ENVIRONMENTAL PRODUCT DECLARATION

THE INTERNATIONAL EPD® SYSTEM

Institut Bauen und Umwelt e.V.

According to ISO 14025 and EN 15804

Registered under the scope of mutual recognition between
The International EPD®System and Institut Bauen und Umwelt e.V (IBU)

Program operator: Institut Bauen und Umwelt
Publisher: International EPD®System
Declaration number: EPD-DOR-20160041-IBD1-EN
Registration number: S-P-00597
Issue date: 2016-04-29
Valid to: 2021-04-28

Automatic Swing Door Operators ED 100 and ED 250

DORMA

1. General Information

DORMA

Automatic Swing Door Operators ED 100 und ED 250

Programme holder
IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Owner of the Declaration
DORMA Deutschland GmbH
Dorma Platz 1
58256 Ennepetal
GERMANY

Declaration number
EPD-DOR-20160041-IBD1-EN

Declared product / Declared unit
The declared unit is the mean value (arithmetic average) for one (1) automatic swing door operator ED consisting of ED 100 and ED 250 incl.:

- an ED slide channel set,
- an ED BASIC cover and
- the respective packaging materials.

This Declaration is based on the Product Category Rules:
Drive systems for automatic doors and gates, 07/2014
(PCR tested and approved by the SVR)

Scope:
This EPD refers to the calculated average of DORMA ED 100 and ED 250 swing door operators. Deviations by the individual products from the calculated average are significantly below 10 %.
The production location for both products is DORMA Ennepetal, Germany. The material and energy flows were taken into consideration accordingly.The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Issue date
29.04.2016

Valid to
28.04.2021

Verification

The CEN Norm /EN 15804/ serves as the core PCR
Independent verification of the declaration according to /ISO 14025/
☐ internally ☒ externally

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

Dr. Burkhart Lehmann
(Managing Director IBU)

Dr.-Ing. Wolfram Trinius
(Independent verifier appointed by SVR)

2. Product

2.1 Product description

The automatic swing door operators manufactured by DORMA are electromechanical swing door operators designed for single- or double-leaf swing doors. Depending on the width and weight of the door leaf, the ED 100 or the ED 250 is required. Both operators can be mounted with standard arm as push-version and with sliding channel as pull-version. Apart from the extended cover, an integrated door coordinator is also available for double-leaf operators, which is also easily fitted. By using the DORMA Upgrade Card, the functional scope can be adapted to a variety of door situations.

- Flexible configuration of the functions actually required
- Inexpensive transport and easy assembly thanks to lower weights
- Low-noise application thanks to multi-stage gear
- Elegant design: DORMA Contur Design with an operator height of only 70 mm

The two ED 100 and ED 250 variants are particularly distinguished by their drive units. For this reason, the ED 250 was taken into consideration in the analysis (maximum characteristics of a swing door operator). Only formation of the average for energy consumption during the usage phase follows the arithmetic average. Using this conservative implementation method, the LCA results are indicated as averages for both swing door operators (ED100 / 250).

2.2 Application

DORMA swing door operators are suitable for various applications:

- For single- or double-leaf swing doors
- Assembly on smoke and fire doors: as pull-version with slide channels and as push-version with standard arm
- Automation of doors with low traffic capacity (Low-Energy Mode) and heavily frequented doors (Full-Energy Mode)
- High torque for full-automatic swing doors with radar detector control
- Suitable for internal and external doors

2.3 Technical Data

ED 100	
Max. power input	120 Watt
Closing force to /EN 1154/	EN 2 – 4 infinitely variable
Max. door-leaf weight for lintel depths of up to 300 mm	100 kg
Door-leaf width	700 – 1,100 mm
Max. opening speed	**50° (27°*)/second
Max. closing speed	**50° (27°*)/second
Axle extension	30/60 mm
Lintel depth for slide channel	± 30 mm
Lintel depth for standard arm	0 – 300 mm

ED 250	
Max. power input	240 Watt
Closing force to EN 1154	EN 4 – 6 infinitely variable
Max. door-leaf weight for lintel depths of up to 300 mm	250 kg to 1,400 mm door-leaf width 190 kg at 1,600 mm door-leaf width
Max. door-leaf weight for lintel depths from 301 to 500 mm	160 kg
Door-leaf width	700 – 1,600 mm
Door-leaf width for fire door	700 – 1,400 mm
Max. opening speed	**60° (27°*)/second
Max. closing speed	**60° (27°*)/second
Axle etension	30/60/90 mm
Lintel depth for slide channel	± 30 mm
Lintel depth for standard arm	0 – 500 mm

* Values in brackets indicate the maximum speed in Low-Energy Mode without Full-Energy or Fire Protection Upgrade Cards
** Depending on the door-leaf weight, automatically limited in accordance with DIN 18650, BS 7036-4 and ANSI 156.19.

