

- a closer

- a slide rail and

- the respective packaging materials.

The mass of the declared unit is **4.49 kg**. The average was established from the weights relating to volumes of the closer variants sold referred to in section 2.1.

4.2 System boundaries

EPD type: Cradle to gate - with options

Modules A1-3

The product stage involves production of the requisite raw materials including all of the upstream chains as well as the requisite procurement transport. Production of the declared unit also took consideration of the requisite auxiliaries and consumables as well as their upstream chains.

Module A5

The environmental impacts incurred during disposal of product packaging materials were taken into consideration here.

Modules C2-4:

These modules include the environmental impacts of waste treatment at the end of life and the associated transports (including transport of distribution packaging waste).

Module D

The value streams arising from waste treatment (from A5, C3 and C4) which can in turn serve as energetic (refuse incineration plant route) or material input (recycling) for a downstream product system are indicated as credits here.

4.3 Estimates and assumptions

A distance of 75 km with a truck capacity utilisation of 50% was assumed for all disposal transports.

4.4 Cut-off criteria

The effect linked to mass percentages not taken into consideration is less than 5% of the impact categories for each module and the minimum limit of 1% total mass as well as the use of renewable and non-renewable primary energy is maintained.

On account of the low volume and inadequate background data, painting (1.6% materials in relation to the total mass, whereby only a fraction stays on the product) and electrolytical galvanising (the parts to be coated are immersed in a zinc bath for approx. 40 seconds giving rise to layer thicknesses of max. 0.4 µm) were neglected from a material aspect.

4.5 Background data

The latest version 5 of the software system for comprehensive analysis (GaBi 5) was used for modelling the life cycle. All of the background data was taken from the current versions of various GaBi data bases and the ecoinvent data base (version 2.2). The data items contained in the data bases are documented online.

4.6 Data quality

Data was recorded for the products under review by way of analysing internal production and environmental data, collating LCA-relevant data within the supply chain (transport distances) as well as measuring the relevant data for the provision of energy. The data recorded has been examined for plausibility and consistency. A good level of representativity can therefore be assumed.

The background data records used for the LCA are generally no more than 10 years old.

4.7 Period under review

The LCA data was recorded in 2012.

4.8 Allocation

Modules A1-A3:

The secondary materials complying with the recycling shares of materials used were incorporated as expenditure as of the end of their waste characteristic (e.g. smelting).

Production waste incurred (steel and aluminium waste) is regarded as co-products and the expenses for which they account are allocated by means of economic allocation.

Module A5:

Thermal recycling of packaging waste incurred is analysed in Module A5 and the ensuing credits are outlined in Module D.

Modules C2-C4:

End-of-Life treatment to the end of the waste characteristic of the product components to be disposed of is analysed in Module C. Any ensuing credits by the secondary materials provided as a result are outlined in Module D as is the energy produced by thermal recovery.

4.9 Comparability

As a general rule, EPD data can only be compared or evaluated if all of the data to be compared has been generated in accordance with EN 15804 and the building context or product-specific features are taken into consideration.

5 LCA: Scenarios and further technical information

Module A5:
Packaging materials are incurred as waste during installation of the declared door closer system:

Description	Value	Unit
Output materials as a result of waste treatment on the construction site	0.272	kg

Module C2 - C5:

After de-construction of the declared door closer system, it is broken down into its individual components at the recycling depot and directed to material (metal) or energetic (plastics) recycling depending on the respective types of materials:

Description	Value	Unit
Collected as mixed construction waste	4.221	kg
For recycling	4.089	kg
For energy recovery	0.132	kg
Means of transport	Truck 17.3 t useful load, Euro 3, freight	
Transport distance	75 km	
Utilisation capacity	50%	

Re-use, recovery and recycling potential (D)

Metal is directed to a material recycling process while plastics and packaging materials are directed towards energetic recovery. The ensuing credits are allocated to Module D.

