

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	ASSA ABLOY / Abloy Oy
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-ASA-20150228-IBA1-EN
Issue date	21.08.2015
Valid to	20.08.2020

Guide rail system – G462 series

ASSA ABLOY / Abloy Oy

www.bau-umwelt.com / <https://epd-online.com>



1. General Information

<p>ASSA ABLOY / Abloy Oy</p> <hr/> <p>Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <hr/> <p>Declaration number EPD-ASA-20150228-IBA1-EN</p> <hr/> <p>This Declaration is based on the Product Category Rules: Locks and fittings, 07.2014</p> <p>(PCR tested and approved by the independent expert committee (SVR))</p> <hr/> <p>Issue date 21.08.2015</p> <hr/> <p>Valid to 20.08.2020</p> <hr/>  <hr/> <p>Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)</p> <hr/>  <hr/> <p>Dr.-Ing. Burkhard Lehmann (Managing Director IBU)</p>	<p>Guide rail – G462 Series</p> <hr/> <p>Owner of the Declaration Abloy Oy Wahlforssinkatu 20, 80100 Joensuu, Finland</p> <hr/> <p>Declared product / Declared unit The declaration represents a guide rail system G462, consisting of the following items: - A guide rail - An integrated door coordinator - An electro-mechanical hold open device - Accessories</p> <hr/> <p>Scope: This declaration and its LCA study are relevant to ASSA ABLOY G462 guide rail. The primary manufacturing processes are made by an external supplier and the final manufacturing processes and assembly for all guide rail components occur at our manufacturing factory in Joensuu, Finland. 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.</p> <hr/> <p>Verification</p> <table border="1"> <tr> <td colspan="2">The CEN Standard EN 15804 serves as the core PCR</td> </tr> <tr> <td colspan="2">Independent verification of the declaration and data according to ISO 14025</td> </tr> <tr> <td><input type="checkbox"/> internally</td> <td><input checked="" type="checkbox"/> externally</td> </tr> </table> <hr/>  <hr/> <p>Dr. Wolfram Trinius (Independent verifier appointed by SVR)</p>	The CEN Standard EN 15804 serves as the core PCR		Independent verification of the declaration and data according to ISO 14025		<input type="checkbox"/> internally	<input checked="" type="checkbox"/> externally
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2. Product

2.1 Product description

Product name: G462 guide rail.

Product characteristic: This versatile system allows ASSA ABLOY Cam-Motion door closers with different guide rail designs to be used for almost any application.

The comprehensive guide rail range enables the required functions to be used in both single leaf and double leaf doors. These systems can provide reliable, automatic closing of doors and electromechanical securing of fire and smoke protection barriers. The concealed guide rails, which are integrated to the door frame, prefer aesthetic advantages for all solutions.

The coordinator system used in double leaf door models ensures that doors are closed safely in the correct order – first the inactive leaf, followed by the active leaf.

The product is characterized by:

- CE mark

- Guide rail with integrated electro-mechanical hold open device and mechanical door coordinator
- Traversable hold-open device, continuously adjustable hold-open angle between 70°-120°
- Continuously adjustable hold open force
- Door coordinator based on wedge system
- Possible to keep both leaves permanent open
- Correct closing sequence guaranteed for double leaf doors, inactive leaf closes before active leaf start to close
- Height-adjustable axis connection between the door closer and guide rail arm

2.2 Application

The ASSA ABLOY G462 guide rails can be used – from private to commercial and public sectors both light and heavy, such as:

- Fire & smoke protection and standard doors
- For interior doors and exterior doors

2.3 Technical Data

The declared guide rail has following technical specifications and is applicable to the following door technical data with reference to the test standard.

Technical data

Name	Value
Door width up to	2800 (double doors) mm
Fire and smoke protections	Yes
DIN door swing directions	Left/right handed
Power supply	24 V DC
Opening angle of inactive leaf	150°/120°
Hold open angle of inactive leaf	70-130°
Hinge distance	1250-2800 mm
Weight	3.4 kg
Height	31 mm
Depth	33 mm
Length	max. 2800 mm
Certified in compliance with	EN1155/EN1158
CE marking for building products	Yes

2.4 Placing on the market / Application rules

For the placing on the market in the EU/EFTA (With the exception of Switzerland) the /Regulation (EU) No 305/2011/ applies. The products need a Declaration of Performance taking into consideration /EN 1155:1997/A1:2002/AC:2006 Building hardware — Electrically powered hold- open devices for swing doors — Requirements and test methods/ as well as /EN 1158:1997/A1:2002/AC:2006 Building hardware — Door coordinator devices — Requirements and test methods/ and the CE-marking.