2.4 Placing on the market / Application rules

General construction inspection approval
Approval number: Z-6.5-1890

Type approval
This is based on the following standards:

- Machinery Directive 2006/42/EC
- /ISO 13849-1/
- /DIN 18650-1/
- /DIN 18650-2/
- /EN 16005/
- /EN 60335-1/
- /EN 60335-2-103/

2.5 Delivery status

ED 100/250	Weight	Dimensions in mm
Operator incl. packaging	8.90 kg	807 x 150 x 180
Slide channel incl. packaging	1.60 kg	410 x 85 x 45
Basic cover incl. packaging	2.20 kg	690 x 100 x 140
TOTAL	**12.70 kg**	

2.6 Base materials / Ancillary materials

The average for ED 100 and ED 250 swing door operators give rise to the following mass percentages for the primary product components:

Component	Weight	Percentage
Steel components	5.05 kg	46 %
Aluminium components	3.00 kg	28 %
Cast zinc components	1.78 kg	16 %
Plastic components	0.76 kg	7 %
Circuit boards	0.20 kg	2 %
Cable	0.11 kg	1 %
TOTAL	**10.90 kg**	**100 %**

2.7 Manufacture

The ED 100 and ED 250 swing door operators each comprise a swing door operator, a slide channel set and a cover made of high-quality aluminium.
The individual components made of steel and non-ferrous metals are largely manufactured in the Ennepetal plant. Electronic components are self-produced (incl. circuit boards) and bought in externally (incl. drive motors). During assembly, the swing door operator, the slide channel sets and covers are assembled, packaged and stored separately. The certified Quality Management System in accordance with /ISO 9001/ ensures the high quality standard of the DORMA products for all production sites.

2.8 Environment and health during manufacturing

The Environment Management System in the Ennepetal plant in accordance with /ISO 14001/ and the Energy Management System in accordance with /ISO 50001/ are certified. Industrial Safety is also certified in accordance with /OHSAS 18001/.

2.9 Product processing/Installation

DORMA deploys its own, specially-trained teams for installing the product systems.

2.10 Packaging

The declared unit comprises the following packaging materials and their mass percentages:

Component	Weight	Percentage
Paper and cardboard	1.66 kg	92 %
Wood	0.09 kg	5 %
LDPE foil	0.05 kg	3 %
TOTAL	**1.80 kg**	**100 %**

2.11 Condition of use
No auxiliary or consumable materials are incurred for maintenance and usage of the swing door operators. Repairs or replacements are not usually necessary. No cleaning efforts need to be taken into consideration.

2.12 Environment and health during use
There are no interactions between products, the environment and health.

2.13 Reference service life
The reference service life amounts to 10 years. This complies with a total of 1,000,000 closing cycles in accordance with /EN 16005/.
Influences on ageing when applied in accordance with the rules of technology
.

2.14 Extraordinary effects

Fire
Irrelevant

Water
No substances are used which have a (negative) impact on ecological water quality on contact by the device with water. Electronic components must however be installed in protected indoor areas.

Mechanical destruction
During mechanical destruction it has to be ensured that components of the product are disposed properly.

2.15 Re-use phase
The following possibilities arise with reference to the material composition of the product system in accordance with section 2.6:

Re-use
During the reference service life, the swing door operators manufactured by DORMA can be dismantled and re-used elsewhere.

Material recycling
The materials suitable for material recycling largely comprise the metals processed in the product.

Energy recovery
The materials suitable for energy recovery largely comprise the plastics contained in the product.

Landfilling
As no substances, which are hazardous to the environment or health are contained in the product, the entire system can be landfilled if there are no waste recycling technologies available.
Disposal of the dismantled drive motor is subject to the WEEE Directive within Europe /2002/96/EG/.

