ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025 and EN 15804

Declaration holder	DORMA GmbH + Co. KG
Publisher	Institut Bauen und Umwelt (IBU)
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ST FLEX Green Automatic Sliding Door
DORMA GmbH + Co. KG

www.bau-umwelt.com

Institut Bauen
und Umwelt e.V.

1 General information

DORMA GmbH + Co. KG

Programme holder

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

Declaration number

EPD-DOR-2012231-E

This Declaration is based on the Product Category Rules:

Automatic doors and gates, and revolving door systems (valid: 29.06.2011).
(PCR-tested and approved by the independent Expert Committee (SVA))

Issue date

18/12/2012

Valid until

17/12/2017

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

Prof. Dr.-Ing. Hans-Wolf Reinhardt
(Chairman of the Expert Committee)

ST FLEX Green Sliding Door

Holder of the Declaration

DORMA GmbH + Co. KG
Dorma Platz 1
58256 Ennepetal
GERMANY

Declared product/unit

The declared unit is one (1) m² (37.3 kg) of the ST FLEX Green automatic sliding door system comprising:

- an ES 200 Easy operator
- two sliding panels,
- two side screens and
- the respective packaging materials.

Area of applicability:

This EPD refers to the entire life cycle of a DORMA ST FLEX GREEN sliding door system. The various technical characteristics are outlined in section 2.3.

The production location is the DORMA production facility in Zusmarshausen, Germany. Product components are also procured from the DORMA facilities in Ennepetal and Bonn. The material and energy flows were taken into consideration accordingly.

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 ☒ external

Dr.-Ing. Wolfram Trinius
(Independent auditor appointed by the SVA)

2 Product

2.1 Product description

The ST FLEX Green automatic sliding door system is suitable for external doors with a focus on saving energy. This EPD describes a double-panel version, i.e. it features two sliding panels and two side screens. The automatic door system also comprises a sliding door operator, including sensors, a control unit and a battery pack. "Green" stands for a slim, thermal-brEWC profile system based on the DORMA FLEX profile. The thermal-brEWC feature in the profile permits increased thermal insulation despite a continuously slim profile view.

- Heat transition coefficient: UD values from 1.4 to max. 1.8 (verified by tests performed by ift Rosenheim)
- This corresponds with the current EnEv 2009 Energy Saving Ordinance
- Individual documentation of the UD value for each ST FLEX Green system supplied

2.2 Application

The ST FLEX Green automatic sliding door system is used in particular where energy saving enjoys key significance during the reference service life. Each system is manufactured to the individual dimensions of the respective building project. The ES 200 Easy operator analysed within the framework of the EPD is designed for the following applications:

Door parameter	Design
Double-leaf sliding door	
- Clear passage width (LW)	800 – 3000 mm
- Max. door panel weight	2 x 100 kg

Apart from the Easy version, other ES 200 operator variants are also available.

2.3 Technical Data

Technical data on the operator system:

ES 200 Easy	Design
Height	100/150 mm
Installation depth	180 mm
Opening and closing force	max. 150 N
Opening speed (incrementally variable)	10 – 50 cm/s
Closing speed (incrementally variable)	10 – 40 cm/s
Hold-open time	0.5 – 30 sec.

ES 200 Easy	Design
Supply voltage, frequency	230V, 50/60 Hz
Power input	180 W
Class of protection	IP 20
Tested in accordance with the Low-Voltage Directive and the EMC Directive	●

Technical data on the control unit (as part of the operator):

Characteristics	
Microprocessor control	●
Function programmes	
- Off	●
- Automatic	●
- Permanent Open	●
- Partial Open	●
- Exit Only	●
- Night-/Bank Function	●
Emergency Stop	●
Self-learning	●
Automatic reversing	●
Connection for bi-stable electromechanical locking device	●
Connection for light barriers (max. 2 pairs)	●
Basic parameters set via integrated display and keypad	●
Emergency opening or closing (when using the rechargeable battery pack)	●
24 V output for ext. consumers	●
Readable error log with error codes	●

Technical data of sliding panels and side screens:

Heat transition coefficient (U-value) in accordance with EN ISO 10077-1 /-2:

- Insulation glass units: 1.0 [W/m²K]
- Heat transition coefficient (U-value) for the automatic sliding door system measuring 6250 x 3305 mm: 1.4 [W/m²K]
- Heat transition coefficient (U-value) for the automatic sliding door system measuring 2100 x 2205 mm: 1.8 [W/m²K]