6 LCA: Results

SYSTEM BOUNDARIES (X = INCLUDED IN THE LCA; MND = MODULE NOT DECLARED)																
Product stage			Construction process stage		Use stage							End-of-life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacture	Transport	Construction-installation process	Use / Application	Maintenance	Repairs	Replacement	Renewal	Operational energy use	Operational water use	De-construction	Transport	Waste treatment	Landfilling	Re-use, recovery and re-cycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X

1 door closer TS93 EN 2-5 (4,406 kg)*							
Indicator	**Unit**	**A1-A3**	**A5**	**C2**	**C3**	**C4**	**D**
LCA RESULTS - USE OF RESOURCES							
Renewable primary energy as energy carrier	[MJ]	6.22E+01	1.38E-02	1.64E-02	3.62E-01	-6.85E-04	6.25E-02
Renewable primary energy as material utilisation	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy sources	[MJ]	6.22E+01	1.38E-02	1.64E-02	3.62E-01	-6.85E-04	6.25E-02
Non-renewable primary energy as energy carrier	[MJ]	2.43E+02	2.70E-01	4.20E-01	4.39E+00	1.68E-02	-6.20E+01
Non-renewable primary energy as material utilisation	[MJ]	2.55E-03	0.00E+00	0.00E+00	2.09E-05	7.04E-11	3.33E-09
Total use of non-renewable primary energy sources	[MJ]	2.43E+02	2.70E-01	4.20E-01	4.39E+00	1.68E-02	-6.20E+01
Use of secondary materials	[kg]	2.73E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m³]	-	-	-	-	-	-

Global Warming Potential	[kg CO_2 equiv.]	1.78E+01	3.75E-01	3.03E-02	1.27E+00	6.63E-02	-5.91E+00
Ozone Depletion Potential	[kg CFC11 equiv.]	2.40E-07	1.73E-10	1.12E-11	2.03E-08	7.86E-11	1.02E-07
Acidification Potential	[kg SO_2 equiv.]	8.83E-02	9.41E-05	1.97E-04	1.49E-03	1.16E-05	-1.75E-02
Eutrification Potential	[kg PO_4^{3-} equiv.]	5.26E-03	1.55E-05	4.74E-05	9.51E-04	2.41E-06	-7.35E-04
Photochemical Ozone Creation Potential	[kg ethene equiv.]	5.51E-03	9.53E-06	-7.96E-05	1.43E-04	8.00E-07	-2.83E-03
Abiotic Depletion Potential non-Fossil Resources	[kg Sb equiv.]	7.47E-04	7.53E-09	1.20E-09	1.05E-06	-2.15E-08	-4.93E-04
Abiotic Depletion Potential Fossil Fuels	[MJ]	2.05E+02	2.42E-01	4.19E-01	3.03E+00	1.36E-02	-6.49E+01

Hazardous waste for disposal	[kg]	-	-	-	-	-	-
Disposed of, non-hazardous waste	[kg]	-	-	-	-	-	-
Disposed of, radioactive waste	[kg]	-	-	-	-	-	-
Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	0.00E+00	4.01E+00	0.00E+00	0.00E+00
Materials for energy recovery	[kg]	0.00E+00	2.70E-01	0.00E+00	0.00E+00	1.27E-01	0.00E+00
EE [electricity]	[MJ]	0.00E+00	4.73E-01	0.00E+00	0.00E+00	1.05E-01	0.00E+00
EE [Thermal energy]	[MJ]	0.00E+00	1.22E+00	0.00E+00	0.00E+00	3.41E-01	0.00E+00

*1 kg = 2,204 lbs

SYSTEM BOUNDARIES (X = INCLUDED IN THE LCA; MND = MODULE NOT DECLARED)																
Product stage			Construction process stage		Use stage							End-of-life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacture	Transport	Construction-installation process	Use / Application	Maintenance	Repairs	Replacement	Renewal	Operational energy use	Operational water use	De-construction	Transport	Waste treatment	Landfilling	Re-use, recovery and re-cycling potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	MND	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X