G462 and relevant accessories are certified according to these standards. For the application and use the respective national provisions apply.

2.5 Delivery status

Guide rail G462 is delivered ready for installation, door closer units are packed in separate packages. The guide rail unit including the packaging has the following dimensions: 330mm (l) x 80mm (h) x 73mm (w).

2.6 Base materials / Ancillary materials

The primary product components and/or materials must be indicated as a percentage mass to enable the user of the EPD to understand the composition of the product in delivery status. The average composition for ASSA ABLOY G462 is as follows:

Component	Percentage in mass (%)
Aluminium	68.7
Brass	2.2
Plastics	3.2
Stainless Steel	0.8
Steel	16.8
Zinc	5.2
Electronics	0.3
Electro Mechanics	1.0
Other	1.8
Total	100.0

2.7 Manufacture

The primary manufacturing processes are made by Tier - 1 supplier and the final manufacturing processes for guide rail units occur at the factory in Joensuu, Finland.

Manufacturing of guide rail consists of aluminum extruding, component manufacturing (machined components, springs, O-rings, hold-open magnet). Final manufacturing process includes assembly, testing, painting and final packing.

Arms are processed in extruding and/or cutting, welding, painting and assembly steps. The factory of Joensuu has a certification of Quality Management system in accordance with ISO 9001:2008 standard.

Offcuts and scraps during the manufacturing process are directed to a recycling unit. Wastewater is treated on-site and waste is sent for disposal.

Waste codes according to European Waste Catalogue and Hazardous Waste List - Valid from 1 January 2002:

EWC 12 01 01 Ferrous metal filings and turnings
EWC 12 01 03 Non-ferrous metal filings and turnings
EWC 08 02 01 Waste coating powders.

2.8 Environment and health during manufacturing

ASSA ABLOY is committed to producing and distributing door opening solutions with minimal environmental impact, where health & safety is the primary focus for all employees and associates.

- Environmental operations, GHG, energy, water, waste, VOC, surface treatment and H&S are being routinely monitored. Inspections, audits, and reviews are conducted periodically to ensure that applicable standards are met and the effectiveness of the environmental management program is evaluated.

- Code of Conduct covers human rights, labor practices and decent work. Management of ASSA ABLOY is aware of their environmental roles and responsibilities, providing appropriate training, supporting accountability and recognizing outstanding performance.

- The factory of Joensuu (Abloy Oy) has certification of Environmental Management to ISO 14001:2004 standard and Occupational Health and Safety to OHSAS 18001:2007 standard.

- The factory of Joensuu strictly follows the waste hierarchy:

- Prevention
- Minimization
- Reuse
- Recycle
- Energy recovery
- Disposal

Any waste metals during machining are separated and recycled. The waste from the water-based painting process is delivered to waste treatment plant.

2.9 Product processing / Installation

G462 guide rail is distributed through and installed by trained installation technicians, such as locksmiths, carpenters etc. adhering to local/national standards and requirements.

Door and frame preparations are made in door manufacturer's production sites.

2.10 Packaging

ASSA ABLOY G462 guide rail is packed in cardboard packaging. Packaging includes two paper sheets (installation instruction and drilling template) – all of which are fully recyclable.

80% of carton is made from recycled material
100% of paper documents are made from recycled material.

Component	Percentage in mass [%]
Brass	1.1
Cardboard/paper	84.3
Plastics	3.6
Steel	11.0
Total	100.0

All materials incurred during installation are directed to a recycling unit.

Waste codes according to European Waste Catalogue and Hazardous Waste List - Valid from 1 January 2002:

EWC 15 01 01 paper and cardboard packaging
EWC 15 01 02 plastic packaging
EWC 15 01 04 metallic packaging.