2.16 Disposal
Offcuts and scraps during the manufacturing process

Offcuts and scraps incurred during the manufacturing phase are directed to metallurgical and energy recovery circuits. They are kept separately and collected for disposal by a disposal company.
Waste codes according to the European Waste Catalogue (EWC) /2001/118/EC/:

- 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
The packaging components incurred during installation in the building are directed to energy recovery circuits:

- EWC 15 01 01 Paper and cardboard packaging
- EWC 15 01 02 Plastic packaging
- EWC 15 01 03 Wooden packaging

End of Life
All materials are directed to an energy or metallurgical recovery circuit:

- EWC 16 02 14 Used devices with the exception of those outlined in 16 02 09 to 16 02 13
- EWC 16 02 16 Components removed from used devices with the exception of those outlined in 16 02 15
- EWC 17 02 03 Plastics
- EWC 17 04 01 Copper, bronze, brass
- EWC 17 04 02 Aluminium
- EWC 17 04 04 Zinc
- EWC 17 04 05 Iron and steel
- EWC 17 04 11 Cables with the exception of those outlined in 17 04 10

2.17 Further information
More information on DORMA and automatic products is available from:

DORMA Deutschland GmbH
Dorma Platz 1
58256 Ennepetal
Germany
Tel.: +49 (0)2333 793-0
Internet: www.dorma.com

3. LCA: Calculation rules

3.1 Declared Unit
The declared unit is the average for one (1) ED 100 and ED 250 automatic swing door operator, incl. ED slide channel set, ED BASIC cover and packaging materials. For the calculation of the average the arithmetic mean was used.

Name	Value	Unit
Weight of the component (incl. packaging)	12.7	kg

3.2 System boundary
Type of EPD: cradle to gate with options.

Modules A1-3, A4 and A5
The product stage commences with consideration of the material and energy flows required for manufacturing the product, including all of the associated upstream chains and requisite transport associated with procurement. Furthermore the whole production phase was mapped, including the treatment of production waste towards achieving the End-of-Waste status (EoW). Distribution transports and the installation into the building were considered as well.

Module B6
Average energy consumption for the two ED 100 and ED 250 automatic swing door operators in Full-Energy Mode is depicted using the arithmetic average over the entire operating life time of 10 years.

Modules C2-3
The modules include the environmental impacts of waste treatment at the end of the product life cycle as well as the transport associated with this.

Module D
Evidence of credits incurred by waste treatment as a result of energetic (MVA route) or material recycling (recycling route) of packaging (A5) and the product at the End-of-Life (C3).

3.3 Estimates and assumptions
No estimates and assumptions were made which would be of relevance for interpreting the Life Cycle Assessment results.

3.4 Cut-off criteria
All data from the plant data survey during the period under review indicated in section 3.7 is taken into consideration with the result that material flows with a mass percentage of less than one per cent were also analysed. It can be assumed that the total of all neglected percentage shares does not exceed 5 % in the impact categories.

3.5 Background data
The current version 7 of the GaBi software system was used for modelling the life cycle. All of the background data used 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.
German data records were used for Modules A1-3 and the corresponding European data records were used for transport associated with distribution (A4), usage (B Modules) and disposal scenarios (C Modules).
Owing to a lack of data on waste treatment, various material flows are summarised under the data record which appears most suitable from a technical perspective.
The secondary and recycling shares can only be taken into consideration via the generic data records. Individual adaptation of these secondary shares is not possible with the modelling software used.

3.6 Data quality
Data on the products reviewed was collated on the basis of evaluations of internal production and environmental data, recording LCA-relevant data within the supplier chain and by measuring the relevant data for the provision of energy. The data collated has been examined for plausibility and consistency with the result that good data representativity can be assumed. The background data used for the assessment is generally not older than 10 years.

3.7 Period under review
The LCA data was collated for the period from 1 January 2011 to 31 December 2011. As no product-specific data was recorded with a time reference, there are no details available, which would be of relevance for forming an average.

3.8 Allocation
The material flows required for the production of the product system were compiled with relation to the DORMA ERP system. The actual recycling shares could not be depicted with the software system used; generic data is applied here. All of the energy flows considered were measured on site. Production waste with a market value was considered by means of economic allocation in the data model.
Credits from material recycling of production waste were allocated to Module A1-3.
The credits from thermal recovery of distribution packaging as well as recycling and energy recovery of the dismantled product were allocated to Module D.
Some data records do not indicate separate results for Modules C3 and D. As the credits prevail, the results were allocated analogously to Module D.

3.9 Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account.