1 door closer TS93 EN 1-5 (4,406 kg)*							
Indicator	**Unit**	**A1-A3**	**A5**	**C2**	**C3**	**C4**	**D**
LCA RESULTS - USE OF RESOURCES							
Renewable primary energy as energy carrier	[MJ]	6.22E+01	1.38E-02	1.64E-02	3.62E-01	-6.85E-04	6.25E-02
Renewable primary energy as material utilisation	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy sources	[MJ]	6.22E+01	1.38E-02	1.64E-02	3.62E-01	-6.85E-04	6.25E-02
Non-renewable primary energy as energy carrier	[MJ]	2.43E+02	2.70E-01	4.20E-01	4.39E+00	1.68E-02	-6.20E+01
Non-renewable primary energy as material utilisation	[MJ]	2.55E-03	0.00E+00	0.00E+00	2.09E-05	7.04E-11	3.33E-09
Total use of non-renewable primary energy sources	[MJ]	2.43E+02	2.70E-01	4.20E-01	4.39E+00	1.68E-02	-6.20E+01
Use of secondary materials	[kg]	2.73E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m^3]	-	-	-	-	-	-
LCA RESULTS - ENVIRONMENTAL IMPACTS							
Global Warming Potential	[kg CO_2 equiv.]	1.78E+01	3.75E-01	3.03E-02	1.27E+00	6.63E-02	-5.91E+00
Ozone Depletion Potential	[kg CFC11 equiv.]	2.40E-07	1.73E-10	1.12E-11	2.03E-08	7.86E-11	1.02E-07
Acidification Potential	[kg SO_2 equiv.]	8.83E-02	9.41E-05	1.97E-04	1.49E-03	1.16E-05	-1.75E-02
Eutrification Potential	[kg PO_4^{3-} equiv.]	5.26E-03	1.55E-05	4.74E-05	9.51E-04	2.41E-06	-7.35E-04
Photochemical Ozone Creation Potential	[kg ethene equiv.]	5.51E-03	9.53E-06	-7.96E-05	1.43E-04	8.00E-07	-2.83E-03
Abiotic Depletion Potential non-Fossil Resources	[kg Sb equiv.]	7.47E-04	7.53E-09	1.20E-09	1.05E-06	-2.15E-08	-4.93E-04
Abiotic Depletion Potential Fossil Fuels	[MJ]	2.05E+02	2.42E-01	4.19E-01	3.03E+00	1.36E-02	-6.49E+01
LCA RESULTS - OUTPUT FLOWS AND WASTE CATEGORIES							
Hazardous waste for disposal	[kg]	-	-	-	-	-	-
Disposed of, non-hazardous waste	[kg]	-	-	-	-	-	-
Disposed of, radioactive waste	[kg]	-	-	-	-	-	-
Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	0.00E+00	4.01E+00	0.00E+00	0.00E+00
Materials for energy recovery	[kg]	0.00E+00	2.70E-01	0.00E+00	0.00E+00	1.27E-01	0.00E+00
EE [electricity]	[MJ]	0.00E+00	4.73E-01	0.00E+00	0.00E+00	1.05E-01	0.00E+00
EE [Thermal energy]	[MJ]	0.00E+00	1.22E+00	0.00E+00	0.00E+00	3.41E-01	0.00E+00

*1 kg = 2,204 lbs

SYSTEM BOUNDARIES (X = INCLUDED IN THE LCA; MND = MODULE NOT DECLARED)																
Product stage			Construction process stage		Use stage							End-of-life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacture	Transport	Construction-installation process	Use / Application	Maintenance	Repairs	Replacement	Renewal	Operational energy use	Operational water use	De-construction	Transport	Waste treatment	Landfilling	Re-use, recovery and re-cycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X

1 door closer TS93 EN 5-7 (6,173 kg)*							
Indicator	**Unit**	**A1-A3**	**A5**	**C2**	**C3**	**C4**	**D**
LCA RESULTS - USE OF RESOURCES							
Renewable primary energy as energy carrier	[MJ]	8.14E+01	1.62E-02	2.30E-02	5.12E-01	-8.80E-04	8.95E-01
Renewable primary energy as material utilisation	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy sources	[MJ]	8.14E+01	1.62E-02	2.30E-02	5.12E-01	-8.80E-04	8.95E-01
Non-renewable primary energy as energy carrier	[MJ]	3.31E+02	3.18E-01	5.88E-01	6.20E+00	2.15E-02	-8.47E+01
Non-renewable primary energy as material utilisation	[MJ]	2.55E-03	0.00E+00	0.00E+00	2.95E-05	9.05E-11	5.07E-09
Total use of non-renewable primary energy sources	[MJ]	3.31E+02	3.18E-01	5.88E-01	6.20E+00	2.15E-02	-8.47E+01
Use of secondary materials	[kg]	3.38E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m³]	-	-	-	-	-	-