2.11 Condition of use

Annual inspection is recommended in order to guarantee correct functionality of the product and the door leaf. The inspection includes: checking, fixing screws to ensure they are properly tight, correct adjustments (closing speeds, force), compliance with local legal inspection standards and greasing all the moving parts of the arm.

2.12 Environment and health during use

There is no harmful emissions potential. No damage to health or damage is expected under normal use corresponding to the intended use of the product.

2.13 Reference service life

Guide rail unit is normally installed by trained technicians. In any case the installation must be done in line with instructions provided by the manufacturer. ASSA ABLOY G462 was developed to comply with EN1155 and EN1158 standard and quality requirements. The typical life time of the product is 15-20 years, dependent on frequency of cycles.

2.14 Extraordinary effects

Fire

ASSA ABLOY G462 is tested for usage in fire and smoke protection doors according to EN1634-1.

Water

Door closers include hydraulic oil, are designed for conventional use and are not intended for flood protection. Unforeseeable flooding conditions will increase the potential for developing surface rust.

Mechanical destruction

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

2.15 Re-use stage

The following possibilities arise with reference to the material composition of the door closer.

Re-use

The product is possible to re-use during the reference service life and be moved from one door to another.

Material Recycling

The majority, by weight, of components is aluminium alloy, steel which can be recycled. The plastic components can be used for energy recovery within a waste incineration process.

Waste codes according to European Waste Catalogue and Hazardous Waste List - Valid from 1 January 2002:

EWC 16 02 13* discarded equipment containing hazardous components (2) other than those mentioned in 16 02 09 to 16 02 12

EWC 17 02 03 plastic

EWC 17 04 01 copper, bronze, brass

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.

2.16 Disposal

No disposal is foreseen for the product nor for the corresponding packaging.

2.17 Further information

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3. LCA: Calculation rules

3.1 Declared Unit

The declaration refers to the functional unit of 1 piece of guide rail G462 series as specified in Part B requirements on the EPD PCR Locks and fittings.

Declared unit

Name	Value	Unit
Declared unit	1	one piece of door closer
Conversion factor to 1 kg	0.332	-

3.2 System boundary

Type of the EPD: cradle to gate - with Options
The following life cycle stages were considered:

Production stage:

- A1 – Raw material extraction and processing
- A2 – Transport to the manufacturer and
- A3 – Manufacturing

Construction stage:

- A4 - Transport from the gate to the site
- A5 – Packaging waste processing

End-of-life stage:

- C2 – Transport to waste processing
- C3 – Waste processing
- C4 – Disposal (landfill)

This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.

- D - Declaration of all benefits or recycling potential from EOL and A5.

3.3 Estimates and assumptions

In the End-of-Life stage a scenario with collection rate of 100% for all the recyclable materials was assumed.

3.4 Cut-off criteria

In the assessment, all available data from the production process are considered, i.e. all raw materials used, auxiliary materials (e.g. lubricants), thermal energy consumption and electric power consumption - including material and energy flows contributing less than 1% of mass or energy (if available). In case a specific flow contributing less than 1% in mass or energy is not available, worst case assumption proxies are selected to represent the respective environmental impacts.

Impacts relating to the production of machines and facilities required during production are out of the scope of this assessment.

3.5 Background data

For life cycle modeling of the considered products, the GaBi 6 Software System for Life Cycle Engineering, developed by thinkstep AG, is used /GaBi 6 2013/. The GaBi-database contains consistent and documented datasets which are documented in the online GaBi-documentation /GaBi 6 2013D/. To ensure comparability of results in the LCA, the basic data of GaBi database were used for energy, transportation and auxiliary materials.

3.6 Data quality

The requirements for data quality and background data correspond to the specifications of the /IBU PCR PART A/.

thinkstep AG performed a variety of tests and checks during the entire project to ensure high quality of the completed project. This obviously includes an extensive review of project-specific LCA models as well as the background data used.

The technological background of the collected data reflects the physical reality of the declared products. The datasets are complete and conform to the system boundaries and the criteria for the exclusion of inputs and outputs.

All relevant background datasets are taken from the GaBi 6 software database. The last revision of the used background data has taken place not longer than 10 years ago.

3.7 Period under review

The period under review is 2013/14 (12 month average).