2.4 Placing on the market/Application rules

The CE design type examination is based on the following guidelines:

- Low-Voltage Directive 2006/95/EC
- EMC Directive (EMC) 2004/108/EC
- Machinery Directive 2006/42/EC

National standards derived from these:

- DIN EN ISO 13849-1
- DIN EN ISO 12100-1
- DIN EN ISO 14121-1
- BGR 232
- EN 61000 - 6 - 2
- EN 61000 - 6 - 3
- EN 61000 - 3 - 2
- EN 61000 - 3 - 3
- DIN EN 55022
- DIN EN 60335-1
- DIN EN 60950-1

The following standards can also be observed voluntarily:

- DIN 18650-1/ -2
- DIN IEC 60335-2-103/A1; VDE 0700-103/A3:2010-04:2010-04

2.5 Delivery status

As an automatic sliding door involves a customised door system, shapes and sizes can vary considerably. The ST FLEX Green product family under review has the following scope of delivery:

Characteristics	Dimensions
Clear height	2.10 m
Total height	2.20 m
Clear width	2.00 m
Total width	4.10 m
Surface area	9.02 m²

The components associated with these dimensions have the following weights:

Components	Weight
1 x operator	59.8 kg
1 x operator packaging	5.3 kg
2 x sliding panel	133.4 kg
2 x side screen	138.3 kg

The ES 200 Easy operator system is supplied in a separate box; the sliding panels and side screens are supplied on frames.

2.6 Base materials/Auxiliaries

Mass percentages of the automatic sliding door system:

Component	Percentage
Glass panes	72 %
Aluminium components	19 %
Plastic components	4 %
Steel components	3 %
Electronic components	2 %
TOTAL	**100 %**

2.7 Production

The ST FLEX Green sliding panels and side screens are manufactured in the DORMA plant in Zusmarshausen. Electronic components in particular are also manufactured within the DORMA Group. The ES 200 Easy operator is manufactured in the Ennepetal plant while the accompanying circuit boards are manufactured in the Bonn plant. The certified Quality Management system to DIN EN ISO 9001 safeguards the high quality standard of DORMA products at all locations.

2.8 Environment and health during manufacturing

The Environment Management system in the DORMA production facilities is certified to DIN EN ISO 14001 while Occupational Health & Safety is certified to OHSAS 18001.

2.9 Product processing/Installation

DORMA deploys its own, specially-trained teams for installation.

2.10 Packaging

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

Component	Percentage
Paper and cardboard	90 %
Wood	9 %
LDPE foil	1 %
TOTAL	**100 %**

Information on the possible re-use of packaging is provided in section 2.16.

2.11 Condition of use

No auxiliary or consumable materials are incurred for maintenance and usage of the automatic ST FLEX Green sliding door system. Repairs or replacements are taken into consideration in accordance with recommendations by DORMA and the list of parts subject to wear which is freely available (data status: October 2009) (www.dorma.com). The energy required for the operator under review (ES 200 Easy) was calculated over the reference service life of 10 years and is also included.

2.12 Environment and health during use

There are no interactions between products, the environment and health.

2.13 Reference service life (RSL)

The reference service life amounts to 10 years. This complies with a total of 1,000,000 closing cycles with approx. 100,000 closing cycles per year.

2.14 Extraordinary effects

Water
No hazardous substances are released into the environment on contact with water.

Mechanical destruction
No danger to the environment can be anticipated during mechanical destruction.

2.15 Re-use phase

The following possibilities arise in terms of material composition:

Material recycling
The materials suitable for material recycling largely comprise the glass panes and metallurgical materials processed in the product.

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

Landfilling
The entire system can be landfilled in the absence of the appropriate waste recovery technologies.

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 16 06 01 Lead batteries
- EWC 17 02 02 Glass
- EWC 17 02 03 Plastics
- EWC 17 04 02 Aluminium
- EWC 17 04 05 Iron and steel
- EWC 17 04 11 Cables with the exception of those outlined in 17 04 10

Note: Disposal of the gearing motor is subject to the WEEE Directive within Europe /2002/96/EC/.

2.17 Further information

Contact data for more detailed information:

Please refer to the last page of this Declaration.

3 LCA: Calculation rules

3.1 Declared unit

The declared unit is one (1) m² (37.3 kg) of the ST FLEX Green automatic sliding door system comprising:
- the ES 200 Easy operator,
- two sliding panels,
- two side screens and
- the respective packaging materials.