Global Warming Potential	[kg CO_2 equiv.]	2.42E+01	4.41E-01	4.24E-02	1.79E+00	8.51E-02	-8.24E+00
Ozone Depletion Potential	[kg CFC11 equiv.]	3.14E-07	2.04E-10	1.57E-11	2.87E-08	1.01E-10	1.69E-07
Acidification Potential	[kg SO_2 equiv.]	1.20E-01	1.11E-04	2.75E-04	2.10E-03	1.49E-05	-2.35E-02
Eutrification Potential	[kg PO_4^{3-} equiv.]	6.94E-03	1.83E-05	6.63E-05	1.34E-03	3.09E-06	-9.41E-04
Photochemical Ozone Creation Potential	[kg ethene equiv.]	7.34E-03	1.12E-05	-1.11E-04	2.02E-04	1.03E-06	-4.02E-03
Abiotic Depletion Potential non-Fossil Resources	[kg Sb equiv.]	1.12E-03	8.87E-09	1.67E-09	1.48E-06	-2.76E-08	-5.48E-04
Abiotic Depletion Potential Fossil Fuels	[MJ]	2.78E+02	2.85E-01	5.86E-01	4.29E+00	1.74E-02	-8.99E+01

Hazardous waste for disposal	[kg]	-	-	-	-	-	-
Disposed of, non-hazardous waste	[kg]	-	-	-	-	-	-
Disposed of, radioactive waste	[kg]	-	-	-	-	-	-
Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	0.00E+00	5.68E+00	0.00E+00	0.00E+00
Materials for energy recovery	[kg]	0.00E+00	3.17E-01	0.00E+00	0.00E+00	1.76E-01	0.00E+00
EE [electricity]	[MJ]	0.00E+00	5.54E-01	0.00E+00	0.00E+00	1.35E-01	0.00E+00
EE [Thermal energy]	[MJ]	0.00E+00	1.56E+00	0.00E+00	0.00E+00	4.38E-01	0.00E+00

*1 kg = 2,204 lbs

SYSTEM BOUNDARIES (X = INCLUDED IN THE LCA; MND = MODULE NOT DECLARED)																
Product stage			Construction process stage		Use stage							End-of-life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacture	Transport	Construction-installation process	Use / Application	Maintenance	Repairs	Replacement	Renewal	Operational energy use	Operational water use	De-construction	Transport	Waste treatment	Landfilling	Re-use, recovery and re-cycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X

1 door closer ANSI 1-5 (5,979 kg)*							
Indicator	**Unit**	**A1-A3**	**A5**	**C2**	**C3**	**C4**	**D**
LCA RESULTS - USE OF RESOURCES							
Renewable primary energy as energy carrier	[MJ]	8.00E+01	1.62E-02	2.22E-02	4.95E-01	-8.80E-04	8.05E-01
Renewable primary energy as material utilisation	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy sources	[MJ]	8.00E+01	1.62E-02	2.22E-02	4.95E-01	-8.80E-04	8.05E-01
Non-renewable primary energy as energy carrier	[MJ]	3.22E+02	3.18E-01	5.70E-01	5.99E+00	2.15E-02	-8.32E+01
Non-renewable primary energy as material utilisation	[MJ]	2.55E-03	0.00E+00	0.00E+00	2.85E-05	9.05E-11	4.94E-09
Total use of non-renewable primary energy sources	[MJ]	3.22E+02	3.18E-01	5.70E-01	5.99E+00	2.15E-02	-8.32E+01
Use of secondary materials	[kg]	3.37E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m³]	-	-	-	-	-	-