4. LCA: Scenarios and additional technical information

Transport zu Baustelle (A4)

Name	Value	Unit
Transport distance Lorry + Container Ship	1378	km
Capacity utilisation (including empty runs)	85	%

The transport distance includes all distribution countries proportionately. Transport to the site is depicted using the country-specific data records.

Referenz Lebensdauer

Name	Value	Unit
Reference service life	10	a

Betriebliche Energie (B6) und Wassereinsatz (B7)

Name	Value	Unit
Electricity consumption	832	kWh
Equipment output ED 100	0.12	kW
Equipment output ED 250	0.24	kW
Class of protection	IP 20	

Electricity consumption was calculated for the entire reference service life of 10 years.

Ende des Lebenswegs (C1-C4)

Name	Value	Unit

Recycling	8.44	kg
Energy recovery	2.46	kg

The processes at the End-of-Life were modelled using European data records.

Wiederverwendungs- Rückgewinnungs- und Recyclingpotential (D), relevante Szenarioangaben

Module D comprises credits for the material recycling of metals of the module C3 as well as credits for the energetic recycling of plastics of module C3 and the packaging materials of module A5.

Name	Value	Unit

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 BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	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

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: ED 100 and ED 250

Parameter	Unit	A1-A3	A4	A5	B6	C2	C3	D
GWP	[kg CO_2-Eq.]	6.33E+1	6.28E-1	2.55E+0	3.94E+2	2.74E-2	4.29E+0	-5.25E+1
ODP	[kg CFC11-Eq.]	1.87E-6	2.54E-12	1.21E-11	2.93E-7	1.12E-13	3.22E-8	-1.16E-6
AP	[kg SO_2-Eq.]	4.26E-1	6.12E-3	5.40E-4	1.98E+0	1.74E-4	6.35E-3	-2.90E-1
EP	[kg $(PO_4)^{3-}$-Eq.]	1.46E-1	1.16E-3	9.49E-5	1.08E-1	4.46E-5	8.75E-4	-1.58E-2
POCP	[kg ethene-Eq.]	8.04E-2	-1.28E-3	3.92E-5	1.15E-1	-7.15E-5	5.57E-4	-1.83E-2
ADPE	[kg Sb-Eq.]	9.49E-3	2.34E-8	4.27E-8	6.24E-5	1.07E-9	3.27E-6	-5.15E-4
ADPF	[MJ]	9.46E+2	8.49E+0	6.64E-1	4.39E+3	3.76E-1	3.65E+1	-5.86E+2

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources

RESULTS OF THE LCA - RESOURCE USE: ED 100 and ED 250

Parameter	Unit	A1-A3	A4	A5	B6	C2	C3	D
PERE	[MJ]	3.34E+2	4.17E-1	7.50E-2	1.48E+3	2.11E-2	1.35E+0	-2.12E+2
PERM	[MJ]	1.22E+1	4.40E-13	2.46E-12	4.14E-8	1.99E-14	1.32E-6	-7.73E+0
PERT	[MJ]	3.46E+2	4.17E-1	7.50E-2	1.48E+3	2.11E-2	1.35E+0	-2.20E+2
PENRE	[MJ]	1.12E+3	8.51E+0	7.83E-1	7.02E+3	3.77E-1	3.95E+1	-6.64E+2
PENRM	[MJ]	7.10E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.52E-11	-4.20E+0
PENRT	[MJ]	1.13E+3	8.51E+0	7.83E-1	7.02E+3	3.77E-1	3.95E+1	-6.69E+2
SM	[kg]	6.31E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	[MJ]	0.00E+0	5.60E-5	2.84E-5	9.26E-2	2.50E-6	5.94E-4	0.00E+0
NRSF	[MJ]	0.00E+0	5.87E-4	1.31E-4	9.67E-1	2.62E-5	4.56E-3	0.00E+0
FW	[m^3]	4.64E+2	3.59E-2	6.97E-2	1.33E+3	1.69E-3	1.86E+0	-5.39E+2

Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

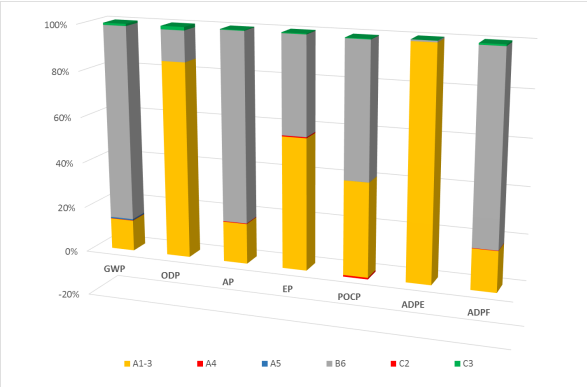
RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: ED 100 and ED 250