The side screens are not part of the moving automatic door but rather form a part of the overall automatic door system and have been taken into consideration in the declared unit.

3.2 System limit

Type of EPD: cradle to grave

Modules A1-5

The product stage commences with considering production of the requisite raw materials including all of the corresponding upstream chains and the requisite procurement transport. Transport associated with distribution as well as installation in the building were also taken into consideration.

Module B3

This module includes replacement of worn components across its entire service life in accordance with the DORMA manufacturer's guidelines for parts subject to wear.

Module B6

This module includes the energy required for operating the ES 200 Easy operator across its entire service life.

Modules C2-3

These modules include the environmental impacts of waste treatment including transport associated with this at the end of the product life cycle.

Module D

The value flows resulting from waste treatment which in turn serve as energy (waste incineration route) or material input (recycling) for a downstream product system are indicated here.

3.3 Estimates and assumptions

No estimates or 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 5 of the software system for comprehensive analysis (GaBi) 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 generally 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). Where no European data was available, German data was relied on.

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.

3.6 Data quality

The background data from the GaBi data bases used for the analysis is for the reference year 2010; data used from the ecoinvent data base originates from the period 1998 to 2002. Accordingly, some data is older than 10 years but still applies as the most suitable data available for modelling the product under review. The ecoinvent data can be classified as conservative, based on available empirical values.

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 secondary and recycling percentages can only be taken into consideration via the generic data records.

3.7 Period under review

The LCA data was collated for the period from 1 January 2011 to 31 December 2011.

3.8 Allocation

The material flows required for the manufacture of the product system were compiled with relation to the DORMA ERP system. All of the energy flows considered in this context were measured on site. The credits from thermal recovery of sales packaging as well as recycling and energy recovery of the dismantled product are allocated to Module D. Some data records do not indicate separate results for Modules C3 and D. The results for these data items were allocated analogously to Module D.

3.9 Comparability

As a general rule, a comparison or evaluation of EPD data is only possible when all of the data to be compared has been drawn up in accordance with EN 15804 and the building's context or product-specific characteristics are taken into consideration.

4 LCA: Scenarios and other technical information

Transport to the site (A4)

Means of transport	truck
	17.3 t useful load, Euro 3
Transport distance	340 km
Capacity utilisation (including empty runs)	85 %

Installation in the building (A5)

Waste treatment on site:

Plastic protective foil	0.02 kg
Wooden pallets and paper	5.23 kg

Disposal transport:

Means of transport	truck
	17.3 t useful load, Euro 3
Transport distance	75 km
Capacity utilisation (including empty runs)	85 %

Reference service life

Reference service life	10 years

Repairs (B3)

Material loss	21.7 kg

Repair cycle as per "Manufacturer's guidelines on wear parts" supplied by DORMA

Operational energy use (B6)

Electricity consumption	96.5 kWh
Equipment output	180 kW

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

End of life (C1-C4)

For recycling	95.2 %
For energy recovery	4.8 %

The processes at the End of Life are modelled using data representing the European average.

Re-use, recovery and recycling potential (D)

Metals and glass are directed to material recycling, plastic and packaging materials are directed to energy recovery circuits.

5 LCA: Results

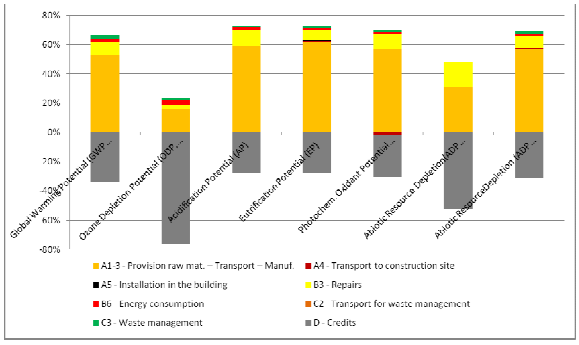
SYSTEM LIMITS (X = INCLUDED IN THE LCA; MND = MODULE NOT DECLARED)																
Production stage			Building construction stage		Usage stage							Disposal stage				Credits and benefits outside the system limit
Provision of raw materials	Transport	Production	Transport to the site	Installation in the building	Use/ Application	Maintenance	Repairs	Replacement	Renewal	Energy required for operating the building	Water required for operating the building	Dismantling/ Demolition	Transport	Waste treatment	Landfilling	Re-use, recovery or re-cycling 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	X	MND	MND	X	MND	MND	X	X	MND	X