Global Warming Potential	[kg CO_2 equiv.]	2.36E+01	4.41E-01	4.11E-02	1.73E+00	8.51E-02	-8.07E+00
Ozone Depletion Potential	[kg CFC11 equiv.]	2.79E-07	2.04E-10	1.52E-11	2.77E-08	1.01E-10	1.64E-07
Acidification Potential	[kg SO_2 equiv.]	1.11E-01	1.11E-04	2.67E-04	2.03E-03	1.49E-05	-2.31E-02
Eutrification Potential	[kg PO_4^{3-} equiv.]	6.63E-03	1.83E-05	6.42E-05	1.30E-03	3.09E-06	-9.30E-04
Photochemical Ozone Creation Potential	[kg ethene equiv.]	6.84E-03	1.12E-05	-1.08E-04	1.95E-04	1.03E-06	-3.94E-03
Abiotic Depletion Potential non-Fossil Resources	[kg Sb equiv.]	1.04E-03	8.87E-09	1.62E-09	1.43E-06	-2.76E-08	-5.47E-04
Abiotic Depletion Potential Fossil Fuels	[MJ]	2.71E+02	2.85E-01	5.68E-01	4.14E+00	1.74E-02	-8.82E+01

Hazardous waste for disposal	[kg]	-	-	-	-	-	-
Disposed of, non-hazardous waste	[kg]	-	-	-	-	-	-
Disposed of, radioactive waste	[kg]	-	-	-	-	-	-
Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	0.00E+00	5.49E+00	0.00E+00	0.00E+00
Materials for energy recovery	[kg]	0.00E+00	3.17E-01	0.00E+00	0.00E+00	1.76E-01	0.00E+00
EE [electricity]	[MJ]	0.00E+00	5.54E-01	0.00E+00	0.00E+00	1.35E-01	0.00E+00
EE [Thermal energy]	[MJ]	0.00E+00	1.56E+00	0.00E+00	0.00E+00	4.38E-01	0.00E+00

*1 kg = 2,204 lbs

SYSTEM BOUNDARIES (X = INCLUDED IN THE LCA; MND = MODULE NOT DECLARED)																
Product stage			Construction process stage		Use stage							End-of-life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacture	Transport	Construction-installation process	Use / Application	Maintenance	Repairs	Replacement	Renewal	Operational energy use	Operational water use	De-construction	Transport	Waste treatment	Landfilling	Re-use, recovery and re-cycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X

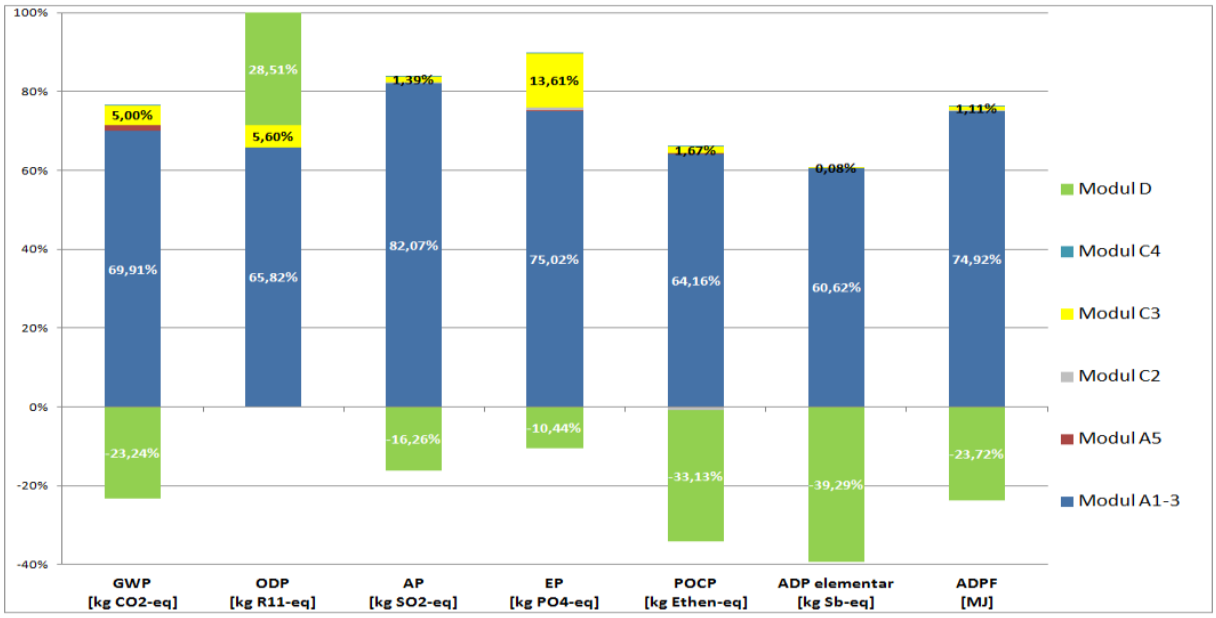
1 door closer TS93 average (4,490 kg)*							
Indicator	**Unit**	**A1-A3**	**A5**	**C2**	**C3**	**C4**	**D**
LCA RESULTS - USE OF RESOURCES							
Renewable primary energy as energy carrier	[MJ]	6.31E+01	1.39E-02	1.67E-02	3.69E-01	-6.95E-04	1.02E-01
Renewable primary energy as material utilisation	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy sources	[MJ]	6.31E+01	1.39E-02	1.67E-02	3.69E-01	-6.95E-04	1.02E-01
Non-renewable primary energy as energy carrier	[MJ]	2.47E+02	2.72E-01	4,28E-01	4.47E+00	1.70E-02	-6.31E+01
Non-renewable primary energy as material utilisation	[MJ]	2.55E-03	0.00E+00	0.00E+00	2.13E-05	7.14E-11	3.42E-09
Total use of non-renewable primary energy sources	[MJ]	2.47E+02	2.72E-01	4,28E-01	4.47E+00	1.70E-02	-6.31E+01
Use of secondary materials	[kg]	2.76E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m^3]	-	-	-	-	-	-