3.8 Allocation

Regarding incineration, the software model for the waste incineration plant (WIP) is adapted according to the material composition and heating value of the combusted material. In this EPD the following specific life cycle inventories for the WIP are considered:

- Waste incineration of plastic
- Waste incineration of paper
- Waste incineration of wood

Regarding the recycling material of metals, the metal parts in the EoL are declared as end-of-waste status. Thus, these materials are considered in module D. Specific information on allocation within the background data is given in the GaBi dataset documentation.

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

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND).

Installation into the building (A5)

Name	Value	Unit
Output substances following waste treatment on site (Paper packaging)	0.383	kg
Output substances following waste treatment on site (Plastics packaging)	0.016	kg
Output substances following waste treatment on site (Brass packaging)	0.005	kg
Output substances following waste treatment on site (Steel packaging)	0.050	kg

Reference service life

Name	Value	Unit
Reference service life	15-20	a

End of life (C2-C4)

Name	Value	Unit
Collected separately Aluminum, brass, electronics, electro mechanics, plastics, stainless steel, steel, zinc	2.96	kg
Collected as mixed construction waste – construction waste for landfilling	0.05	kg
Reuse plastics parts,	0.10	kg
Recycling Aluminum, brass, electronics, electro mechanics, steel, stainless steel, zinc	2.86	kg
Construction waste for landfilling	0.05	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
Collected separately waste type Guide rail (including packaging)	3.47	kg
Recycling Aluminium	59.71	%
Recycling Brass	1.93	%
Recycling Electronics	0.29	%
Recycling Electro mechanics	0.84	%
Recycling Stainless steel	0.67	%
Recycling Steel	14.59	%
Recycling Zinc	4.50	%
Thermal Treatment (plastics)	2.84	%
Loss Construction waste for landfilling (no recycling potential)	1.53	%
Reuse Packaging (paper) (from A5)	11.05	%
Reuse Packaging (plastics) (from A5)	0.47	%
Recycling Packaging (steel) (from A5)	1.44	%
Recycling Packaging (brass) (from A5)	0.14	%

5. LCA: Results

Results shown below were calculated using CML2001 – Apr. 2013 Methodology.

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 ⁽¹⁾	Refurbishment ⁽¹⁾	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	MND	MND	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 piece of G462 guide rail system

Parameter	Unit	A1 - A3	A4	A5	C2	C3	C4	D
Global warming potential	[kg CO ₂ -Eq.]	3.16E+01	1.33E-01	5.80E-01	8.32E-02	0.00E+00	2.49E-01	-1.69E+01
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	4.52E-09	5.75E-13	2.59E-12	3.98E-13	0.00E+00	7.50E-13	7.49E-09
Acidification potential of land and water	[kg SO ₂ -Eq.]	2.08E-01	1.90E-03	1.33E-04	3.81E-04	0.00E+00	6.35E-05	-9.39E-02
Eutrophication potential	[kg (PO ₄) ³⁻ - Eq.]	1.25E-02	2.40E-04	2.23E-05	8.70E-05	0.00E+00	4.81E-06	-4.40E-03
Formation potential of tropospheric ozone photochemical oxidants	[kg Ethen Eq.]	1.12E-02	-3.28E-05	9.24E-06	-1.23E-04	0.00E+00	3.08E-06	-5.19E-03
Abiotic depletion potential for non fossil resources	[kg Sb Eq.]	1.89E-03	4.42E-09	1.23E-08	3.14E-09	0.00E+00	1.65E-08	-9.73E-04
Abiotic depletion potential for fossil resources	[MJ]	3.47E+02	1.76E+00	1.68E-01	1.15E+00	0.00E+00	1.05E-01	-1.64E+02

