

# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	ASSA ABLOY
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-ASA-20150308-IBA1-EN
Issue date	03.11.2015
Valid to	02.11.2020

**Guide rail – G-CO-S**

**ASSA ABLOY Sicherheitstechnik GmbH**

[www.bau-umwelt.com](http://www.bau-umwelt.com) / <https://epd-online.com>



## 1. General Information

<p><b>ASSA ABLOY Sicherheitstechnik GmbH</b></p> <hr/> <p><b>Programme holder</b>          IBU - Institut Bauen und Umwelt e.V.          Panoramastr. 1          10178 Berlin          Germany</p> <hr/> <p><b>Declaration number</b>          EPD-ASA-20150308-IBA1-EN</p> <hr/> <p><b>This Declaration is based on the Product Category Rules:</b>          Locks and fittings, 07.2014</p> <p>(PCR tested and approved by the independent expert committee (SVR))</p> <hr/> <p><b>Issue date</b>          03.11.2015</p> <hr/> <p><b>Valid to</b>          02.11.2020</p> <hr/> <p>          Prof. Dr.-Ing. Horst J. Bossenmayer          (President of Institut Bauen und Umwelt e.V.)</p> <hr/> <p>          Dr.-Ing. Burkhard Lehmann          (Managing Director IBU)</p>	<p><b>Guide rail – G-CO-S</b></p> <hr/> <p><b>Owner of the Declaration</b>          ASSA ABLOY Sicherheitstechnik GmbH          Bildstockstraße 20,          72458 Albstadt, Germany</p> <hr/> <p><b>Declared product / Declared unit</b>          The declaration represents 1 guide rail G-CO-S, consisting of the following items:          - A guide rail          - An integrated door coordinator          - An electro-mechanical hold open device          - An integrated smoke detector          - Accessories</p> <hr/> <p><b>Scope:</b>          This declaration and its LCA study are relevant to ASSA ABLOY G-CO-S guide rail.          The primary manufacturing processes are made by external suppliers and the final manufacturing processes and assembly for all guide rail components occur at our manufacturing factory in Albstadt, Germany. 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><b>Verification</b>          The CEN Standard EN 15804 serves as the core PCR          Independent verification of the declaration and data according to ISO 14025</p> <p><input type="checkbox"/> internally    <input checked="" type="checkbox"/> externally</p> <hr/> <p>          Dr. Wolfram Trinius          (Independent verifier appointed by SVR)</p>
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## 2. Product

### 2.1 Product description

Product name: G-CO-S guide rail.

Product characteristic: The G-CO-S guide rail is CE Marked and characterized by:

- For fire and smoke protection doors with hinge distance up to 2800 mm
- Electro-mechanical hold open device
- Traversable hold open device, continuously adjustable between ca. 80°-130°
- Continuously adjustable holding force
- Integrated 230 V power supply
- Standard installation types on the hinge side
- Same drilling template as standard guide rails
- Standard colours: silver EV1, white similar to RAL9016, stainless steel

- Mechanical door coordinator according to EN1158
- Concealed smoke detector with contamination indicator and alarm threshold monitoring
- Optical smoke detector after scattered light principle

This EPD is applicable to following products: G-CO-S. Wide range of accessories.

### 2.2 Application

The ASSA ABLOY G-CO-S guide rail can be used in private, commercial and public sectors, in both light and heavy applications:

- Fire & smoke protection doors
- For interior double leaf doors
- For exterior double leaf doors

## 2.3 Technical Data

The declared door closer has the following technical specifications and is applicable to doors with the following technical data, with reference to the test standard.

### Technical data

Name	Value
Door width up to	2800 mm
Fire and smoke protections	Yes
DIN door swing directions	double door application
Hold-open angle	between 80° - 130°
Power supply	230 V supply voltage
Continuous duty	100% G-E:100% ED
Class of protection	IP20
Weight	5 kg
Height	30 mm
Depth	58 mm
Length	depending on overall door width
Certified in compliance with	EN1155 and EN1158
CE marking for building products	Yes

## 2.4 Placing on the market / Application rules

For the marketing in the EU/EFTA (with the exception of Switzerland) the Regulation (EU) No 305/2011 dated from 9 March 2011 applies.

The products need a Declaration of Performance taking into consideration /EN 1155:1997/A1:2002/AC:2006/ – Building hardware. Electro-mechanical hold-open devices for swing doors,

/EN 1158:1997/A1:2002/AC:2006/ – Building hardware. Door coordinator and the CE-marking.