Global Warming Potential	[kg CO_2 equiv.]	1.38E+01	1.81E+01	3.79E-01	3.09E-02	1.29E+00	6.72E-02
Ozone Depletion Potential	[kg CFC11 equiv.]	3.69E-07	2.43E-07	1.75E-10	1.15E-11	2.07E-08	7.97E-11
Acidification Potential	[kg SO_2 equiv.]	7.37E-02	8.97E-02	9.49E-05	2.01E-04	1.52E-03	1.17E-05
Eutrification Potential	[kg PO_4^{3-} equiv.]	5.63E-03	5.34E-03	1.57E-05	4.83E-05	9.69E-04	2.44E-06
Photochemical Ozone Creation Potential	[kg ethene equiv.]	2.78E-03	5.59E-03	9.62E-06	-8.11E-05	1.45E-04	8.12E-07
Abiotic Depletion Potential non-Fossil Resources	[kg Sb equiv.]	2.70E-04	7.64E-04	7.60E-09	1.22E-09	1.07E-06	-2.18E-08
Abiotic Depletion Potential Fossil Fuels	[MJ]	1.46E+02	2.08E+02	2.44E-01	4.27E-01	3.09E+00	1.38E-02

Hazardous waste for disposal	[kg]	-	-	-	-	-	-
Disposed of, non-hazardous waste	[kg]	-	-	-	-	-	-
Disposed of, radioactive waste	[kg]	-	-	-	-	-	-
Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	0.00E+00	4.09E+00	0.00E+00	0.00E+00
Materials for energy recovery	[kg]	0.00E+00	2.73E-01	0.00E+00	0.00E+00	1.32E-01	0.00E+00
EE [electricity]	[MJ]	0.00E+00	4.77E-01	0.00E+00	0.00E+00	1.06E-01	0.00E+00
EE [Thermal energy]	[MJ]	0.00E+00	1.24E+00	0.00E+00	0.00E+00	3.46E-01	0.00E+00

*1 kg = 2,204 lbs

7 LCA: Interpretation



The product stage (Modules A1-A3) and assumed material recycling clearly dominate proportionately and this is also reflected in the credits in Module D. This result is typical for products with a high metal content (91% in this case). Energy consumption levels are primarily attributable to the upstream chains. In interpreting the indicators, it must be noted whether recycled metals such as steel (share of 80% here) are involved for which only melting (usually based on fossil fuels) and the associated material losses are largely of relevance in terms of expenditure. These energy consumption levels then have an influence on the GWP, AP, EP and ADPF indicators. A comparison of the shares indicates that renewed melting was not taken into consideration for steel in an analysis of the End-of-Life stage. This is reflected by the ADPE indicator for product components based on primary materials (e.g. aluminium). EOL treatment (credit with secondary material) explains the difference in module distribution.