RESULTS OF THE LCA - RESOURCE USE: 1 piece of G462 guide rail system

Parameter	Unit	A1 - A3	A4	A5	C2	C3	C4	D
Renewable primary energy as energy carrier	[MJ]	1.11E+02	-	-	-	-	-	-
Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-
Total use of renewable primary energy resources	[MJ]	1.11E+02	4.64E-02	1.53E-02	4.53E-02	0.00E+00	7.72E-03	-7.22E+01
Non renewable primary energy as energy carrier	[MJ]	4.12E+02	-	-	-	-	-	-
Non renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-
Total use of non renewable primary energy resources	[MJ]	4.12E+02	1.77E+00	1.96E-01	1.15E+00	0.00E+00	1.17E-01	-2.10E+02
Use of secondary material	[kg]	1.54E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	0.00E+00						
Use of non renewable secondary fuels	[MJ]	0.00E+00						
Use of net fresh water	[m ³]	3.10E-01	3.57E-05	1.67E-03	3.19E-05	0.00E+00	6.09E-04	-1.92E-01

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 piece of G462 guide rail system

Parameter	Unit	A1 - A3	A4	A5	C2	C3	C4	D
Hazardous waste disposed	[kg]	4.07E-02	3.32E-06	1.35E-05	2.62E-06	0.00E+00	8.19E-06	-3.41E-03
Non hazardous waste disposed	[kg]	3.18E+00	1.47E-04	1.71E-02	1.45E-04	0.00E+00	2.32E-02	-2.66E+00
Radioactive waste disposed	[kg]	2.62E-02	2.26E-06	1.11E-05	1.51E-06	0.00E+00	4.67E-06	-1.83E-02
Components for re-use	[kg]	0.00E+00						
Materials for recycling	[kg]	0.00E+00	0.00E+00	3.83E-01	0.00E+00	2.98E+00	0.00E+00	0.00E+00
Materials for energy recovery	[kg]	0.00E+00						
Exported electrical energy	[MJ]	0.00E+00	0.00E+00	7.58E-01	0.00E+00	0.00E+00	4.77E-01	0.00E+00
Exported thermal energy	[MJ]	0.00E+00	0.00E+00	2.13E+00	0.00E+00	0.00E+00	1.31E+00	0.00E+00

6. LCA: Interpretation

This chapter contains an interpretation of the Life Cycle Impact Assessment categories. Stated percentages in the whole interpretation are related to the overall life cycle, excluding credits (module D).

The production stage (modules A1-A3) contributes between 97% and 100% to the overall results for all the environmental impact assessment categories hereby considered. Within the production stage, the main contribution for all the impact categories is the production of aluminium and steel, with app. 99%, mainly due to the energy consumption on this process. Stainless steel and Brass account with app. 86% to the

overall mass of the product, therefore, the impacts are in line with the mass composition of the product. The environmental impacts for the transport (A2) have a negligible impact within this stage.

In the end-of-life stage, there are loads and benefits (module D, negative values) considered. The benefits are considered beyond the system boundaries and are declared for the recycling potential of the metals and for the credits from the incineration process (energy substitution).

7. Requisite evidence

Not applicable in this EPD.

8. References

Institut Bauen und Umwelt

Institut Bauen und Umwelt e.V., Berlin (pub.):
Generation of Environmental Product Declarations (EPDs);

General principles

for the EPD range of Institut Bauen und Umwelt e.V. (IBU), 2013-04
www.bau-umwelt.de

IBU PCR Part A

IBU PCR Part A: Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. April 2013
www.bau-umwelt.de

IBU PCR Part B

IBU PCR Part B: PCR Guidance-Texts for Building-Related Products and Services. From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU). Part B: Requirements on the EPD for Locks and fittings.
www.bau-umwelt.com

DIN EN 1154

DIN EN 1154: Building hardware - Controlled door closing devices - Requirements and test methods (includes amendment A1:2002)

DIN EN ISO 9001

DIN EN ISO 9001:2008: Quality management systems - Requirements; Trilingual version EN ISO 9001:2008

DIN EN ISO 14001

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

DIN EN 1154

DIN EN 1154 EN 1154:1996/A1:2002/AC:2006: Building hardware - Controlled door closing devices - Requirements and test methods

DIN EN 1155

DIN EN 1155 EN 1155:1997/A1:2002/AC:2006: Building hardware - Electrically powered hold-open devices for swing doors. Requirements and test methods

DIN EN 1158

DIN EN 1158 EN 1158:1997/A1:2002/AC:2006 : Building hardware - Door coordinator devices. Requirements and test methods

OHSAS 18001

OHSAS 18001:2007: Occupational health and safety management

Building hardware

Building hardware - Door fittings for use by children, elderly and disabled people in domestic and public buildings - A guide for specifiers; German version CEN/TR 15894:2009

DIN EN ISO 14025

DIN EN ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804

EN 15804:2012+A1:2014: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

GaBi 6 2013

GaBi 6 2013: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Leinfelden-Echterdingen, 1992-2013.