Parameter	Unit	A1-3	A4	A5	B3	B6	C2	C3	D
LCA RESULTS: ENVIRONMENTAL EFFECTS									
Global Warming Potential (GWP)	[kg CO_2 equiv.]	1.38E+02	5.98E-01	8.20E-01	2.25E+01	5.23E+00	7.03E-02	7.60E+00	-8.85E+01
Ozone Depletion Potential (ODP)	[kg CFC11 equiv.]	1.57E-06	2.22E-10	3.71E-10	2.30E-07	3.41E-07	8.00E-09	1.64E-07	-7.44E-06
Acidification Potential (AP)	[kg SO_2 equiv.]	8.76E-01	3.92E-03	1.95E-04	1.74E-01	2.23E-02	4.03E-04	1.19E-02	-4.12E-01
Eutrophication Potential (EP)	[kg PO_4^3 equiv.]	6.06E-02	9.43E-04	3.24E-05	7.10E-03	1.20E-03	1.14E-04	1.31E-03	-2.70E-02
Photochemical Ozone Creation Potential (POCP)	[kg ethene equiv.]	5.01E-02	-1.60E-03	1.96E-05	8.92E-03	1.35E-03	-1.28E-05	7.79E-04	-2.53E-02
Abiotic Depletion Potential for Elements (ADPE)	[kg Sb equiv.]	1.77E-03	2.36E-08	1.55E-08	9.79E-04	4.29E-07	1.26E-07	3.22E-06	-3.02E-03
Abiotic Depletion Potential of Fossil Fuels (ADPF)	[MJ]	1.61E+03	8.27E+00	4.94E-01	2.32E+02	5.96E+01	1.03E+00	4.48E+01	-8.77E+02
LCA RESULTS: USE OF RESOURCES									
Primary energy, renewable (PERE)	[MJ]	3.71E+02	3.24E-01	2.84E-02	5.18E+01	1.33E+01	2.16E-02	2.41E+00	-3.04E+02
Primary energy, renewable, used as raw materials (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 (PERT)	*[MJ]*	*3.71E+02*	*3.24E-01*	*2.84E-02*	*5.18E+01*	*1.33E+01*	*2.16E-02*	*2.41E+00*	*-3.04E+02*
Primary energy, non-renewable (PENRE)	[MJ]	1.83E+03	8.30E+00	5.51E-01	2.68E+02	9.13E+01	1.07E+00	5.47E+01	-1.16E+03
Primary energy, non-renewable, used as raw materials (PENRM)	[MJ]	1.75E-03	0.00E+00	0.00E+00	3.47E-05	0.00E+00	3.87E-06	2.49E-03	-1.36E-06
Total use of non-renewable primary energy resources *(PENRT)*	*[MJ]*	*1.83E+03*	*8.30E+00*	*5.51E-01*	*2.68E+02*	*9.13E+01*	*1.07E+00*	*5.47E+01*	*-1.16E+03*
Use of Secondary Material (SM)	[kg]	1.19E+02	0.00E+00	0.00E+00	2.98E+01	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
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 Fresh Water resources (FW)	[m³]	-	-	-	-	-	-	-	-
LCA RESULTS: OUTPUT FLOWS AND WASTE CATEGORIES									
Hazardous Waste Disposed (HWD)	[kg]	-	-	-	-	-	-	-	-
Non-Hazardous Waste Disposed (NHWD)	[kg]	-	-	-	-	-	-	-	-
Radioactive Waste Disposed (RWD)	[kg]	-	-	-	-	-	-	-	-
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]	1.10E+02	0.00E+00	0.00E+00	7.22E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for Energy Recovery (MER)	[kg]	2.05E+02	0.00E+00	4.99E+00	1.34E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy [electricity]	[MJ]	9.35E-02	0.00E+00	5.43E-01	8.72E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy [thermal energy]	[MJ]	2.29E-01	0.00E+00	1.52E+00	2.19E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

6 LCA: Interpretation

ENVIRONMENTAL EFFECTS

An evaluation of the LCA results allows the following interpretation of the CML results:



The phases of extracting raw materials and repairs have a dominant influence on all environmental impacts. In particular, the drive unit installed in the product and the high mass percentages of glass and aluminium processed in the sliding panels and side screens are responsible for this. On the other hand, energy use during manufacturing is only of subordinate significance as it is provided in full by hydropower.