G-CO-S and relevant accessories are certified according to these standards.

For the application and use the respective national provisions apply.

## 2.5 Delivery status

The ASSA ABLOY G-CO-S guide rail is delivered ready for installation. The guide rail unit including the packaging has the following max.dimensions: 1,500mm x 150mm x 80mm.

## 2.6 Base materials / Ancillary materials

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The average composition for the ASSA ABLOY G-CO-S, including the guide rail arm is as following:

Component	Percentage in mass (%)
Aluminium	38.23
Copper	0.10
Plastics	4.17
Stainless Steel	2.73
Steel	40.84
Zinc	9.03
Electronic	3.90
Other	1.00
Total	100.0

## 2.7 Manufacture

The primary manufacturing processes are made by Tier 1 suppliers and the final manufacturing processes occur at the ASSA ABLOY Sicherheitstechnik GmbH

factory in Albstadt, Germany. The components typically come from processes such as extrusion (in the case of aluminium), stamping (in the case of steel), turning (in the case of steel), castings (in the case of zinc and steel). Final assembly takes place in Germany.

The factory of ASSA ABLOY Sicherheitstechnik GmbH has a Quality Management system in accordance with ISO 9001:2008.

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

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 Environmental 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 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, labour 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 ASSA ABLOY Sicherheitstechnik GmbH has certification of Environmental Management according to ISO 14001:2004 and Occupational Health and Safety according to OHSAS 18001:2007.

## 2.9 Product processing/installation

The ASSA ABLOY G-CO-S 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 can be made in door manufacturer's production sites.

## 2.10 Packaging

The ASSA ABLOY G-CO-S 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 (%)
Cardboard/paper	100.0

Total	100.0
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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.

## 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 emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product.

## 2.13 Reference service life

The ASSA ABLOY G-CO-S is developed to comply with EN1155 & EN1158 standard requirements. The typical life time of a G-CO-S is 15-20 years, dependent on frequency of cycles.

## 2.14 Extraordinary effects

### Fire

ASSA ABLOY G-CO-S is tested for use in fire and smoke protection doors according to EN1634-1.

### Water

Door closers include hydraulic oil and 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 product is possible to re-use during the reference service life and be moved from one door to another. The majority, by weight, of components is aluminium alloy and 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

Product parts and components that cannot be clearly separated or recyclable are landfilled.

## 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 G-CO-S guide rail as specified in Part B requirements on the EPD PCR Locks and fittings.

#### Declared unit

Name	Value	Unit
Declared unit	1	One piece of guide rail
Conversion factor to 1 kg	0.196	-

### 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

Use stage:

- B6 – Operational energy use

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 modelling 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.

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)	0.96	kg

### Reference service life

Name	Value	Unit
Reference service life	15	a

### Operational energy use (B6)

Name	Value	Unit
Electricity consumption	207.4	kWh
Days per year in use	365	Days
Hours per day in on mode	8	h
Hours per day stand-by mode	16	h
Power consumption on mode	6	W
Power consumption stand-by mode	2.4	W

### End of life (C2-C4)

Name	Value	Unit
Collected separately aluminium, copper, plastics, stainless steel, steel, zinc, electronics	5.053	kg
Collected as mixed construction waste – construction waste for landfilling	0.051	kg
Reuse plastics parts	0.213	kg
Recycling aluminium, copper, stainless steel, steel, zinc, electronics	4.84	kg
Construction waste for landfilling	0.051	kg

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

Name	Value	Unit
Collected separately waste type guide rail (including packaging)	6.06	kg
Recycling Aluminium	32.20	%
Recycling Copper	0.08	%
Recycling Stainless steel	2.30	%
Recycling Steel	34.40	%
Recycling Zinc	7.60	%
Recycling Electronic	3.29	%
Thermal Treatment (plastics)	3.52	%
Loss Construction waste for landfilling (no recycling potential)	0.84	%
Reuse Packaging (paper) (from A5)	15.77	%

## 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 <sup>(1)</sup>	Refurbishment <sup>(1)</sup>	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	X	X

### RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 piece of G-CO-S guide rail

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
GWP	Global warming potential	[kg CO <sub>2</sub> -Eq.]	4.35E+01	1.01E-01	1.35E+00	2.22E+02	1.01E-01	7.12E-03	3.89E-01	-2.31E+01
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	6.46E-09	4.84E-13	6.19E-12	1.52E-07	4.84E-13	4.88E-12	1.18E-12	8.17E-09
AP	Acidification potential of land and water	[kg SO <sub>2</sub> -Eq.]	2.64E-01	4.62E-04	3.09E-04	1.04E+00	4.62E-04	3.36E-05	1.16E-04	-1.21E-01
EP	Eutrophication potential	[kg (PO <sub>4</sub> ) <sup>3-</sup> -Eq.]	1.78E-02	1.06E-04	5.38E-05	5.88E-02	1.06E-04	1.89E-06	1.19E-05	-6.11E-03
POCP	Formation potential of tropospheric ozone photochemical oxidants	[kg Ethen Eq.]	1.65E-02	-1.49E-04	2.19E-05	6.21E-02	-1.49E-04	2.00E-06	6.46E-06	-7.85E-03
ADPE	Abiotic depletion potential for non fossil resources	[kg Sb Eq.]	5.51E-03	3.81E-09	2.44E-08	3.07E-05	3.81E-09	9.86E-10	3.41E-08	-2.67E-03
ADPF	Abiotic depletion potential for fossil resources	[MJ]	4.98E+02	1.39E+00	3.79E-01	2.52E+03	1.39E+00	8.09E-02	1.96E-01	-2.27E+02

### RESULTS OF THE LCA - RESOURCE USE: 1 piece of G-CO-S guide rail

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
PERE	Renewable primary energy as energy carrier	[MJ]	1.42E+02	-	-	-	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	1.42E+02	5.49E-02	3.54E-02	7.21E+02	5.49E-02	2.32E-02	1.62E-02	-8.62E+01
PENRE	Non renewable primary energy as energy carrier	[MJ]	5.73E+02	-	-	-	-	-	-	-
PENRM	Non renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PENRT	Total use of non renewable primary energy resources	[MJ]	5.73E+02	1.40E+00	4.44E-01	3.94E+03	1.40E+00	1.27E-01	2.19E-01	-2.83E+02
SM	Use of secondary material	[kg]	1.02E+00	0.00E+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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of non renewable secondary fuels	[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
FW	Use of net fresh water	[m <sup>3</sup> ]	3.39E-01	3.88E-05	3.94E-03	1.78E+00	3.88E-05	5.72E-05	9.75E-04	-2.37E-01

### RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 piece of G-CO-S guide rail

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
HWD	Hazardous waste disposed	[kg]	4.45E-02	3.19E-06	3.06E-05	5.46E-01	3.19E-06	1.76E-05	1.80E-05	-4.04E-03
NHWD	Non hazardous waste disposed	[kg]	5.51E+00	1.76E-04	3.40E-02	1.27E+00	1.76E-04	4.09E-05	1.50E-01	-2.82E+00
RWD	Radioactive waste disposed	[kg]	2.98E-02	1.83E-06	2.60E-05	5.68E-01	1.83E-06	1.83E-05	9.05E-06	-2.22E-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	0.00E+00	0.00E+00
MFR	Materials for recycling	[kg]	0.00E+00	0.00E+00	9.56E-01	0.00E+00	0.00E+00	4.68E+00	0.00E+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	0.00E+00	0.00E+00
EEE	Exported electrical energy	[MJ]	0.00E+00	0.00E+00	1.71E+00	0.00E+00	0.00E+00	0.00E+00	6.81E-01	0.00E+00
EET	Exported thermal energy	[MJ]	0.00E+00	0.00E+00	4.83E+00	0.00E+00	0.00E+00	0.00E+00	1.87E+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 from 4% to 23% to the overall results for all the environmental impact assessment categories hereby considered. Except for the abiotic depletion potential (ADPE) where the contribution from the production stage accounts for almost 99%. This impact category describes the reduction of the global amount of non-renewable raw materials, therefore, as expected, it is mainly related with the extraction of raw materials (A1).

Within the production stage, the main contribution for all the impact categories is the production of steel and Aluminium mainly due to the energy consumption on this process. Aluminium and steel account with app. 79% 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.

To reflect the use stage (module B6), the energy consumption was included and it has a major contribution for all the impact assessment categories considered - between 76% and 96%, with the exception of ADPE (1%). This is a result of 8 hours of operation in on mode and 16 hour in stand-by mode per day and per 365 days in a year.