GaBi 6 2013D

GaBi 6 2013D: Documentation of GaBi 6: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Leinfelden-Echterdingen, 1992-2013. <http://documentation.gabi-software.com/>

REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

9. Annex

Results shown below were calculated using TRACI Methodology.

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 ⁽¹⁾	Refurbishment ⁽¹⁾	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	MND	MND	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 piece of G462 guide rail system

Parameter	Parameter	Unit	A1-3	A4	A5	C2	C3	C4	D
GWP	Global warming potential	[kg CO ₂ -Eq.]	3.16E+01	1.33E-01	5.80E-01	8.32E-02	0.00E+00	2.49E-01	-1.69E+01
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	4.81E-09	6.12E-13	2.76E-12	4.24E-13	0.00E+00	7.98E-13	7.97E-09
AP	Acidification potential of land and water	[kg SO ₂ -Eq.]	2.09E-01	2.10E-03	1.61E-04	4.98E-04	0.00E+00	7.45E-05	-8.78E-02
EP	Eutrophication potential	[kg N-eq.]	7.20E-03	8.77E-05	8.98E-06	3.52E-05	0.00E+00	2.27E-06	-2.15E-03
Smog	Ground-level smog formation potential	[kg O ₃ -eq.]	2.12E+00	3.95E-02	3.59E-03	1.02E-02	0.00E+00	5.85E-04	-7.73E-01
Resources	Resources – fossil resources	[MJ]	2.78E+01	2.53E-01	1.95E-02	1.65E-01	0.00E+00	1.09E-02	-1.44E+01

RESULTS OF THE LCA - RESOURCE USE: 1 piece of G462 guide rail system

Parameter	Parameter	Unit	A1-3	A4	A5	C2	C3	C4	D
PERE	Renewable primary energy as energy carrier	[MJ]	1.11E+02	-	-	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	1.11E+02	4.64E-02	1.53E-02	4.53E-02	0.00E+00	7.72E-03	-7.22E+01
PENRE	Non renewable primary energy as energy carrier	[MJ]	4.12E+02	-	-	-	-	-	-
PENRM	Non renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-
PENRT	Total use of non renewable primary energy resources	[MJ]	4.12E+02	1.77E+00	1.96E-01	1.15E+00	0.00E+00	1.17E-01	-2.10E+02
SM	Use of secondary material	[kg]	1.54E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	[MJ]	0.00E+00						
NRSF	Use of non renewable secondary fuels	[MJ]	0.00E+00						
FW	Use of net fresh water	[m ³]	3.10E-01	3.57E-05	1.67E-03	3.19E-05	0.00E+00	6.09E-04	-1.92E-01

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 piece of G462 guide rail system

Parameter	Parameter	Unit	A1-3	A4	A5	C2	C3	C4	D
HWD	Hazardous waste disposed	[kg]	4.07E-02	3.32E-06	1.35E-05	2.62E-06	0.00E+00	8.19E-06	-3.41E-03
NHWD	Non hazardous waste disposed	[kg]	3.18E+00	1.47E-04	1.71E-02	1.45E-04	0.00E+00	2.32E-02	-2.66E+00
RWD	Radioactive waste disposed	[kg]	2.62E-02	2.26E-06	1.11E-05	1.51E-06	0.00E+00	4.67E-06	-1.83E-02
CRU	Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
MFR	Materials for recycling	[kg]	0.00E+00	0.00E+00	3.83E-01	0.00E+00	2.98E+00	0.00E+00	-
MER	Materials for energy recovery	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
EEE	Exported electrical energy	[MJ]	0.00E+00	0.00E+00	7.58E-01	0.00E+00	0.00E+00	4.77E-01	-
EET	Exported thermal energy	[MJ]	0.00E+00	0.00E+00	2.13E+00	0.00E+00	0.00E+00	1.31E+00	-

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