Parameter	Unit	A1-A3	A4	A5	B6	C2	C3	D
HWD	[kg]	9.02E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-5.79E-3
NHWD	[kg]	2.21E+2	3.05E-2	1.58E-1	1.63E+3	1.42E-3	2.63E+0	-7.72E+1
RWD	[kg]	5.82E-2	1.15E-5	4.75E-5	1.05E+0	5.15E-7	1.26E-3	-3.24E-2
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	3.47E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	9.37E+0
MER	[kg]	0.00E+0	0.00E+0	1.72E+0	0.00E+0	0.00E+0	0.00E+0	1.02E+0
EEE	[MJ]	0.00E+0	0.00E+0	9.38E+0	0.00E+0	0.00E+0	0.00E+0	2.37E+1
EET	[MJ]	0.00E+0	0.00E+0	2.59E+1	0.00E+0	0.00E+0	0.00E+0	6.20E+1

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

6. LCA: Interpretation

An evaluation of the environmental impacts allows the following interpretation on the basis of the current CML results (April 2015):



The dominance analysis shows that modules A1-3 (upstream processes, transports and production stage) as well as B6 (use stage) are the dominant stages of the entire life cycle of the declared swing door operators. The impact categories Global Warming Potential, Ozone Depletion Potential, Acidification Potential, Photochemical Ozone Creation Potential and the Abiotic Depletion Potential of Fossil Fuels are mainly caused by the power production for the energy demand in the operational stage B6, while the potentials for Ozone Depletion, Eutrophication and the Abiotic, Elementary Resource Use are dominating caused by the resource and energy demand within the upstream processes (module A1-3).
In the module A1-3 the installed assembly groups and the components of the drive unit as well as the relatively high share of the used aluminium in the profiles are mainly responsible for the environmental impacts. With shares of 16 to nearly 100% the module A1-3 is of significance in regard to the environmental impacts of the door swing operators. The energy use during the production of the product is, however, of subordinate significance because the energy is generated on 100 % by hydro power.
During the usage stage, the consumption of electrical energy across the reference service life of 10 years is significant. With shares in the dominance analysis of 65 - 70 % in the impact categories Global Warming Potential, Acidification Potential and Abiotic, Fossil Resource Use the usage stage is – apart from the module A1-3 – identified as a major contributor of the environmental impacts within the entire life cycle. In this context it is important to note that the actually results of this stage are particularly determined by the share of renewable energy of the really used energy mix of the final consumer. In this calculation model the European power mix for the average of the EU-27 was used.
Transport associated with procurement and distribution (Modules A2 and A4) as well as waste treatment (Module C3) only account for a minor share of the potential environmental impacts.
The positive effects of the transports in the modules A4 and C2 on the Photochemical Ozone Creation Potential are caused by a negative characterisation factor within the actual CML assessment version.

7. Requisite evidence

This Environmental Product Declaration does not require any evidence in relation to the material composition in the product and its area of application.

8. References

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www.bau-umwelt.de

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DIN 18650-1:2010-06, Powered pedestrian doors – Part 1: Product requirements and test methods.

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Generation of Environmental Product Declarations (EPDs);

General principles
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EN 15804
EN 15804:2012-04+A1 2013: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

Publisher
Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@bau-umwelt.com
Web **www.bau-umwelt.com**

Programme holder
Institut Bauen und Umwelt e.V.
Panoramastr 1
10178 Berlin
Germany

Tel +49 (0)30 - 3087748- 0
Fax +49 (0)30 – 3087748 - 29
Mail info@bau-umwelt.com
Web **www.bau-umwelt.com**

Author of the Life Cycle Assessment
brands & values GmbH
Vagtstr. 48/49
28203 Bremen
Germany

Tel +49 421 69 68 67 15
Fax +49 421 69 68 67 16
Mail info@brandsandvalues.com
Web **www.brandsandvalues.com**

Owner of the Declaration
DORMA Deutschland GmbH
DORMA Platz 1
58256 Ennepetal
Germany

Tel +49 2333 793- 2590
Fax +49 2333 793- 4950
Mail lea.kullmann@dorma.com
Web **www.dorma.com**