The results of the Ozone Depletion Potential (ODP) are conspicuous as higher credits than encumbrances are ascertainable. This is primarily attributable to selection of the "PE: Aluminium Extrusion Profile Mix" data item in Modules A1-A3 and offsetting "EAA: Massel Mix (2005) as a credit) in Module D.

During the usage phase, the use of electrical energy over the reference service life of 10 years is apparent but does not have any significant influence on the result. A European power mix (EU-27) was used for this calculation.

Waste management also has an impact on practically every impact category. But the environmental impacts, especially those associated with thermal recovery of the plastics contained in the product, are not of relevance for any of the categories analysed.

The transport associated with procurement and distribution (A2 and A4) hardly has any effect on the CML indicators.

Credits are primarily incurred by material recycling of the glass panes as well as the aluminium and steel components. Electricity and natural gas are also offset against the system for energy recovery of the plastic components.

COMMENTS

The Expert Committee (SVA) at IBU clearly defined the calculation rules for declaring waste in its last meeting held on 4 October 2012. The basis for background data used in the data bases must be revised accordingly. This Environmental Product Declaration therefore follows the interim solution approved by the SVA and is drawn up without a waste declaration.

The background data used does not represent proof of the indicator for use of fresh water resources. The Declaration is therefore disclosed without any content and value regarding fresh water.

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

Institute Construction and Environment e.V. (Institut Bauen und Umwelt e.V.), Königswinter (pub.):

General Principles for the EPD Programme of the Institute Construction and Environment e.V., 2011-06

Product Category Rules for Construction Products Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report, 2011-07

Product Category Rules for Construction Products Part B: Requirements on the EPD for automatic doors, automatic gates, and revolving door systems

www.bau-umwelt.de

2001/118/EC: Commission Decision of 16 January 2001 amending Decision 2000/532/EC as regards the list of wastes.

2002/96/EGC Directive 2020/96/EC of the EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on waste electrical and electronic equipment (WEEE)

2004/108/EC: DIRECTIVE 2004/108/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC.

2006/95/EC: DIRECTIVE 2006/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.

CEN/TR 15941:2010-03: Sustainability of construction works – Environmental product declarations – Methodology for selection and use of generic data; German version CEN/TR 15941:2010

DIN EN ISO 14025:2011-10, Environmental labels and declarations – Type III environmental declarations – Principles and procedures (ISO 14025:2006); German and English version EN ISO 14025:2011

DIN EN ISO 14044:2006-10, Environmental management – Life cycle assessment – Requirements and guidelines (ISO 14044:2006); German and English version EN ISO 14044:2006

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

DIN EN ISO 13849-1:2008-12, Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design (ISO 13849-1:2006

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

DIN 18650-2:2010-06, Powered pedestrian doors – Part 2: Safety at powered pedestrian doors

DIN EN ISO 12100-1:2004-04, Safety of machinery - Basic concepts, general principles for design – Part 1: Basic terminology, methodology (ISO 12100-1:2003); German version EN ISO 12100-1:2003

DIN EN ISO 14121-1:2007-12, Safety of machinery – Risk assessment - Part 1: Principles (ISO 14121-1:2007); German version EN ISO 14121-1:2007

DIN EN 61000-6-2; VDE 0839-6-2:2006-03:2006-03, Electromagnetic compatibility (EMC) - Part 6-2: Generic standards – Immunity for industrial environments (IEC 61000-6-2:2005); German version EN 61000-6-2:2005

DIN EN 61000-6-3; VDE 0839-6-3:2011-09:2011-09, Electromagnetic compatibility (EMC) - Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3:2006 + A1:2010); German version EN 61000-6-3:2007 + A1:2011

DIN EN 61000-3-2; VDE 0838-2:2010-03:2010-03, Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase) (IEC 61000-3-2:2005 + A1:2008 + A2:2009); German version EN 61000-3-2:2006 + A1:2009 + A2:2009

DIN EN 61000-3-3; VDE 0838-3:2009-06:2009-06, Electromagnetic compatibility (EMC) - Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <=16 A per phase and not subject to conditional connection (IEC 61000-3-3:2008); German version EN 61000-3-3:2008

DIN EN 55022; VDE 0878-22:2011-12:2011-12, Information technology equipment – Radio disturbance characteristics - Limits and methods of measurement (CISPR 22:2008, modified); German version EN 55022:2010

DIN EN 60335-1; VDE 0700-1:2012-10:2012-10, Household and similar electrical appliances – Safety - Part 1: General requirements (IEC 60335-1:2010, modified); German version EN 60335-1:2012

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