A review of the use of resources is consistent with the environmental impacts where the share of renewable energy used becomes apparent (25%) which is used in the production of primary aluminium but also in the internal DORMA production processes (100% hydropower).

All of the door closer variants analysed in the TS93 range comprise the same materials; the larger variants combine a higher weight of metals with the percentage share shifting slightly (almost 1%) in that direction for which the statements outlined above are even more applicable.

Comments

The Expert Committee (SVA) at IBU clearly defined the calculation rules for the Declaration at its last meeting on 4 October 2012. The data on which background data items from the data bases are based must be revised to that effect. This Environmental Product Declaration therefore complies with the transition solution approved by the SVA and is generated without a waste declaration.

Likewise, the background data items used do not identify the indicator for the use of fresh water resources. The Declaration is therefore issued without any values for fresh water.

8 Requisite evidence

Location certificates:

- Quality Management System ISO 9001:2008, Certificate no.: KLN 4000368
- Environment Management System ISO 14001:2004, Certificate no.: KLN 4001256 (LRQA)
- Industrial Safety OHSAS 18001:2007, Certificate no.: KLN 4001256 (LRQA)
- AVU-Ökostrom, Certificate no.: 111ZST048.1 (TÜV Nord)

Product certificate TS93:

- General construction inspection approval, Approval no.: Z-6.5-1890

- EC Certificate of Conformity 0432-BPR-0008
- Load change 500,000 cycles as per DIN EN 1154 (variants: EN 1-5/ EN 2-5/ EN 5-7)
- Load change 1.5 million cycles as per ANSI Grade 1 (variant ANSI 1-5)

9 References

Institut Bauen und Umwelt e.V., Königswinter (pub.):

General Principles for the EPD range of Institut Bauen und Umwelt e.V. (IBU), 2011-06

Product Category Rules for Building Products, Part A: Calculation rules for the Life Cycle Assessment and requirements on the background report, 2011-07

Product Category Rules for Building Products, Part B: Requirements on the EPD for locks and fittings

www.bau-umwelt.de

DIN EN ISO 14025:2011-10: Environmental Designations and Declarations – Type III Environmental Declarations – Basic Principles and Processes (ISO 14025:2006)

DIN EN 15804:2012-04: Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products; German version EN 15804:2012

2001/118/EC: European Waste Catalogue (EWC) – Commission decision of 16 January 2001 amending Decision 2000/532/EC as regards the list of wastes

DIN EN 1154: Building hardware – Controlled door closing devices – Requirements and test methods (includes amendment A1:2002); German version EN 1154:1996 + A1:2002

DIN EN 1155: Building hardware – Electrically-powered hold-open devices for swing doors – Requirements and test methods (includes amendment A1:2002); German version EN 1155:1997 + A1:2002

DIN EN 1158:2003-04: Building hardware – Door coordinator devices – Requirements and test methods (includes amendment A1:2002); German version EN 1158:1997 + A1:2002

DIN EN ISO 9001:2008-12: Quality Management Systems – Requirements (ISO 9001:2008)

DIN EN 13501-2:2010-02: Fire classification of construction products and building elements – Part 2: Classification using data from fire resistance tests, excluding ventilation services

DIN EN ISO 14001:2009-11: Environmental management systems – Requirements with guidance for use (ISO 14001:2004 + Cor. 1:2009)

DIN EN 14600:2006-03: Doors and openable windows with fire-resistant and/or smoke control characteristics – Requirements and classification

Construction Products Directive 89/106/EEC

ANSI/ BHMA A156.4-2008

OHSAS 18001:2007: Occupational health and safety – Management systems – Requirements

Ecoinvent: LCA data base (life cycle inventory data), version 2.2 Swiss Centre for Life Cycle Inventories, St. Gallen

GaBi 5: Software and data base for comprehensive analysis LBP, University of Stuttgart and PE International, 2011

TA Air: German Ministry of Transport, Building and Urban Affairs: first general administrative specification under federal pollution control law (Technical Guideline for Air Pollution Control – "TA Luft") 24 July 2002.

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