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](http://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](http://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](http://www.bau-umwelt.com)

### 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 1155

DIN EN 1155:2006-06: 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, Corrigenda to DIN EN 1155:2003-04; German version EN 1155:1997/AC:2006

### DIN EN 1158

EN 1158:1997/A1:2002/AC:2006: Building hardware - Door coordinator devices - Requirements and test methods (includes amendment A1:2002); German version EN 1158:1997 + A1:2002

### DIN EN 1634-1

Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware - Part 1: Fire resistance test for door and shutter assemblies and openable windows; German version FprEN 1634-1:2012

### 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 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/>

**OHSAS 18001**

OHSAS 18001:2007: Occupational health and safety management.

## 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 <sup>(1)</sup>	Refurbishment <sup>(1)</sup>	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	X	X	

### RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 piece of G-CO-S guide rail

Parameter	Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
GWP	Global warming potential	[kg CO <sub>2</sub> -Eq.]	4.35E+01	1.01E-01	1.35E+00	2.22E+02	1.01E-01	7.12E-03	3.89E-01	-2.31E+01
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	6.89E-09	5.14E-13	6.58E-12	1.61E-07	5.14E-13	5.19E-12	1.26E-12	8.69E-09
AP	Acidification potential of land and water	[kg SO <sub>2</sub> -Eq.]	2.60E-01	6.04E-04	3.74E-04	9.89E-01	6.04E-04	3.18E-05	1.36E-04	-1.14E-01
EP	Eutrophication potential	[kg N-eq.]	1.20E-02	4.27E-05	2.15E-05	4.21E-02	4.27E-05	1.35E-06	5.77E-06	-3.26E-03
Smog	Ground-level smog formation potential	[kg O <sub>3</sub> -eq.]	2.91E+00	1.24E-02	8.73E-03	8.96E+00	1.24E-02	2.88E-04	1.67E-03	-1.07E+00
Resources	Resources – fossil resources	[MJ]	4.01E+01	2.00E-01	4.45E-02	1.79E+02	2.00E-01	5.76E-03	2.05E-02	-1.75E+01

### RESULTS OF THE LCA - RESOURCE USE: 1 piece of G-CO-S guide rail

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
PERE	Renewable primary energy as energy carrier	[MJ]	1.42E+02	-	-	-	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	1.42E+02	5.49E-02	3.54E-02	7.21E+02	5.49E-02	2.32E-02	1.62E-02	-8.62E+01
PENRE	Non renewable primary energy as energy carrier	[MJ]	5.73E+02	-	-	-	-	-	-	-
PENRM	Non renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PENRT	Total use of non renewable primary energy resources	[MJ]	5.73E+02	1.40E+00	4.44E-01	3.94E+03	1.40E+00	1.27E-01	2.19E-01	-2.83E+02
SM	Use of secondary material	[kg]	1.02E+00	0.00E+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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of non renewable secondary fuels	[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
FW	Use of net fresh water	[m <sup>3</sup> ]	3.39E-01	3.88E-05	3.94E-03	1.78E+00	3.88E-05	5.72E-05	9.75E-04	-2.37E-01

### RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 piece of G-CO-S guide rail

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
HWD	Hazardous waste disposed	[kg]	4.45E-02	3.19E-06	3.06E-05	5.46E-01	3.19E-06	1.76E-05	1.80E-05	-4.04E-03
NHWD	Non hazardous waste disposed	[kg]	5.51E+00	1.76E-04	3.40E-02	1.27E+00	1.76E-04	4.09E-05	1.50E-01	-2.82E+00
RWD	Radioactive waste disposed	[kg]	2.98E-02	1.83E-06	2.60E-05	5.68E-01	1.83E-06	1.83E-05	9.05E-06	-2.22E-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	0.00E+00	-
MFR	Materials for recycling	[kg]	0.00E+00	0.00E+00	9.56E-01	0.00E+00	0.00E+00	4.68E+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	0.00E+00	-
EEE	Exported electrical energy	[MJ]	0.00E+00	0.00E+00	1.71E+00	0.00E+00	0.00E+00	0.00E+00	6.81E-01	-
EET	Exported thermal energy	[MJ]	0.00E+00	0.00E+00	4.83E+00	0.00E+00	0.00E+00	0.00E+00	1.87E+00	-

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